INTERNATIONAL PACIFIC HALIBUT COMMISSION

IPHC–2021–AM097–00
Last Update: 11 February 2021

97th Session of the IPHC Annual Meeting (AM097) – *Compendium of meeting documents*

25 – 29 January 2021, Seattle, WA, USA

Commissioners

Canada	United States of America
Paul Ryall	Glenn Merrill
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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INTERNATIONAL PACIFIC HALIBUT COMMISSION

11 February 2021

IPHC CIRCULAR 2021-004

SUBJECT:
REPORT OF THE 97th SESSION OF THE IPHC ANNUAL MEETING (AM097)

Dear Commissioners,

In accordance with Rule 15 (Reports and Records) of the IPHC Rules of Procedure (2021), I am pleased to provide you with a link to the final Report of the 97th Session of the IPHC Annual Meeting (AM097), recently held electronically from the IPHC Headquarters in Seattle, Washington, USA:

- 97th Session of the IPHC Annual Meeting (AM097) (IPHC-2021-AM097-R): adopted on 11 February 2021

All supporting documents, presentations, and webinar recordings may be accessed via the meeting webpage: https://www.iphc.int/venues/details/97th-session-of-the-iphc-annual-meeting-am097

Yours sincerely

David T. Wilson, Ph.D.
Executive Director, IPHC

Attachments:
Nil

AGENDA & SCHEDULE FOR THE 97th SESSION OF THE IPHC ANNUAL MEETING (AM097)

Date: 25-29 January 2021
Location: Electronic
Venue: Electronic platform
Time: 25 Jan: 12:30-17:30;
26-29 Jan: 09:00-17:00 daily
Chairperson: Mr Paul Ryall (Canada)
Vice-Chairperson: Vacant (USA)

Notes:
- ***Document deadline**: 26 December 2020 (30 days prior to the opening of the Session)*
- *All sessions are open to observers and the general public, unless the Commission specifically decides otherwise.*
- *All open sessions will be webcast. Webcast sessions will also take audience comments and questions as directed by the Chairperson of the Commission.*

AGENDA FOR THE 97th SESSION OF THE IPHC ANNUAL MEETING (AM097)

1. **OPENING OF THE SESSION** (Chairperson)

2. **ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE SESSION** (Chairperson)

3. **IPHC PROCESS**
   - 3.1 Update on actions arising from the 96th Session of the IPHC Annual Meeting (AM096), 96th Session of the IPHC Interim Meeting (IM096), and 2020 Intersessional Decisions (D. Wilson)
   - 3.2 Report of the IPHC Secretariat (2020) (D. Wilson)
   - 3.3 2nd IPHC Performance Review (PRIPHC02): Implementation of recommendations (D. Wilson)

4. **STATE OF THE FISHERY (2020)** (L. Erikson)

5. **STOCK STATUS OF PACIFIC HALIBUT (2020) & HARVEST DECISION TABLE (2021)**
   - 5.1 IPHC Fishery-Independent Setline Survey (FISS) (2020) (L. Erikson)
   - 5.2 Space-time modelling of survey data and FISS designs for 2021-23 (R. Webster)
   - 5.3 Stock Assessment: Data overview and stock assessment (2020), and harvest decision table (2021) (I. Stewart)
   - 5.4 Pacific halibut mortality projections using the IPHC mortality projection tool (2021) (I. Stewart)
   - 5.5 Size limit review (I. Stewart)

6. IPHC SCIENCE AND RESEARCH
- 6.1 IPHC 5-year Biological and Ecosystem Science Research Plan (2017-21): update (J. Planas)

7. REPORT OF THE 21st SESSION OF THE IPHC RESEARCH ADVISORY BOARD (RAB020) (J. Planas)

8. REPORTS OF THE IPHC SCIENTIFIC REVIEW BOARD (S. Cox)

9. MANAGEMENT STRATEGY EVALUATION
- 9.1 IPHC Management Strategy Evaluation: update (A. Hicks)
- 9.2 Reports of the IPHC Management Strategy Advisory Board (A. Kaiser)

10. IPHC FISHERY REGULATIONS: PROPOSALS FOR THE 2020-21 PROCESS
- 10.1 IPHC Secretariat fishery regulation proposals (L. Erikson)
- 10.2 Contracting Party fishery regulation proposals (Contracting Parties)
- 10.3 Other Stakeholder fishery regulation proposals (Stakeholders)
- 10.4 Stakeholder statements (L. Erikson)

11. CONTRACTING PARTY NATIONAL REPORTS
- 11.1 Canada (TBA)
- 11.2 United States of America (TBA)

12. PACIFIC HALIBUT FISHERY ECONOMICS UPDATE (B. Hutniczak)

13. REPORT OF THE 97th SESSION OF THE IPHC FINANCE AND ADMINISTRATION COMMITTEE (FAC097) (D. Wilson)

14. REPORT OF THE 91st SESSION OF THE IPHC CONFERENCE BOARD (CB091) (CB Co-Chairpersons)

15. REPORT OF THE 26th SESSION OF THE IPHC PROCESSOR ADVISORY BOARD (PAB026) (PAB Chairperson)

16. OTHER BUSINESS
- 16.1 IPHC meetings calendar (2021-23) (D. Wilson)
- 16.2 Election of Chairperson and Vice-Chairperson for the next year (D. Wilson)

17. REVIEW OF THE DRAFT AND ADOPTION OF THE REPORT OF THE 97th SESSION OF THE IPHC ANNUAL MEETING (AM097) (Chairperson)

SCHEDULE FOR THE 97th SESSION OF THE IPHC ANNUAL MEETING (AM097)

Monday, 25 January 2021		
Time	**Agenda item**	**Lead (support)**
	97th Session of the IPHC Annual Meeting (AM097): *Virtual Room link:* *TBA*	
Time	**Agenda item**	**Lead (support)**
12:30-12:40	1. Opening of the Session	P. Ryall
12:40-12:50	2. Adoption of the agenda and arrangements for the Session ➢ ***IPHC-2021-AM097-01***: *Agenda & Schedule for the 97th Session of the IPHC Annual Meeting (AM097)* ➢ ***IPHC-2021-AM097-02***: *List of Documents for the 97th Session of the IPHC Annual Meeting (AM097)*	P. Ryall (D. Wilson)
12:50-13:10	3. IPHC Process 3.1 Update on actions arising from the 96th Session of the IPHC Annual Meeting (AM096), 96th Session of the IPHC Interim Meeting (IM096) and 2020 Intersessional decisions ➢ ***IPHC-2021-AM097-03***: *Update on actions arising from the 96th Session of the IPHC Annual Meeting (AM096), 96th Session of the IPHC Interim Meeting (IM096) and 2020 Intersessional decisions* ➢ ***IPHC-2020-IM096-R***: *Report of the 96th Session of the IPHC Interim Meeting (IM096)* 3.2 Report of the IPHC Secretariat (2020) ➢ ***IPHC-2021-AM097-04***: *Report of the IPHC Secretariat (2020)* 3.3 Report of the 2nd IPHC Performance Review (PRIPHC02) ➢ ***IPHC-2021-AM097-13***: *Implementation of the recommendations from the 2nd IPHC Performance Review (PRIPHC02)*	D. Wilson
13:10-13:30	4. State of the Fishery (2020) ➢ ***IPHC-2021-AM097-05***: *State of the Fishery (2020)*	L. Erikson
13:45-14:00	5. Stock status of Pacific halibut (2020) and harvest decision table (2021) 5.1 IPHC Fishery Independent Setline Survey (FISS) (2020)	L. Erikson

	➢ ***IPHC-2021-AM097-06:*** *IPHC Fishery-Independent Setline Survey (FISS) implemented in 2020*	
14:00-14:45	5.2 Space-time modelling of survey data and FISS designs for 2021-23 ➢ ***IPHC-2021-AM097-07:*** Space-time modelling of survey data and FISS designs for 2021-23	R. Webster
15:00-15:30	5.3 Stock Assessment: Data overview and stock assessment (2020), and harvest decision table (2021) ➢ ***IPHC-2021-AM097-08:*** *Stock Assessment: Summary of the data, stock assessment, and harvest decision table for Pacific halibut (Hippoglossus stenolepis) at the end of 2020*	I. Stewart
15:30-15:45	Break	
15:45-17:00	5.4 Pacific halibut mortality projections using the IPHC mortality projection tool (2021) ➢ ***IPHC-2021-AM097-INF02***: The IPHC mortality projection tool for 2021 (and 2022) mortality limits 5.5 Size limit review ➢ ***IPHC-2021-AM097-09***: *Evaluation of directed commercial fishery size limits in 2020*	I. Stewart
17:00-17:30	*Public comment and questions **(Agenda items 4-5)***	Chairperson
Tuesday, 26 January 2021		
Time	**Agenda item**	**Lead (support)**
	97th Session of the IPHC Annual Meeting (AM097) cont.: *Virtual Room link: TBA*	
09:00-09:30	6. IPHC Science and Research 6.1 IPHC 5-year Biological & Ecosystem Science Research Plan (2017-21): update ➢ ***IPHC-2021-AM097-10***: *IPHC 5-year Biological and Ecosystem Science Research Plan (2017-21): update*	J. Planas
09:30-09:40	7. Report of the 21st Session of the IPHC Research Advisory Board (RAB021) ➢ ***IPHC-2020-RAB021-R***: *Report of the 21st Session of the IPHC Research Advisory Board (RAB021)*	J. Planas
09:40-09:55	8. Reports of the IPHC Scientific Review Board ➢ ***IPHC-2020-SRB016-R***: *Report of the 16th Session of the IPHC Scientific Review Board (SRB016)*	S.Cox

	➢ ***IPHC-2020-SRB017-R***: *Report of the 17th Session of the IPHC Scientific Review Board (SRB017)*	
09:55-10:40	9. Management strategy evaluation 9.1 IPHC Management Strategy Evaluation update ➢ ***IPHC-2021-AM097-11***: *Management Strategy Evaluation results for distribution management procedures*	A. Hicks
10:40-10:50	Break	
10:40-10:55	9.2 Reports of the IPHC Management Strategy Advisory Board ➢ ***IPHC-2020-MSAB015-R:*** *Report of the 15th Session of the IPHC Management Strategy Advisory Board (MSAB015)* ➢ ***IPHC-2020-MSAB016-R:*** *Report of the 16th Session of the IPHC Management Strategy Advisory Board (MSAB016)*	MSAB Co-Chairpersons
10:55-11:30	10. IPHC Fishery Regulations: Proposals for the 2020-21 process ➢ ***IPHC-2021-AM097-12:*** *IPHC Fishery Regulations: Proposals for the 2020-21 process and implementation notes* 10.1 IPHC Secretariat fishery regulation proposals ➢ ***IPHC-2021-AM097-PropA1***: *Mortality and Fishery Limits (Sect. 5)* ➢ ***IPHC-2021-AM097-PropA2***: *Commercial Fishing Periods (Sect. 9)* ➢ ***IPHC-2021-AM097-PropA3***: *IPHC Fishery Regulations: minor amendments* 10.2 Contracting Party fishery regulation proposals ➢ ***IPHC-2021-AM097-PropB1:*** *Charter Management Measures in IPHC Regulatory Areas 2C and 3A (Sect. 29)* 10.3 Other Stakeholder fishery regulation proposals 10.4 Stakeholder statements ➢ ***IPHC-2021-AM097-INF01:*** *Stakeholder statements on IPHC fishery regulation proposals for 2021*	L. Erikson L. Erikson *USA: NOAA-Fisheries* Stakeholders Stakeholders
11:30-11:40	11. Contracting Party: National Reports 11.1 Canada ➢ ***IPHC-2021-AM097-NR01:*** *Canada*	Canada
11:40-11:50	11.2 United States of America ➢ ***IPHC-2021-AM097-NR02:*** *USA*	USA
11:50-12:10	12. Pacific halibut fishery economics update ➢ ***IPHC-2021-AM097-14***: *Pacific Halibut Multiregional Economic Impact Assessment (PHMEIA): summary of progress (B. Hutniczak)*	B. Hutniczak
11:50-12:30	*Public comment and questions* ***(Agenda Items 6-12)***	P. Ryall

12:30-13:30	Lunch	
13:30-14:00	13. Report of the 97th Session of the IPHC Finance and Administration Committee (FAC097) ➢ ***IPHC-2021-FAC097-R:*** *Report of the 97th Session of the IPHC Finance and Administration Committee (FAC097)*	D. Wilson (K. Jernigan)
14:00-17:00	No AM097 Session: Commissioner opportunity to caucus and/or listen to CB/PAB proceedings	
Wednesday, 27 January 2021		
Time	**Agenda item**	**Lead (support)**
09:00-17:00	No AM097 Session: Commissioner opportunity to caucus and/or listen to CB/PAB proceedings	
Thursday, 28 January 2021		
97th Session of the IPHC Annual Meeting (AM097) cont.: *Virtual Room link:* *TBA*		
09:00-12:30	No AM097 Session: Commissioner opportunity to caucus and/or listen to CB/PAB proceedings	
12:30-13:30	Lunch	
13:30-14:15	14. Report of the 91st Session of the IPHC Conference Board (CB091) ➢ ***IPHC-2021-CB091-R****: Report of the 91st Session of the IPHC Conference Board (CB091)*	CB Co-Chairpersons
14:15-15:30	15. Report of the 26th Session of the IPHC Processor Advisory Board (PAB026) ➢ ***IPHC-2021-PAB026-R****: Report of the 26th Session of the IPHC Processor Advisory Board (PAB026)*	PAB Chairperson
15:30-15:45	Break	
15:45-17:00	Revisit Regulatory proposals for 2021: for decision (Agenda item 10)	L. Erikson
Friday, 29 January 2021		
97th Session of the IPHC Annual Meeting (AM097) cont.: *Virtual Room link:* *TBA*		
09:00-10:00	Revisit Regulatory proposals for 2021: for decision (Agenda item 10)	L. Erikson

10:00-10:30	Mortality limits for 2021: For decision/announcement (Agenda Item 10)	P. Ryall
10:30-10:45	Break	
10:45-11:30	Revisit final mortality projections based on adopted mortality limits for 2021	D. Wilson
11:30-12:30	16. Other business 16.1 IPHC meetings calendar (2021-23) ➢ ***IPHC-2021-AM097-15:*** *IPHC 3-year meetings calendar (2021-23)* 16.2 Election of a Chairperson and Vice-Chairperson for the next year	 D. Wilson D. Wilson
12:30-13:30	Lunch	
13:30-17:00	17. Review of the draft and adoption of the Report of the 97th Session of the IPHC Annual Meeting (AM097)	P. Ryall (D. Wilson)

LIST OF DOCUMENTS FOR THE 97th SESSION OF THE IPHC ANNUAL MEETING (AM097)

Meeting documents	Title	Availability
IPHC-2021-AM097-01	Agenda & Schedule for the 97th Session of the IPHC Annual Meeting (AM097)	✓ 27 Oct 2020 ✓ 22 Dec 2020 ✓ 05 Jan 2021
IPHC-2021-AM097-02	List of Documents for the 97th Session of the IPHC Annual Meeting (AM097)	✓ 27 Oct 2020 ✓ 15 Dec 2020 ✓ 28 Jan 2021
IPHC-2021-AM097-03	Update on actions arising from the 96th Session of the IPHC Annual Meeting (AM096), 96th Session of the IPHC Interim Meeting (IM096) and 2020 Intersessional decisions (D. Wilson)	✓ 15 Dec 2020
IPHC-2021-AM097-04	Report of the IPHC Secretariat (2020) (D. Wilson, L. Erikson)	✓ 15 Dec 2020
IPHC-2021-AM097-05 Rev_1	State of the Fishery (2020) (L. Erikson & H. Tran)	✓ 17 Dec 2020 ✓ 08 Jan 2021
IPHC-2021-AM097-06	IPHC Fishery-Independent Setline Survey (FISS) design and implementation in 2020 (L. Erikson & K. Ualesi)	✓ 17 Dec 2020
IPHC-2021-AM097-07	Space-time modelling of survey data and FISS designs for 2021-23 (R. Webster)	✓ 22 Dec 2020
IPHC-2021-AM097-08	Stock Assessment: Summary of the data, stock assessment, and harvest decision table for Pacific halibut (*Hippoglossus stenolepis*) at the end of 2020 (I. Stewart, A. Hicks, R. Webster & D. Wilson)	✓ 15 Dec 2020
IPHC-2021-AM097-09	Evaluation of directed commercial fishery size limits in 2020 (I. Stewart, A. Hicks & B. Hutniczak)	✓ 15 Dec 2020
IPHC-2021-AM097-10	IPHC 5-year Biological and Ecosystem Science Research Plan (2017-21): update (J. Planas)	✓ 15 Dec 2020
IPHC-2021-AM097-11	IPHC Management Strategy Evaluation for Pacific halibut (*Hippoglossus stenolepis*) (A. Hicks, P. Carpi, I. Stewart & S. Berukoff)	✓ 18 Dec 2020
IPHC-2021-AM097-12 Rev_1	IPHC Fishery Regulations: Proposals for the 2020-21 process and associated implementation notes (D. Wilson & L. Erikson)	✓ 23 Dec 2020 ✓ 21 Jan 2021
IPHC-2021-AM097-13	Implementation of the recommendations from the 2nd IPHC Performance Review (PRIPHC02) (D. Wilson)	✓ 15 Dec 2020

IPHC-2021-AM097-14	Pacific Halibut Multiregional Economic Impact Assessment (PHMEIA): summary of progress (B. Hutniczak)	✓ 22 Dec 2020
IPHC-2021-AM097-15 Rev_1	IPHC 3-year meetings calendar (2021-22) (IPHC Secretariat)	✓ 15 Dec 2020 ✓ 25 Jan 2021
Contracting Party National Reports		
IPHC-2021-AM097-NR01	National Report 2020: Canada	✓ 23 Dec 2020
IPHC-2021-AM097-NR02 Rev_1	National Report 2020: United States of America	✓ 23 Dec 2020 ✓ 11 Jan 2021
Fishery Regulation proposals for 2021		
IPHC Secretariat fishery regulation proposals for 2021		
IPHC-2021-AM097-PropA1	Mortality and Fishery Limits (Sect. 5) (IPHC Secretariat)	✓ 15 Dec 2020
IPHC-2021-AM097-PropA2	Commercial Fishing Periods (Sect. 9) (IPHC Secretariat)	✓ 15 Dec 2020
IPHC-2021-AM097-PropA3	IPHC Fishery Regulations: minor amendments (IPHC Secretariat)	✓ 16 Dec 2020
Contracting Party fishery regulation proposals for 2021		
IPHC-2021-AM097-PropB1	Charter Management Measures in IPHC Regulatory Areas 2C and 3A (Sect. 29) (USA: NOAA-Fisheries)	✓ 18 Dec 2020
Other Stakeholder fishery regulation proposals for 2021		
IPHC-2021-AM097-PropC1 Rev_1	Commercial Fishing Periods (Sect. 9) (W. Connor, R. Hauknes)	✓ 23 Dec 2020 ✓ 15 Jan 2021
Information papers		
IPHC-2021-AM097-INF01 Rev_1	Stakeholder statements on fishery regulation proposals for 2021 (IPHC Secretariat)	✓ 15 Jan 2021 ✓ 25 Jan 2021
IPHC-2021-AM097-INF02	The IPHC mortality projection tool for 2021 (and 2022) mortality limits (I. Stewart)	✓ 15 Dec 2020
IPHC-2021-AM097-INF03	The IPHC MSE Explorer tool (A. Hicks & P. Carpi)	✓ 15 Dec 2020
IPHC-2021-AM097-INF04 Rev_3	IPHC Financial Regulations (2021) - Draft (D. Wilson & K. Jernigan)	✓ 25 Jan 2021 ✓ 26 Jan 2021 ✓ 27 Jan 2021
IPHC-2021-AM097-INF05	Commercial Fisheries (Sect. 9) (USA: NOAA-Fisheries)	✓ 28 Jan 2021
Reports from IPHC subsidiary bodies (2020/21)		
IPHC-2020-RAB021-R	Report of the 21st Session of the IPHC Research Advisory Board (RAB021)	✓ 27 Feb 2020

IPHC-2020-SRB016-R	Report of the 16th Session of the IPHC Scientific Review Board (SRB016)	✓ 26 Jun 2020
IPHC-2020-SRB017-R	Report of the 17th Session of the IPHC Scientific Review Board (SRB017)	✓ 25 Sept 2020
IPHC-2020-MSAB015-R	Report of the 15th Session of the IPHC Management Strategy Advisory Board (MSAB015)	✓ 15 May 2020
IPHC-2020-MSAB016-R	Report of the 16th Session of the IPHC Management Strategy Advisory Board (MSAB016)	✓ 23 Oct 2020
IPHC-2020-IM096-R	Report of the 96th Session of the IPHC Interim Meeting (IM096)	✓ 02 Dec 2020
IPHC-2021-FAC097-R	Report of the 97th Session of the IPHC Finance and Administration Committee (FAC097)	✓ 28 Jan 2021
IPHC-2021-CB091-R	Report of the 91st Session of the IPHC Conference Board (CB091)	✓ 28 Jan 2021
IPHC-2021-PAB026-R	Report of the 26th Session of the IPHC Processor Advisory Board (PAB026)	✓ 28 Jan 2021

INTERNATIONAL PACIFIC HALIBUT COMMISSION

Update on actions arising from the 96th Session of the IPHC Annual Meeting (AM096), 96th Session of the IPHC Interim Meeting (IM096) and 2020 Intersessional decisions

PREPARED BY: IPHC SECRETARIAT (D. WILSON; 15 DECEMBER 2020)

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 during the 96th Session of the IPHC Annual Meeting (AM096), 96th Session of the IPHC Interim Meeting (IM096) and 2020 Intersessional decisions.

BACKGROUND

At the 96th Session of the IPHC Annual Meeting (AM096), 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, following amendments to the IPHC Rules of Procedure in 2019 and again in 2020, the Commission possesses a clear process for inter-sessional decision making and tracking. Throughout 2020, the Commission made a number of inter-sessional decisions with the aim of improving governance and responsiveness of the organisation, as detailed in Appendix B.

At the 96th Session of the IPHC Interim Meeting (IM096), Contracting Parties agreed on an additional series of actions to be taken by Commissioners, subsidiary bodies, and the IPHC Secretariat on a range of issues as detailed in Appendix C.

DISCUSSION

Noting that best practice governance requires the prompt delivery of core tasks assigned to the IPHC Secretariat by the Commission, at each subsequent session of the Commission and its subsidiary bodies, attempts will be made to ensure that 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-2021-AM097-03, 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 during the 96th Session of the IPHC Annual

Meeting (AM096), 96th Session of the IPHC Interim Meeting (IM096) and 2020 Intersessional decisions.

APPENDICES

Appendix A: Update on actions arising from the 96th Session of the IPHC Annual Meeting (AM096: February 2020)

Appendix B: 2020 Inter-sessional decisions of the Commission

Appendix C: Update on actions arising from the 96th Session of the IPHC Interim Meeting (IM096: November 2020)

APPENDIX A

Update on actions arising from the 96th Session of the IPHC Annual Meeting (AM096: February 2020)

96th Session of the IPHC Annual Meeting (AM096)		
Action No.	**Description**	**Update**
RECOMMENDATIONS		
AM096–Rec.01 (para. 31)	***Space-time modelling of IPHC Fishery-Independent Setline Survey (FISS) data*** The Commission **RECOMMENDED** that for the 2020 FISS season, the IPHC Secretariat shall employ the proposed subarea design for Regulatory Areas 2A, 4A, 4B, 4CDE, and an enhanced randomised subsampling FISS design in Regulatory Areas 2B, 2C, 3A, and 3B to meet the primary design objective, while also considering secondary and tertiary objectives (Table 2). The IPHC Secretariat shall determine the number of skates at each FISS station with the secondary objective in mind (Table 2). A demonstration of this design is provided at Fig. 2.	**Lead**: Lara Erikson **Status/Plan**: Completed See paper **IPHC-2020-IM096-06** *IPHC Fishery-independent setline survey (FISS) (2020): Preliminary update* (L. Erikson, R. Webster) Also note IPHC-2020-ID011 in Appendix B
AM096–Rec.02 (para. 32)	The Commission **RECOMMENDED** the following specific additions to the new 2020 FISS design, on the basis of the tertiary objective specified in Table 2 on a cost recovery basis. Any other tertiary sampling objective shall be at the discretion of the IPHC Secretariat unless specifically directed by the Commission: a) Regulatory Area 2A: Washington Department of Fish and Wildlife - rockfish sampling; b) Regulatory Area 2B: DFO-Canada - rockfish sampling.	**Lead**: Lara Erikson **Status/Plan**: Completed Due to the COVID-19 pandemic, neither of the two tertiary sampling activities were possible in 2020. They will be revisited as options for 2021 on a cost-recovery basis.
REQUESTS		
AM096–Req.01 (para. 33)	***Space-time modelling of IPHC Fishery-Independent Setline Survey (FISS) data*** The Commission **REQUESTED** the 2020 consultation process in preparation for the 2021 FISS and beyond be enhanced to include input from the IPHC subsidiary bodies, particularly the Research Advisory Board and the Scientific Review Board, as well as from stakeholders who have performed survey work for the IPHC, with a view to finalizing the FISS sampling design for the coming year as early as possible in the annual planning cycle.	**Lead**: Ray Webster **Status/Plan**: Completed FISS design work was presented for discussion to both the RAB021 in February, and, in more detail, to the SRB016 in June 2020, and again in more detail at SRB017 in September 2020 (see agenda item 7.2 for the SRB's advice). Further stakeholder engagement was obtained at IM096 and via direct vessel owner/captain engagement throughout 2020. The IPHC Secretariat intends on seeking further input at the IPHC meeting series in January 2021.

96th Session of the IPHC Annual Meeting (AM096)		
Action No.	**Description**	**Update**
AM096–Req.02 (para. 52)	***Stock Assessment: Data overview and stock assessment (2019), and harvest decision table (2020)*** The Commission **REQUESTED** that the IPHC MSE process continue to evaluate status quo management related to discard mortality for non-directed fisheries (bycatch) under the current program of work for delivery of full MSE results at AM097 in 2021, noting that this source of mortality is currently modelled as a fixed component of the total (with variability).	**Lead**: Allan Hicks **Status/Plan**: Completed The current framework continues to model non-directed commercial mortality with a fixed average that is dependent on the total simulated biomass and random variability. See paper IPHC-2021-AM097-11
AM096–Req.03 (para. 89)	***Reports of the 13th and 14th Sessions of the IPHC Management Strategy Advisory Board (MSAB013 and MSAB014)*** The Commission **REQUESTED** the MSAB to confirm the proposed topics of work beyond the 2021 deliverables in time for the Interim Meeting (IM096), including work to investigate and provide advice on approaches for accounting for the impacts of bycatch in one Regulatory Area on harvesting opportunities in other Regulatory Areas.	**Lead**: Allan Hicks **Status/Plan**: Completed The MSAB has expressed interest in data-based approaches (e.g. less reliance on stock assessment models) and multi-year decision-making process as highlighted in the 2nd Performance Review of the IPHC (PRIPCH02). See agenda item 8.2 for the latest MSAB advice arising from MSAB016 (19-22 October 2020)
AM096–Req.04 (para. 110)	***Stakeholder statements*** The Commission **REQUESTED** that the IPHC Secretariat organise and synopsize stakeholder statements by topic, in order to insert the stakeholder written inputs into public comment at appropriate points in the agenda for the Commission's consideration.	**Lead**: David Wilson **Status/Plan**: Completed See paper IPHC-2021-AM097-INF01
AM096–Req.05 (para. 113)	***Contracting Party National Reports - United States of America*** The Commission **NOTED** that the NOAA Fisheries Observer Program has increased observer fees and has received increased government funding, and **REQUESTED** that NOAA Fisheries provide a synopsis of observer coverage rates over time and how coverage rates are expected to change in 2020 and beyond.	**Lead**: NOAA-Fisheries **Status/Plan**: Pending NOAA-Fisheries have indicated they will provide a response via their the National Report from the USA, at AM097. See paper IPHC-2021-AM097-NR02
AM096–Req.06 (para. 135)	***IPHC Rules of Procedure (2020)*** The Commission **ADOPTED** the revised IPHC Rules of Procedure (2020) by consensus, and **REQUESTED** that the IPHC Secretariat finalise and publish them accordingly.	**Lead**: David Wilson **Status/Plan**: Completed IPHC Rules of Procedure (2020) was published on 7 February 2020.
AM096–Req.07 (para. 139)	***Report of the 2nd IPHC Performance Review*** 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	**Lead**: David Wilson **Status/Plan**: Completed

96th Session of the IPHC Annual Meeting (AM096)		
Action No.	**Description**	**Update**
	facilitate this request by proposing intersessional meeting dates.	Intersessional meeting held 17 March 2020 where the Commission endorsed the recommendations. See paper IPHC-2021-AM097-13 *Update on progress regarding the implementation of the 2nd IPHC Performance Review recommendations* (D. Wilson)
AM096–Req.08 (para. 158)	***Size limits*** The Commission **REQUESTED** that the IPHC Secretariat prepare an updated discussion of the costs and benefits of removing or adjusting the current minimum size limit and/or adding a maximum size limit. This analysis would be presented during the 2020 Work Meeting and IM096.	**Lead**: Ian Stewart **Status/Plan**: Completed See paper IPHC-2021-AM097-09 *Evaluation of directed commercial fishery size limits in 2020* (I. Stewart, A. Hicks & B. Hutniczak)
AM096–Req.09 (para. 159)	***Review of the draft and adoption of the report of the 96th Session of the IPHC Annual Meeting (AM096)*** The Commission **REQUESTED** that the IPHC Secretariat finalise and publish the IPHC *Pacific Halibut Fishery Regulations (2020)* no later than 28 February 2020, **NOTING** that only minor editorial and formatting changes are permitted beyond the decisions made by the Commission at the AM096.	**Lead**: David Wilson **Status/Plan**: Completed Published on 7 February 2020.

APPENDIX B

2020 Inter-sessional Decisions of the Commission

2020 Inter-sessional decisions		
Action No.	**Description**	**Update**
IPHC-2020-ID001	***Management Strategy Evaluation (MSE)*** The Commission **RECOMMENDED** that the primary coastwide and area-specific objectives outlined in Table 1 of Appendix A be used for evaluating MSE results conditional on future consideration of the objectives after preliminary MSE results are presented at MSAB015 in May 2020.	**Lead**: Allan Hicks **Status/Plan**: Completed See agenda item 8.2 for the latest MSAB advice arising from MSAB016 (19-22 October 2020)
IPHC-2020-ID002	The Commission **RECOMMENDED** a reference SPR fishing intensity of 43% with a 30:20 control rule be used as an updated interim harvest policy consistent with MSE results pending delivery of the final MSE results at AM097, noting the additional components intended to apply for a period of 2020 to 2022 as defined in IPHC-2020-AM096-R paragraphs 97 b, c, d, and e. Specifically, these additional components are allocations to 2A and 2B, accounting for some impacts of U26 non-directed discard mortality, and the use of a rolling three-year average for projecting non-directed fishery discard mortality.	**Lead**: Allan Hicks **Status/Plan**: Completed The reference SPR fishing intensity of 43% with a 30:20 control rule is being used in the 2020 stock assessment and harvest advice for 2021 and will presented at AM097 See paper IPHC-2021-AM097-08)
IPHC-2020-ID003	***IPHC Performance Review: 2nd IPHC Performance Review (PRIPHC02)*** 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.	**Lead**: David Wilson **Status/Plan**: Completed See paper IPHC-2021-AM097-13
IPHC-2020-ID004	***IPHC Financial Regulations (2020)*** The Commission **ADOPTED** by consensus, the IPHC Financial Regulations (2020), and directed the IPHC Secretariat to finalise and publish accordingly.	**Lead**: David Wilson **Status/Plan**: Completed IPHC Financial Regulations (2020) was published on 17 March 2020.
IPHC-2020-ID005	***Fishery-Independent Setline Survey (FISS)*** **NOTING** paper IPHC-2020-SS06-INF01 which provided a description of the benefits of selling Pacific halibut less than 32 inches in length that is captured and sampled on the 2020 FISS, the Commission **ENDORSED** the sale of this portion of the FISS catch.	**Lead**: Lara Erikson **Status/Plan**: Completed The sale of U32 fish that could not be returned to the sea alive were landed and sold throughout the 2020 FISS season. As of 12 September 2020, U32 fish sales yielded US$65,669.63 in revenue, at an average price of US$4.15/lb.

2020 Inter-sessional decisions		
Action No.	**Description**	**Update**
IPHC-2020-ID006	**NOTING** paper IPHC-2020-SS06-INF02 which provided details of the 2020 FISS design, including the number of skates to be deployed at each FISS station by IPHC Regulatory Area, the Commission **ENDORSED** the design (Appendix C).	**Lead**: Lara Erikson **Status/Plan**: Completed Note that the design endorsed here, was subsequently amended (see IPHC-2020-ID011 below) following the COVID-19 pandemic outbreak.
IPHC-2020-ID007	***Alaska Charter Sector Allocation – IPHC Regulatory Areas 2c And 3a*** The Commission **NOTED** and **ADOPTED** regulatory proposal IPHC-2020-SS07-PropA1, which amends Sect. 29 of the IPHC Pacific Halibut Fishery Regulations: Recreational (Sport) Fishing for Pacific Halibut—IPHC Regulatory Areas 2C, 3A, 3B, 4A, 4B, 4C, 4D, 4E. The amendments (provided at Appendix III) are to: a) Regulatory Area 2C - implement a reverse slot limit with a lower limit of 45 inches (increased from 40 inches) for recreational charter anglers for the remainder of the 2020 season; b) Regulatory Area 3A – modify the lower limit from 26 inches to 32 inches; No annual limit and no daily closures, for the remainder of the 2020 season.	**Lead**: David Wilson **Status/Plan**: Completed IPHC Fishery Regulations (2020) was published on 20 May 2020.
IPHC-2020-ID008	***Pacific Halibut Bycatch In The Washington Sablefish Fishery*** The Commission **NOTED** and **ADOPTED** regulatory proposal IPHC-2020-SS07-PropA2, which amended the deadline for when 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. The amendments (provided at Appendix IV) modify the deadline for submission from 15 March to 29 May 2020. The extension was made based solely on the potential negative impacts that the COVID-19 pandemic may have had on the licencees and does not set a precedent for future years.	**Lead**: David Wilson **Status/Plan**: Completed IPHC Fishery Regulations (2020) was published on 20 May 2020.
IPHC-2020-ID009	***Intersessional meeting formats*** The Commission **REQUESTED** that the IPHC Secretariat prepare draft guidelines for intersessional meetings to compliment those already contained with the IPHC Rules of Procedure (2020), given the potential ongoing COVID-19 impacts.	**Lead**: David Wilson **Status/Plan**: Completed See paper IPHC-2021-FAC097-09 for draft amendments

2020 Inter-sessional decisions		
Action No.	**Description**	**Update**
IPHC-2020-ID010	***IPHC Fishery Regulations – May 2020*** The Commission **REQUESTED** that the IPHC Secretariat finalise and publish the IPHC *Pacific Halibut Fishery Regulations (2020)* within 24 hours, **NOTING** that only minor editorial and formatting changes are permitted beyond the decisions made by the Commission at the SS07.	**Lead**: David Wilson **Status/Plan**: Completed The Report of the 7th Special Session (IPHC-2020-SS07-R) was published on 20 May 2020. IPHC Fishery Regulations (2020) was published on 20 May 2020.
IPHC-2020-ID011	***Revised 2020 IPHC Fishery-Independent Setline Survey (FISS) design and implementation*** The Commission **ENDORSED** the 2020 FISS design provided in Appendix I, which includes 898 stations in a reduced footprint within IPHC Regulatory Areas 2B, 2C, 3A and 3B.	**Lead**: Lara Erikson **Status/Plan**: Completed See paper IPHC-2021-AM097-06
IPHC-2020-ID012	The Commission **RECOMMENDED** that the 2020 FISS commence on or near 1 July 2020, with a completion target of 31 August 2020.	**Lead**: Lara Erikson **Status/Plan**: Completed The 2020 FISS commenced on 27 June 2020, 4 days ahead of schedule. The FISS was completed on 9 September 2020.
IPHC-2020-ID013	***Independent External Auditor's Report for FY2018 & FY2019*** The Commission **ENDORSED** the Independent External Auditor's Report for FY2018 & FY2019.	**Lead**: David Wilson **Status/Plan**: Completed
IPHC-2020-ID014	***Fishing period extension for the directed commercial fishery in IPHC Regulatory Area 2B*** The Commission **NOTED** and **ADOPTED** regulatory proposal IPHC-2020-SS08-PropA1, which amends Sect. 9, of the IPHC Pacific Halibut Fishery Regulations, by extending the commercial fishing period in IPHC Regulatory Area 2B to 7 December 2020. The amended text shall read as follows: *9. Commercial Fishing Periods* *(3) All commercial fishing for Pacific halibut in all IPHC Regulatory Areas shall cease for the year at 1200 local time on 15 November, with the exception of IPHC Regulatory Area 2B which shall cease at 1200 local time on 7 December 2020.*	**Lead**: David Wilson **Status/Plan**: Completed IPHC Fishery Regulations (2020) was published on 17 September 2020.

2020 Inter-sessional decisions		
Action No.	**Description**	**Update**
IPHC-2020-ID015	***External Auditors appointment*** The IPHC Finance and Administration Committee (FAC) **RECOMMENDED**, and the Commission **APPOINTED** the external auditor 'Moss Adams' to audit the accounts of the Commission for FY2020, FY2021, and FY2022.	**Lead**: David Wilson/Keith Jernigan **Status/Plan**: Completed The auditors were contracted on 9 November 2020. The auditors have also completed the FY2020 audit which is available on the FAC097 meeting page.
IPHC-2020-ID016	***IPHC 2021 Fishery-Independent Setline Survey (FISS)*** The Commission **RECOMMENDED** that the IPHC Secretariat proceed with an '*optimised*' version of the '*minimum 2021 FISS design*', involving adding an additional ~398 stations within the areas covered by the 'minimum 2021 FISS design' and where feasible, adding additional skates on each station (Fig. 2). The Commission reserved the right to make ad-hoc adjustments to the 2021 FISS at the 97th Session of the IPHC Annual Meeting (AM097), based on updated information to be provided by the IPHC Secretariat on IPHC Regulatory Areas 4B and 2A.	**Lead**: David Wilson **Status/Plan**: In progress The IPHC Secretariat has commenced operationalising the 2021 FISS. This included the RFT, contracting Setline Survey Specialists (vessel staff), bait purchases and all associated contracts. At AM097, a re-costing of IPHC Regulatory Area 4B and 2A will be provided for Commissioner review.

APPENDIX C

Update on actions arising from the 96th Session of the IPHC Interim Meeting (IM096: November 2020)

96th Session of the IPHC Interim Meeting (IM096)		
Action No.	**Description**	**Update**
RECOMMENDATIONS		
IM096-Rec.01 (para. 35)	***FISS redesign discussion*** The Commission **NOTED** some existing opportunities for stakeholder engagement in the FISS design review process and **RECOMMENDED** that additional formalised opportunities should be added to the review timeline for future presentations. An option is to hold the annual RAB meeting in November or December of each year.	**Lead**: Lara Erikson **Status/Plan**: In Progress The IPHC Secretariat will provide an updated schematic at AM097 for consideration. See paper **IPHC-2021-AM097-07**
IM096-Rec.02 (para. 46)	***FISS design endorsement (2021-23)*** The Commission **RECOMMENDED** that the IPHC 2021 FISS design be considered for decision at the 9th Special Session of the Commission (SS09), at a date and format to be agreed upon intersessionally. The IPHC Secretariat will develop necessary material to support the decision making process.	**Lead**: David Wilson **Status/Plan**: Completed The 9th Special Session was held on 8 December 2020. Outcomes are provided on the meeting page: https://www.iphc.int/venues/details/9th-special-session-of-the-iphc-ss09
IM096-Rec.03 (para. 47)	The Commission **RECOMMENDED** that the IPHC Secretariat provide the Commission, at AM097, an expanded schematic of the rationalisation of the FISS following the 2014-19 expansion series. The intent is to show all the steps from design to implementation of a FISS.	**Lead**: Lara Erikson **Status/Plan**: Completed See paper **IPHC-2021-AM097-06**
IM096-Rec.04 (para. 74)	***IPHC Management Strategy Evaluation*** The Commission **RECOMMENDED** that a Special Session of the Commission be held prior to the AM097 meeting in January, to look at potential modifications to existing MPs as part of the IPHC Secretariat's MSE program of work. The IPHC Secretariat will seek to establish agreeable dates, and publish the meeting invitation accordingly, noting that all meetings of the Commission are public unless otherwise decided by the Commission.	**Lead**: David Wilson/Allan Hicks **Status/Plan**: Completed The Commission is scheduled to hold the 10th Special Session of the IPHC (SS010) on 08 January 2021. The outcomes will be further discussed at AM097.
IM096-Rec.05 (para. 90)	***IPHC Fishery regulations: Proposals for the 2020-21 process*** The Commission **RECOMMENDED** that interested stakeholders note the deadline for submission of IPHC Fishery Regulation proposals, for consideration at the 97th Session of the Annual Meeting (AM097), of **26 December 2020**. Late proposals will not be considered at AM097.	**Lead**: David Wilson **Status/Plan**: Completed Media release calling for proposals communicated on 3 December 2020. IPHC-MR-2020-035

96th Session of the IPHC Interim Meeting (IM096)		
Action No.	**Description**	**Update**
REQUESTS		
IM096-Req.01 (para. 58)	***Size limit review*** **NOTING** the indication from some Commissioners that there may be regulatory compliance concerns to be considered, the Commission **REQUESTED** that relevant Contracting Party agencies, led by NOAA and DFO, consider and present those concerns (if applicable) at AM097.	**Lead**: NOAA and DFO **Status/Plan**: Pending See papers: IPHC-2021-AM097-NR01: Canada IPHC-2021-AM097-NR02: USA

Report of the IPHC Secretariat (2020)

PREPARED BY: IPHC SECRETARIAT (D. WILSON, L. ERIKSON, 15 DECEMBER 2020)

Contents

1. PURPOSE

To provide the Commission with a preliminary update on the activities of the IPHC Secretariat in 2020, not already contained within other papers before the Commission.

2. STAFFING IMPROVEMENTS DURING 2020

2.1. REGULAR FULL-TIME POSITIONS

FT Arrivals	Type	Hire Date	Status	Position Title
Ms Erin **Salle**	Regular full-time	23 Mar 2020	Active	Administrative Specialist
Mr Rob **Tynes**	Regular full-time	01 Apr 2020	Active	Information Technology Specialist
Mr Nicholas **Wilson**	Regular full-time	08 Apr 2020	Active	Accounting Specialist
Ms Tara **Coluccio**	Regular full-time	26 Jun 2020	Active	Administrative Specialist

2.2. TEMPORARY FULL-TIME POSITIONS

Temporary full-time positons				
Temp/contract	**Type**	**Hire Date**	**Status**	**Position Title**
Ms Taika **Gebretsadik**	Temporary full-time	17 Aug 2020	Active	Senior Staff Accountant

2.3. PROMOTIONS

FT Departure				
K. **Jernigan**	Regular full-time	24 Nov 2020	Active	Assistant Director

3. IPHC INTERNSHIP PROGRAM: 2020

The IPHC funds one full-time intern each summer. In 2020, Mr Adam Ziegler from Stonehill College, Easton, MA, USA, joined the IPHC. Adam worked on the sex-ratio analysis of 2019 commercial Pacific halibut, *Hippoglossus stenolepis*, in IPHC Convention Waters.

4. IPHC MERIT SCHOLARSHIP FOR 2020-23

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 Amercia 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.

A four (4) person IPHC Merit Scholarship Panel reviews applications and determines recipients based on academic qualifications, career goals, and relationship to the Pacific halibut industry.

In 2020, the IPHC Merit Scholarship was awarded to Mr Hahlen **Behnken-Barkhau** (Whitman College).

The list of current recipients and their expected years of receipt are provided below. Note that in 2016, the IPHC Merit Scholarship shifted from an award of US$2,000 per year for four years, with a new recipient selected each year, to an award of US$4,000 per year for four years, with a new recipient selected every other year.

Name	2018	2019	2020	2021	2022	2023
Kaia Dahl (Petersburg, AK, USA)	$4,000	$4,000	$4,000	$4,000	-	-
Hahlen Behnken-Barkhau (Sitka, AK, USA)	-	-	$4,000	$4,000	$4,000	$4,000

5. MEETINGS OF THE COMMISSION AND SUBSIDIARY BODIES DURING 2020

Meeting	No.	Date	Location
Annual Meeting (AM)	**96th**	**3-7 Feb**	**Anchorage, USA**
Finance and Administration Committee (FAC)	96th	3 Feb	Anchorage, USA
Conference Board (CB)	90th	4-5 Feb	Anchorage, USA
Processor Advisory Board (PAB)	25th	4-5 Feb	Anchorage, USA
Research Advisory Board (RAB)	21st	26 Feb	Seattle, USA
Management Strategy Advisory Board (MSAB)	15th	11-14 May	Electronic
	16th	19-22 Oct	Electronic
Scientific Review Board (SRB)	16th	23-25 June	Electronic
	17th	22-24 Sept	Electronic
Work Meeting (WM)	--	16-17 Sept	Electronic
Interim Meeting (IM)	**96th**	**18-19 Nov**	**Electronic**

6. IPHC PACIFIC HALIBUT FISHERY REGULATIONS (2020)

6.1. IPHC FISHERY REGULATIONS ADOPTED IN 2020

In 2020, the Commission adopted **six (6)** fishery regulations/amendments in accordance with Article III of the Convention, as follows:

IPHC Fishery Regulations: Fishery Limits (Sect. 4)

The Commission **NOTED** and **ADOPTED** regulatory proposal IPHC-2020-AM096-PropA1, which aimed to improve clarity and transparency of fishery limits in the IPHC Fishery Regulations, and to provide the framework for mortality limits adopted by the Commission. (para. 90)

The Commission **ADOPTED** the distributed mortality limits for each Contracting Party, by IPHC Regulatory Area, (Table 6) and sector, as provided in Appendix IV. [**Canada**: In favour=2, Against=1][**USA**: In favour=2, Against=1] (para. 91)

Table 6. Adopted TCEY mortality limits for 2020

IPHC Regulatory Area	Mortality limit (TCEY) (mlb)	Mortality limit (TCEY) (metric tonnes)
2A	1.65	748
2B	6.83	3,098
2C	5.85	2,654
3A	12.20	5,534
3B	3.12	1,415
4A	1.75	794
4B	1.31	594
4CDE	3.90	1,769
Total (IPHC Convention Area)	**36.60**	**16,601**

The Commission **ADOPTED**: (para. 97)

a) a coastwide mortality limit (TCEY) of 36.6 million pounds; and

b) a fixed TCEY for IPHC Regulatory Area 2A of 1.65 million pounds is intended to apply for a period from 2019-2022, subject to any substantive conservation concerns; and

c) a share-based allocation for IPHC Regulatory Area 2B. The share will be defined based on a weighted average that assigns 30% weight to the current interim management procedure's target TCEY distribution and 70% on 2B's recent historical average share of 20%. This formula for defining IPHC Regulatory Area 2B's annual allocation is intended to apply for a period of 2019 to 2022. For 2020, this equates to a share of 18.2% before accounting for U26; and

d) an accounting for some impacts of U26 non-directed discard mortality from US IPHC Regulatory Areas on available harvest in IPHC Regulatory Area 2B. The accounting increases the 2B TCEY by 50% of the estimated yield lost due to U26 non-directed discard mortality in Alaskan waters and is intended to apply for the period 2020-2022. For 2020 this calculation equates to 0.21 million pounds and reduces all Alaskan IPHC Regulatory Area TCEYs to maintain a coastwide TCEY of 36.6 million pounds; and

e) the use of a rolling three-year average for projecting non-directed fishery discard mortality by IPHC Regulatory Area; this is also intended to apply for a period of 2020 to 2022.

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

The Commission **NOTED** and **ADOPTED** regulatory proposal IPHC-2020-AM096-PropA2, which specified fishing periods for the commercial Pacific halibut fisheries. (para. 98)

Commercial fishing periods

The Commission **ADOPTED** fishing periods for 2020 as provided below, thereby superseding the relevant portions of Section 9 of the IPHC Pacific halibut fishery regulations and specifying that: (para. 100)

f) All commercial fishing for Pacific halibut in all IPHC Regulatory Areas may begin no earlier than 14 March and must cease on 15 November;

g) The IPHC Regulatory Area 2A non-tribal directed commercial fishery may take place during specific fishing periods of 3 days' duration, beginning on the fourth Monday in June, with fishing period limits (vessel quota) to be determined and communicated by the IPHC Secretariat.

IPHC Fishery Regulations: minor amendments

The Commission **NOTED** and **ADOPTED** regulatory proposal IPHC-2020-AM096-PropA3, which proposed amendments to ensure clarity and consistency in the IPHC Fishery Regulations, with minor modification as identified during AM096. (para. 101)

IPHC Fishery Regulations: Vessel Clearance in IPHC Regulatory Area 4 (Sect. 16)

The Commission **NOTED** and **ADOPTED** regulatory proposal IPHC-2020-AM096-PropA4, which proposed amendments to address the need for clearances when a National Oceanic and Atmospheric Administration (NOAA) Fisheries observer or electronic monitoring device is present. (para. 102)

Charter management measures in IPHC Regulatory Areas 2C and 3A

The Commission **NOTED** and **ADOPTED** regulatory proposal IPHC-2020-AM096-PropB1, which proposed IPHC Regulation changes for charter recreational Pacific halibut fisheries in IPHC Regulatory Areas 2C and 3A, in order to achieve the charter Pacific halibut allocation under the North Pacific Fisheries Management Council's (NPFMC) Pacific halibut Catch Sharing Plan. (para. 105)

Revising definition of IPHC Regulatory Area 2A-1

The Commission **NOTED** and **ADOPTED** regulatory proposal IPHC-2020-AM096-PropB2, which proposed an update to IPHC regulatory language regarding the usual and accustomed fishing areas of Indian tribes with treaty fishing rights to Pacific halibut, with the addition of the geographic reference for Point Chehalis (46° 53.30' N. lat.). (para. 106)

6.2. DEFERRED REGULATORY PROPOSALS

IPHC Fishery Regulations: IPHC Closed Area (Sect. 11)

1) *The* Commission **NOTED** and **DEFERRED** regulatory proposal IPHC-2020-AM096-PropA5, which proposed amendments to consider the intent and purpose of the IPHC Closed Area, as defined in the Pacific Halibut Fishery Regulations (2019) Section 11,, which currently excludes directed Pacific halibut fishing, but allows other forms of mortality such as trawling, and to propose the removal of the IPHC Closed Area from the IPHC Pacific Halibut Fishery Regulations.

7. Interactions with Contracting Parties

7.1. *Contracting Party reports*

In 2020, 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.

7.2. *Canada*

7.2.1. *Fisheries and Oceans Canada (DFO)*

Areas of conservation concern

The IPHC Secretariat continues to work with Fisheries and Oceans representatives to address gaps in coverage for the IPHC Fishery-Independent Setline Survey (FISS) in the IPHC Convention Area. An application was submitted again in 2020 to fish the FISS stations within the Marine Protected Areas in Canadian waters, which was denied.

Halibut Advisory Board (HAB)

The Executive Director participates as a HAB member, with other Secretariat staff in support. This relationship is expected to continue into the future given the HAB's contributions to the Canadian decision-making process.

7.3. *United States of America*

7.3.1. *North Pacific Fishery Management Council (NPFMC)*

Areas of conservation concern

The IPHC Secretariat worked with USA agency staff to address gaps in coverage for the Fishery-Independent Setline Survey (FISS) in IPHC Convention Waters. An application was submitted to fish the FISS stations within the Glacier Bay National Park, which was approved, allowing these stations to be fished.

Abundance-Based Management of Pacific halibut bycatch (ABM)

The NPFMC's Abundance-Based Management Working Group (ABMWG) continued its work, with participation of the IPHC Secretariat. The Commission has supported the development of ABM due to its potential effect on the directed Pacific halibut fisheries.

At its January/February 2020 meeting, the NPFMC revised the ABM motion (Council D4 Motion AM80) for the forthcoming Pacific halibut ABM PSC limit analysis and added a second motion (Council D4 Motion PSC Limits) containing additional options to consider in a discussion paper.

ABM was a priority agenda at the NPFMC October 2020 meeting. The Scientific and Statistical Committee (SSC) discussed the operating model and results from the simulation analysis. However, a misspecification of directed commercial mortality in the model for the year 2019 was found which likely had an important effect because results for the directed commercial fisheries were presented relative to the 2019 mortality. With little time to review the updated results before the end of the SSC meeting, the SSC unanimously decided to not review the results at that time. The SSC did, however, provide advice on improvements to the model assumptions and analysis. The Council discussed the outcomes extensively and moved to a new approach in Council C6 Motion as well as updating the purpose and need. The motion specifies four alternatives for analysis with one being status quo and the other three variations of a lookup table incorporating the two indices calculated from the FISS data and the EBS trawl survey data. Four options were specified that would reduce variability in the annual PSC limits and introduce performance standards that may increase or decrease the PSC limit depending on percent usage of the limit.

The Council's three-meeting outlook notes an initial review of Pacific halibut ABM analysis in April 2021.

7.3.2. *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 2020 will be presented during Agenda Item 5 on fishery statistics. The IPHC Secretariat noted that the recreational fishery sub-area – California remained open for four additional days when it was determined the fishery limit had been exceeded and against the Secretariat recommendation. This resulted in an over-catch of ~9%.

IPHC Regulatory Area 2A non-tribal directed commercial fishery

During 2019 and 2020, in response to letters exchanged between the Commission and the PFMC, and the Commission's desires expressed at AM095 and AM096, discussions included shifting responsibility for management of Pacific halibut fisheries in IPHC Regulatory Area 2A from the IPHC to domestic agencies, as is the case in all other IPHC Regulatory Areas.

At its June 2019 and June 2020 meetings, the PFMC affirmed its commitment to pursue domestic management of the Pacific halibut fisheries in IPHC Regulatory Area 2A before the 2021 fishing period. The PFMC may then later investigate other potential management options for the fishery. Further discussion of the way ahead is expected at the PFMC's September 2020 meeting.

The PFMC noted its commitment to the transition of management in its letter to the IPHC of 6 September 2019. The Commission responded in its letter to the PFMC of October 2019, offering to support the transition process and expressing its desire to complete the transition as expeditiously as possible.

2020 Update: At its September 2020 meeting, the Council further considered the transition of IPHC Regulatory Area 2A Fishery Management, with the intention of adopting preliminary preferred alternatives. Reference Council paper and presentation provided in paper IPHC-2020-IM096-INF02. At the September PFMC meeting, the final motion on the matter was as follows:

> *Transition of Area 2A Fishery Management The Council adopted for public review the following as preliminary preferred alternatives:*

1. *4.1.2 - Alternative 2: Consider the directed fishery framework during the CSP process in September and November, including any guidance for vessel limits and inseason changes for NMFS implementation.*
2. *4.2.1 Alternative 2: Issue permits for all Area 2A halibut non-Indian fisheries (commercial directed, incidental salmon troll, incidental sablefish, and recreational charter).*
3. *4.2.2 Alternative 2: Allow NMFS to determine the appropriate application deadlines for all commercial halibut applications, set to coincide with Council meetings and NMFS processing time.*
4. *4.2.5 Alternative 1: Status quo (revised). Require proof of permit to be onboard fishing vessel and made readily available upon request, regardless of the type of permit (e.g., paper or electronic). NMFS to provide access to permit in a printable format or send paper copy directly to the participant.*

The PFMC will further consider the above alternatives during its November Council meeting (13 and 16 November 2020).

8. IPHC COMMUNICATIONS AND OUTREACH

8.1. *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 interactive maps for the IPHC Fishery-Independent Setline Survey (FISS) data, and commercial fishery data pages and catch tables. https://www.iphc.int/www.iphc.int/data

8.2. *Annual Report*

The 2019 Annual Report (1 January to 31 December 2019) was published on 2 March 2020 and is available for download from the IPHC website at the following link: https://www.iphc.int/uploads/pdf/ar/iphc-2020-ar2019-r.pdf

We continue to implement an accelerated production timeline for the IPHC Annual Report, thereby ensuring users of the report receive the summary information as close to the relevant year as possible. Continued feedback on the content, format and presentation of the Annual Report is welcome.

8.3. *IPHC Circulars and Media Releases*

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.

https://www.iphc.int/library/documents/category/circulars

IPHC Media Releases are the primary informal communication with all stakeholders. In some cases, these will duplicate the formal communications provided in IPHC Circulars.

https://www.iphc.int/library/documents/category/media-releases

Stakeholders 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

8.4. *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 2020, much of this engagement took place electronically.

Committees and external organisation appointments

North America:

1) *Technical Subcommittee (TSC) of the Canada-United States Groundfish Committee* - Dr. Josep Planas & Ms. Lara Erikson

Canada:

1) *Halibut Advisory Board* (Canada) - Dr. David Wilson

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* – Ms. Huyen Tran
6) *North Pacific Research Board Science Panel* - Dr. Josep Planas
7) *Observer Science Committee (NOAA-Alaska)* – Dr. Ray Webster
8) *Interagency electronic reporting system for commercial fishery landings in Alaska (eLandings) Steering Committee – Ms. Kamala Carroll and Ms. Huyen Tran*
9) *Interagency electronic reporting system for commercial fishery landings in Alaska (eLandings) IT Steering Committee – Ms. Huyen Tran and Mr. Afshin Taheri*
10) *Interagency electronic reporting system for commercial fishery landings in Alaska (eLandings) Interagency Coordination Committee (ICC) – Ms. Lara Erikson and Ms. Huyen Tran*

Conferences and symposia (chronological order)

1) 2020 Alaska Marine Science Symposium, 27-31 January, Anchorage, AK, USA – Dr. Josep Planas, Ms. Dana Rudy, Mr. Andy Jasonowicz
2) 2020 Ocean Sciences Meeting, 16 - 21 February, San Diego, CA, U.S.A – Mrs. Lauri Sadorus
3) AFSC 2nd Workshop on Integrating ecosystem and socioeconomic information into the groundfish/crab stock assessments Ecosystem and Socioeconomic Profiles, 10-12 March, Seattle, WA – Dr. Ian Stewart

Outreach

1) **Booth at the Pacific Northwest Sportsman's Show, 5-9 February, Portland, OR, USA** – Caroline Robinson, Kimberly Sawyer, Robert Tobin and Andy Jasonowicz

Academic affiliations 2020

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 - Alaska Pacific University, Anchorage, AK, USA
4) Dr. Ian Stewart - University of Washington School of Aquatic & Fishery Sciences, Seattle, WA, USA
5) Dr. Josep Planas - Alaska Pacific University, Anchorage, AK, USA

9. IPHC PUBLICATIONS IN 2020

9.1. *Published peer-reviewed journal papers*

Fish T, Wolf N, Harris BP, **Planas JV** (*2020)* A comprehensive description of oocyte developmental stages in Pacific halibut, *Hippoglossus stenolepis*. J Fish Biol. 97:1880–1885. https://doi.org/10.1111/jfb.14551

Forrest RE, **Stewart IJ**, Monnahan CC, Bannar-Martin KH and Lacko LC (2020) Evidence for rapid avoidance of rockfish habitat under reduced quota and comprehensive at-sea monitoring in the British Columbia Pacific Halibut fishery. Can J Fish Aquat Sci 77:1409-1420.

Hutniczak B, Meere F (2020) International Co-operation as a Key Tool to Prevent IUU Fishing and Disputes over It. International Community Law Review 22:439–448.

Nielsen JK, Mueter FJ, Adkison MD, **Loher T**, McDermott SF, Seitz AC (2020) Potential utility of geomagnetic data for geolocation of demersal fishes in the North Pacific Ocean. Animal Biotelemetry. 8:17. https://doi.org/10.1186/s40317-020-00204-0

Punt, AE, Tuck G, Day J, Canales M, Cope JM, de Moor C, De Oliveira JAA, Dickey-Collas M, Elvarsson B, Haltuch MA, Hamel OS, **Hicks AC**, Legault CM, Lynch PD, Wilberg MJ (2020). When are model-based stock assessments rejected for use in management and what happens then? Fisheries Research 224: https://doi.org/10.1016/j.fishres.2019.105465

van Helmond ATM, Mortensen LO, Plet-Hansen KS, Ulrich C, Needle CL, Oesterwind D, Kindt-Larsen L, Catchpole T, Mangi S, Zimmermann C, Olesen HK, Bailey N, Bergsson H, Dalskov J, Elson J, Hosken M, Peterson L, McElderry H, Ruiz J, Pierre JP, **Dykstra C**, Poos JJ. (2020). Electronic monitoring in fisheries: Lessons from global experiences and future opportunities. Fish & Fisheries 21:162–189.

Webster RA, Soderlund E, Dykstra CL and **Stewart IJ** (2020) Monitoring change in a dynamic environment: spatio-temporal modelling of calibrated data from different types of fisheries surveys of Pacific halibut. Can J Fish Aquat Sci 77(8):1421-1432.

Stewart IJ, **Hicks AC** and **Carpi P** (*In press*) Fully subscribed: evaluating yield trade-offs among fishery sectors utilizing the Pacific halibut resource. *Fisheries Research.*

9.2. *In press peer-reviewed journal papers*

Lomeli MJM, Wakefield WW, Herrmann B, **Dykstra CL, Simeon A, Rudy DM, Planas JV** (*In press*) Use of Artificial Illumination to Reduce Pacific Halibut Bycatch in a U.S. West Coast Groundfish Bottom Trawl. *Fisheries Research*.

https://doi.org/10.1016/j.fishres.2020.105737

Sadorus LL, Goldstein E, **Webster RA**, Stockhausen WT, **Planas JV**, Duffy-Anderson J (*In press*). Multiple life-stage connectivity of Pacific halibut (*Hippoglossus stenolepis*) across the Bering Sea and Gulf of Alaska. *Fisheries Oceanography.* https://onlinelibrary.wiley.com/doi/abs/10.1111/fog.12512

Stewart IJ, **Hicks AC**, **Carpi P** (2021) Fully subscribed: Evaluating yield trade-offs among fishery sectors utilizing the Pacific halibut resource. Fisheries Research 234. https://doi.org/10.1016/j.fishres.2020.105800

9.3. ***Submitted* peer-review journal papers – In review**

Kroska AC, Wolf N, **Planas JV**, Baker MR, Smeltz TS, Harris BP (*In review*) Controlled experiments to explore the use of a multi-tissue approach to characterizing stress in wild-caught Pacific halibut (*Hippoglossus stenolepis*). *Conservation Physiology.*

Stewart IJ, Scordino JJ, Petersen JR, Wise AW, Svec CI, Buttram RH, Monette JL, Gonzales MR, Svec R, Scordino J, Butterfield K, Parker W and Buzzell LA (*In review*) Out with the new and in with the old: reviving a historical technology to meet modern challenges. *Fisheries.*

10. RECOMMENDATION

That the Commission **NOTE** paper IPHC-2021-AM097-04 which provides the Commission with an update on activities of the IPHC Secretariat in 2020 not detailed in other papers before the Commission.

APPENDICES

Nil.

State of the Fishery (2020)

PREPARED BY: IPHC SECRETARIAT (L. ERIKSON, H. TRAN; 17 DECEMBER 2020 AND 8 JANUARY 2021)

PURPOSE

To provide an overview of the key fishery statistics regarding Pacific halibut removals from fisheries catching Pacific halibut during 2020, including the status of landings compared to fishery limits implemented by the Contracting Parties of the Commission.

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-2021-AM097-08**) and other analyses. The data are compiled by the IPHC Secretariat and include data from Federal and State agencies of each Contracting Party. All 2020 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 research

Figure 1 shows the distribution of Pacific halibut removals (mortality) by these fishery sources in 2020. Table 1 and Table 2 provide estimates of total removals by IPHC Regulatory Area (Figure 2).

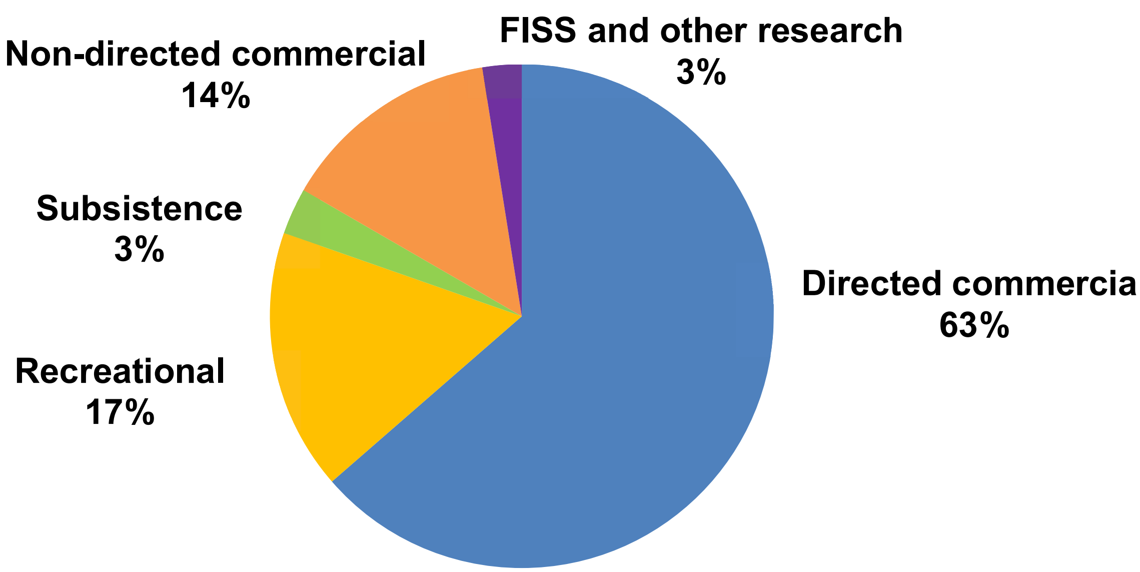

Figure 1. Distribution of Pacific halibut mortality by source in 2020.

Table 1. 2020 Mortality limits (TCEYs) and 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	**3,098**	**6,830,000**	2,904	6,402,376	94
United States of America	**13,508**	**29,780,000**	12,564	27,698,259	93
IPHC Regulatory Area 2A	748	1,650,000	644	1,419,993	86
IPHC Regulatory Area 2C	2,654	5,850,000	2,560	5,643,248	96
IPHC Regulatory Area 3A	5,534	12,200,000	5,316	11,720,165	96
IPHC Regulatory Area 3B	1,415	3,120,000	1,268	2,796,158	90
IPHC Regulatory Area 4A	794	1,750,000	680	1,498,469	86
IPHC Regulatory Area 4B	594	1,310,000	468	1,030,977	79
IPHC Regulatory Area 4CDE and Closed Area	1,769	3,900,000	1,628	3,589,249	92
Subtotal (TCEY)	**16,601**	**36,600,000**	**15,468**	**34,101,635**	**93**
Non-directed commercial discard mortality (U26)	none	none	422	930,000	n/a
Total	**none**	**none**	**15,890**	**35,031,635**	**n/a**

Table 2. 2020 estimates of total removals (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)	3,098.04	6,830,000	2,904.07	6,402,376	94
Directed commercial fishery landings	2,322.39	5,120,000	2,218.90	4,891,833	96
Directed commercial discard mortality	58.97	130,000	74.84	165,000	127
Recreational fishery	399.16	880,000	235.25	518,639	59
Recreational discard mortality[1]	22.68	50,000	11.01	24,262	49
Subsistence[1]	185.97	410,000	183.70	405,000	99
Non-directed commercial discard mortality (O26)[1]	108.86	240,000	91.17	201,000	84
IPHC fishery-independent setline survey[2]	n/a	n/a	89.20	196,642	n/a
Non-directed commercial discard mortality (U26)	9.07	20,000	13.15	29,000	145
USA – 2A (California, Oregon, and Washington)	748.43	1,650,000	644.10	1,419,993	86
Non-treaty directed commercial	115.41	254,426	110.06	242,647	95
Non-treaty incidental to salmon troll fishery	20.37	44,899	13.16	29,012	65
Non-treaty incidental to sablefish fishery	31.75	70,000	28.74	63,358	91
Treaty Indian directed commercial	223.53	492,800	221.77	488,915	99
Directed commercial discard mortality	13.61	30,000	14.97	33,000	110
Recreational – Washington	125.69	277,100	81.02	178,624	64
Recreational – Oregon	131.35	289,575	75.21	165,807	57
Recreational – California	17.69	39,000	29.08	64,107	164
Recreational discard mortality	n/a	n/a	3.99	8,797	n/a
Treaty Indian ceremonial and subsistence	14.61	32,200	18.02	39,726	123
Non-directed commercial discard mortality (O26)[1]	54.43	120,000	48.08	106,000	88
Non-directed commercial discard mortality (U26)	0.00	0	0.91	2,000	n/a

continued….

Table 2 continued. 2020 estimates of total removals (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)	2,653.51	5,850,000	2,559.73	5,643,248	96
Directed commercial fishery landings	1,546.75	3,410,000	1,451.83	3,200,727	94
Directed commercial discard mortality	31.75	70,000	28.58	63,000	90
Metlakatla (Annette Island Reserve)	n/a	n/a	10.94	24,119	n/a
Guided recreational fishery	353.80	780,000	216.38	477,041	64
Guided recreational discard mortality[3]	n/a	n/a	10.12	22,316	n/a
Guided recreational fishery (GAF)[1]	n/a	n/a	24.98	55,061	n/a
Unguided recreational fishery[1]	521.63	1,150,000	519.09	1,144,401	101
Unguided recreational discard mortality[3]	n/a	n/a	6.87	15,140	n/a
Subsistence[1]	167.83	370,000	166.11	366,214	99
Non-directed commercial discard mortality (O26)[1]	31.75	70,000	42.18	93,000	133
IPHC fishery-independent setline survey[2]	n/a	n/a	82.66	182,229	n/a
Non-directed commercial discard mortality (U26)	0	0	0.45	1,000	n/a
USA – Area 3A (central Gulf of Alaska)	5,533.83	12,200,000	5,316.18	11,720,165	96
Directed commercial fishery landings	3,197.83	7,050,000	3,092.66	6,818,145	97
Directed commercial discard mortality	131.54	290,000	85.28	188,000	65
Guided recreational fishery	775.64	1,710,000	717.73	1,582,333	93
Guided recreational discard mortality[3]	n/a	n/a	6.28	13,839	n/a
Guided recreational fishery (GAF)	n/a	n/a	0.97	2,147	n/a
Unguided recreational fishery[1]	752.96	1,660,000	759.52	1,674,445	102
Unguided recreational discard mortality[3]	n/a	n/a	11.68	25,754	n/a
Subsistence[1]	86.18	190,000	85.14	187,698	99
Non-directed commercial discard mortality (O26)[1]	585.13	1,290,000	343.37	757,000	59
IPHC fishery-independent setline survey[2]	n/a	n/a	213.55	470,804	n/a
Non-directed commercial discard mortality (U26)	131.54	290,000	100.24	221,000	76
USA – Area 3B (western Gulf of Alaska)	1,415.21	3,120,000	1,268.32	2,796,158	90
Directed commercial fishery landings	1,093.16	2,410,000	1,018.86	2,246,209	93
Directed commercial discard mortality[1]	72.57	160,000	43.54	96,000	60
Recreational fishery[1]	0.00	0	4.97	10,948	n/a
Recreational discard mortality	0.00	0	0.19	429	n/a
Subsistence[1]	9.07	20,000	7.55	16,644	83
Non-directed commercial discard mortality (O26)[1]	240.40	530,000	176.45	389,000	73
IPHC fishery-independent setline survey[2]	n/a	n/a	16.75	36,928	n/a
Non-directed commercial discard mortality (U26)	54.43	120,000	22.68	50,000	42
USA – Area 4A (eastern Aleutians)	793.79	1,750,000	679.69	1,498,469	86
Directed commercial fishery landings	639.57	1,410,000	520.27	1,146,995	81
Directed commercial discard mortality[1]	40.82	90,000	37.65	83,000	92
Recreational fishery[1]	4.54	10,000	7.26	16,008	162
Recreational discard mortality	0.00	0	0.10	229	n/a
Subsistence[1]	4.54	10,000	6.00	13,237	132
Non-directed commercial discard mortality (O26)[1]	99.79	220,000	108.41	239,000	109
Non-directed commercial discard mortality (U26)	63.50	140,000	19.05	42,000	30

continued….

Table 2 continued. 2020 estimates of total removals (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 4B (central/western Aleutians)	594.21	1,310,000	467.64	1,030,977	79
Directed commercial fishery landings	498.95	1,100,000	405.95	894,971	81
Directed commercial discard mortality[1]	18.14	40,000	16.33	36,000	90
Recreational fishery	0.00	0	0.00	0	n/a
Recreational discard mortality	0.00	0	0.00	0	n/a
Subsistence[1]	0.00	0	0.76	1,684	n/a
Non-directed commercial discard mortality (O26)[1]	72.57	160,000	39.92	88,000	55
IPHC fishery-independent setline survey[2] & research	n/a	n/a	4.68	10,322	n/a
Non-directed commercial discard mortality (U26)	4.54	10,000	4.54	10,000	100
USA – Area 4CDE and Closed (Bering Sea)	1,769.01	3,900,000	1,628.06	3,589,249	92
Directed commercial fishery landings	784.71	1,730,000	728.47	1,606,002	93
Directed commercial discard mortality[1]	36.29	80,000	35.83	79,000	99
Recreational fishery[1]	0.00	0	0.00	0	n/a
Recreational discard mortality	0.00	0	0.00	0	n/a
Subsistence[1]	18.14	40,000	15.08	33,247	83
Non-directed commercial discard mortality (O26)[1]	934.40	2,060,000	848.67	1,871,000	91
Non-directed commercial discard mortality (U26)	462.66	1,020,000	261.27	576,000	56
Totals	16,601.48	36,600,000	15,468.24	34,101,635	93
Directed commercial fishery landings	10,881.68	23,990,000	10,158.62	22,395,933	93
Recreational fishery	3,111.64	6,860,000	2,721.70	6,000,327	87
Subsistence[1]	480.81	1,060,000	482.37	1,063,450	100
Non-directed commercial discard mortality (O26)[1]	2,127.35	4,690,000	1,698.25	3,745,000	80
IPHC fishery-independent setline survey[2] & research	n/a	n/a	406.84	896,925	n/a
Non-directed commercial discard mortality (U26)	725.75	1,600,000	422.00	930 ,000	58

[1] ‘Mortality projection’ is the 2019 estimate, which was used in setting the TCEY for the IPHC Regulatory Area.

[2] Includes U32 Pacific halibut landed during FISS

[3] Limit included in limit listed above.

n/a = not available and GAF = Guided Angler Fish (GAF leased from commercial quota).

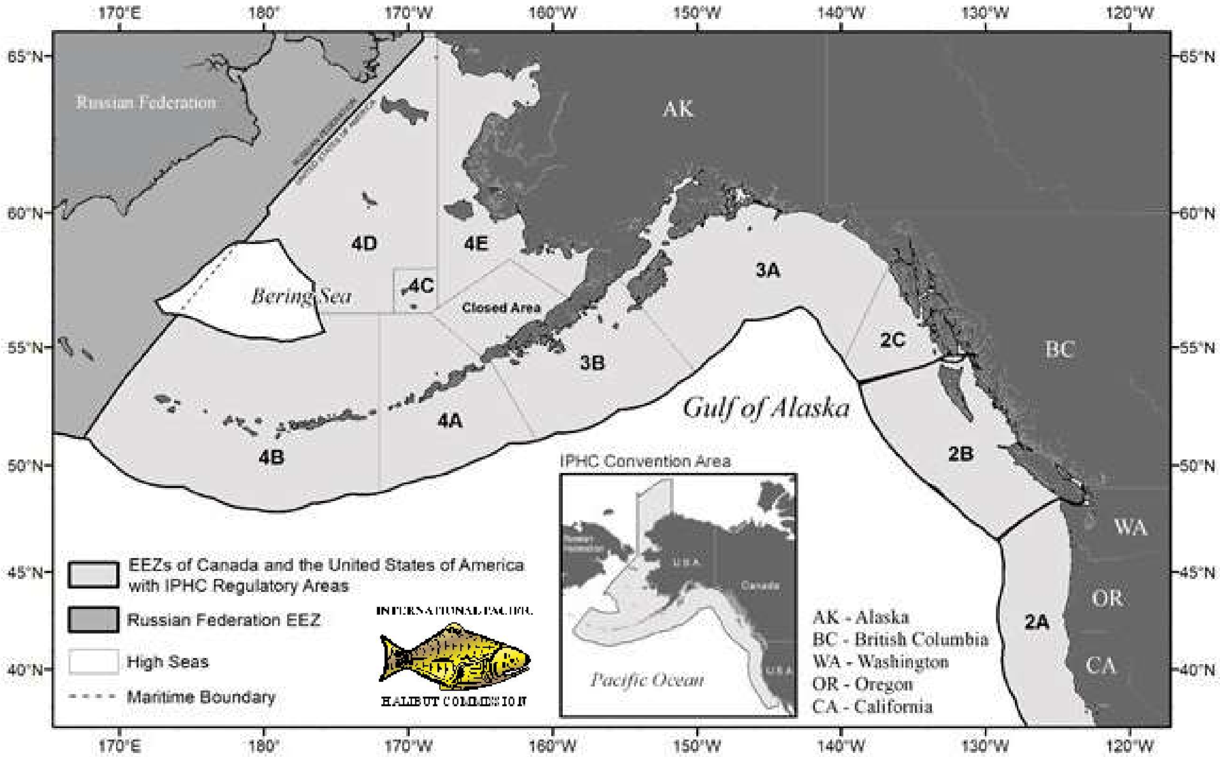

Figure 2. Map of the IPHC Convention Area (insert) and IPHC Regulatory Areas.

DEFINITIONS

Directed commercial fisheries: include commercial landings and discard mortality. Directed commercial discard mortality continues to include estimates of sub-legal Pacific halibut (under 81.3 cm (32 inches), also called 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 (formerly called personal use/subsistence): 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:

- i) ceremonial and subsistence (C&S) removals in the IPHC Regulatory Area 2A treaty Indian fishery,
- ii) the sanctioned First Nations Food, Social, and Ceremonial (FSC) fishery conducted in British Columbia,
- iii) federal subsistence fishery in Alaska, USA that uses Alaska Subsistence Halibut Registration Certificate (SHARC), and
- iv) U32 Pacific halibut retained in IPHC Regulatory Areas 4D and 4E by the CDQ fishery for personal use.

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 FISS and Research: includes Pacific halibut landings and removals as a result of the IPHC fishery-independent setline survey and other research.

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 Individual Fishing Quota (IFQ) system in Alaska, USA; the Community Development Quota (CDQ) fisheries in IPHC Regulatory Areas 4B and 4CDE; and the Metlakatla fishery in IPHC Regulatory Area 2C. All 2020 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 14 March and closed at 12 noon local time on 15 November, with IPHC Regulatory Area 2B only closing on 7 December 2020 (Table 3). The IPHC Regulatory Area 2A directed commercial fisheries, including the treaty Indian commercial fisheries, occurred during the same calendar period (14 March to 15 November 2020). For IPHC Regulatory Area 2A, the potential of 58-hour fishing periods every two weeks beginning on the fourth Monday in June for the non-treaty directed commercial fishery were adopted. All of these fishing periods began on the Monday at 0800 and ended on the Wednesday at 1800 local time (58-hours), were further restricted by fishing period limits, and closed for the remainder of the year after the fifth opening on 19 August 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, 2011-20.

IPHC Regulatory Area	Year									
	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011
Canada: 2B	14 Mar- 7 Dec (268)	15 Mar- 14 Nov (244)	24 Mar– 7 Nov (228)	11 Mar– 7 Nov (241)	19 Mar– 7 Nov (233)	14 Mar–7 Nov (238)	8 Mar–7 Nov (244)	23 Mar–7 Nov (230)	17 Mar–7 Nov (236)	12 Mar– 18 Nov (252)
USA: 2A Treaty Indian	14 Mar-30 Sept (55 h) (Unrestricted) 14 Mar-30 Sep (222 h) (Restricted) 5 Oct -18 Oct (800 lb per calendar day per vessel)	15 Mar-15 May (55 h) (Unrestricted) 15 Mar-15 May (84 h) 20 May-15 Jun (72 h) (Restricted) 11 Jun-24 Jul (~327 lb per tribe)	24 Mar – 28 Apr (36 h) 24 Mar – 28 Apr (37 h) 4 May – 23 May(30 h)	20 Mar, 15-16 Apr 1-2 May 19-20 May, 22-23 May 18-19 Jun 21-22 Jul	19-21 Mar, 20-21 Mar, 21- 23 Mar 1-2 Apr 1-2,11-12 May, 18 May-15 Aug, 25 Jul-2 Aug, 12 Sep-7 Nov	16-18 Mar (48 h) 1-2 Apr	11-13 Mar (48 h) 20-21Mar, 8May 8 May	23-25 Mar (48 h) 2-4 Apr, 15-16 Apr, 8 May, 6 Jun, 13 Jul, 20 Jul, 3 Aug	24-26 Mar (2) 1 May (13 h) 17-19 Mar (55 h)	20-22 Mar (2) 1-2 May (19 h) 12-19 Mar 24-28 Mar (13 h)
USA: 2A Commercial Directed	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)	28 Jun 12 Jul 26 Jul (10 h each)	22 Jun 6 Jul 20 Jul (10 h each)	24 Jun 8 Jul (10 h each)	25 Jun 9 Jul (10 h each)	26 Jun 10 Jul (10 h each)	27 Jun 11 Jul (10 h each)	29 Jun 13 Jul (10 h each)
USA: 2A Commercial Incidental	Salmon 15 Apr–30 Sep (WA – 168) 15 Apr–31 Oct (OR - 199) 1 Aug–30 Sep (CA - 60) Sablefish 1 Apr – 15 Nov (228)	Salmon 20 Apr - 30 Sep (WA, CA - 163) 20 Apr - 31 Oct (OR - 194) Sablefish 1 Apr- 31 Oct (213)	Salmon 24 Mar - 8 Aug (137) Sablefish 24 Mar – 7 Nov (228)	Salmon 1 Apr–3 Aug (124) Sablefish 1 Apr– 31 Oct (213)	Salmon 1 Apr – 31 Oct (213) Sablefish 1 Apr – 31 Oct (213)	Salmon 1 Apr–21 Aug (142) Sablefish 1 Apr– 31 Aug (152)	Salmon 1 Apr–11 Sep (163) Sablefish 1 Apr– 31 Oct (213)	Salmon 1 May–10 Aug (101) Sablefish 1 May– 31 Oct (184)	Salmon 1 May – 3 Jul (64) Sablefish 1 May– 31 Oct (184)	Salmon 1 May–28 May (28) 29 Jul-31 Oct (94) Sablefish No fishery
USA: Alaska (2C, 3A, 3B, 4A, 4B, 4CDE)	14 Mar- 15 Nov (246)	15 Mar- 14 Nov (244)	24 Mar– 7 Nov (228)	11 Mar– 7 Nov (241)	19 Mar–7 Nov (233)	14 Mar–7 Nov (238)	8 Mar–7 Nov (244)	23 Mar–7 Nov (230)	17 Mar–7 Nov (236)	12 Mar–18 Nov (252)

Directed Commercial Landings

Directed commercial landings and fishery limits by IPHC Regulatory Area for the 2020 fishing season are shown in Table 2. Directed commercial fishery limit, as referred to here, is the IPHC commercial fishery limit set by the Contracting Parties following the Annual Meeting. The fishery limits with adjustments from the underage and overage programs from the previous year's quota share programs and in IPHC Regulatory Area 2B, the Use of Fish allocation are not presented. Historical landings and fishery limits are available on the IPHC website (https://www.iphc.int/data).

The 2020 directed commercial fishery landings were spread over nine months of the year in the USA and ten months in Canada (Table 4). On a month-to-month comparison, April 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

Table 4. 2020 directed commercial landings (tonnes, net weight, preliminary) of Pacific halibut for Alaska, USA and British Columbia, Canada by IQ fisheries,IPHC Regulatory Area and month.

IPHC Regulatory Area	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2B[1]	185	369	274	288	272	260	258	197	106	10	2,219
2C[2]	104	145	239	204	134	242	175	162	49		1,452
3A[2]	95	276	485	449	349	453	424	426	136		3,093
3B[2]	-	30[3]	174	120	122	177	219	141	37		1,019
4A[2]		-	53[3]	46	-	201[3]	140	81[4]	-		520
4B[2]		-	95[3]	195[4]	-	-	-	116[3,4]	-		406
4CDE[2]			10	23	149	335	212[4]	-			728
Alaska, USA Total	199	451	1,055	1,037	753	1,407	1,170	926	221		7,218
Grand Total	383	820	1,329	1,325	1,025	1,667	1,428	1,123	327	10	9,437

[1] Based on landings from DFO Fishery Operations System (FOS).
[2] Based on landings from NOAA Fisheries Restricted Access Management (RAM) Program.
[3] Weight combined with the previous month(s) for confidentiality purposes.
[4] Weight combined with the following month for confidentiality purposes.

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 143 in 2020. In addition, Pacific halibut can be landed as incidental catch in other licensed groundfish fisheries. Therefore, Pacific halibut was landed from a total of 210 active licences in 2020, with 66 of these licences from other fisheries. The 2020 directed commercial landings represented 2,219 tonnes (4,891,833 pounds) of Pacific halibut (Table 2).

Directed commercial trips from IPHC Regulatory Area 2B were delivered into 16 different ports in 2020. The ports of Port Hardy (including Coal Harbour and Port McNeill) and Prince Rupert/Port Edward were the major landing locations, receiving 93% of the commercial landings. Port Hardy received 52% while Prince Rupert received 40% of the directed commercial landings. All of the IVQ landings were landed in IPHC Regulatory Area 2B. Only Canadian vessels landed frozen, head-off Pacific halibut in 2020, and only in Canadian ports: 45 landings (25 tonnes; 55,779 net lb) reported frozen-at-sea head-off product from 25 vessels.

In IPHC Regulatory Area 2B, 1.2 tonnes (2,648 pounds) of Pacific halibut were caught with pot gear and landed within the directed commercial fishery representing 0.05% of the total landings for which logs were collected by the IPHC.

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

The 2020 IPHC Regulatory Area 2A fisheries and respective fishery limits are listed in Table 2. The total IPHC Regulatory Area 2A directed commercial landings of 373 tonnes (822,000 pounds) are 5% below the fishery limit. The total directed commercial non-treaty Indian landings of 110 tonnes (243,000 pounds) were 5% under the fishery limit of 115 tonnes (254,426 pounds) after five 58-hour openers. The fishing period limits by vessel size class for each opening in 2020 are listed in Table 5.

The salmon troll fishery season began on 15 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. The incidental Pacific halibut retention in Washington and California remained open through 30 September and in Oregon, through 31 October. Total landings of 13 tonnes (29,012 pounds) was 35% under the fishery limit (20 tonnes (44,899 pounds)).

Incidental Pacific halibut retention during the limited-entry sablefish (*Anoplopoma fimbria*) fishery remained open from 1 April to noon on 15 November. Beginning 1 April, the allowable landing ratio was 0.09 tonnes (200 pounds) (net weight) of Pacific halibut to 0.45 tonnes (1,000 pounds) (net weight) of sablefish, and up to two additional Pacific halibut in excess of the ratio limit. Effective 19 October, the landing ratio was modified to 0.11 tonnes (250 pounds) (net weight) of Pacific halibut to 0.45 tonnes (1,000 pounds) (net weight) of sablefish, and up to two additional Pacific halibut in excess of the ratio limit. The total landings of 29 tonnes (63,358 pounds) were 12% under the fishery limit (32 tonnes (70,000 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 were one unrestricted, open access fishery, not to exceed 55 hours, 14 March to 30 September, and one restricted fishery opening not to exceed 222 hours, including a vessel per day limit of 0.23 tonnes (500 pounds) and limit of 10 landings for 14 March to 30 September. A late season fishery was open 5 October to 18 October and included a per calendar day per vessel limit of 0.3 tonnes (800 pounds). Estimated total landings, of 222 tonnes (488,915 pounds), were less than 1% under the fishery limit (224 tonnes (492,800 pounds)).

Table 5. The fishing periods and limits (tonnes, dressed, head-on with ice/slime) by vessel class used in the 2020 directed commercial fishery in IPHC Regulatory Area 2A.

Vessel Class		**Fishing Period (dates) & Limits (t)**		
Letter	**Feet**	**22-24 June**	**6-8 July**	**20-22 July, 3-5 August, 17-19 August**
A	1-25	0.41	0.82	1.03
B	26-30	0.41	0.82	1.03
C	31-35	0.41	0.82	1.03
D	36-40	0.62	1.24	1.55
E	41-45	0.62	1.24	1.55
F	46-50	0.82	1.65	2.06
G	51-55	0.82	1.65	2.06
H	56+	0.93	1.86	2.32

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) 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 2020, RAM reported that 2,297 persons/entities held QS.

The total 2020 landings from the IFQ/CDQ Pacific halibut fishery for the waters off Alaska, USA were 7,218 tonnes (15,913,000 pounds), 7% under the fishery limit (Table 2). By IPHC Regulatory Area, the landings were under the fishery limit by 6% for Area 2C, 3% for Area 3A, 7% for Area 3B, 19% for Area 4A and Area 4B and 7% for 4CDE/Closed (Table 2).

Homer received approximately 18% (1,282 tonnes (2,826,000 pounds)) of the directed commercial landings of Alaskan catch making it the port that received the greatest number of pounds thus far in 2020. Dutch Harbor received the second and Kodiak the third largest landing volume at 12% (867 tonnes (1,912,000 pounds)) and 11% (804 tonnes (1,773,000 pounds)) of the Alaskan commercial landings, respectively. In Southeast Alaska, the two largest landing volumes were received in Juneau (602 tonnes (1,327,000 pounds)), and Sitka (503 tonnes (1,109,000 pounds)), and their combined landings represented 15% of the directed commercial Alaskan landings. The Alaskan QS catch that was landed outside of Alaska, USA was 2%.

In the IFQ fishery is Alaska, 27 tonnes (60,447 pounds) of Pacific halibut were caught with pot gear and landed within the directed commercial fishery representing 0.6% of the total 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 eight two-day openings between 12 June and 20 September for total landings of 11 tonnes (24,119 pounds) (Table 6). The fishery closed on 1 October.

Table 6. Metlakatla community fishing periods, number of vessels, and Pacific halibut landings (net weight) in IPHC Regulatory Area 2C, 2020.

Fishing Period Dates	Landings		Number of Vessels
	(Tonnes)	(Pounds)	
12 – 14 June	1.16	2,562	2
26 – 28 June	2.02	4,461	7
10 – 12 July	1.54	3,391	6
24 – 26 July	2.06	4,535	10
07 – 09 August	1.93	4,255	8
21 – 23 August	1.01	2,224	7
04 – 06 September	0.93	2,059	4
18 – 20 September	0.29	631	3
Total	10.94	24,119	8 Openings

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 fisheries-independent setline survey 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 2020 recreational removals of Pacific halibut, including discard mortality, was estimated at 2,723 tonnes (6,002,478 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 126 cm (49.6 inch) maximum size limit and one Pacific halibut had to be between 90 – 126 cm (35.4 - 49.6 inches) or both under 90 cm (35.4 inch) when attaining the two fish possession limit with an annual limit of six per licence holder. On 14 August the daily limit was matched to the possession limit. The IPHC Regulatory Area 2B recreational harvest was 41% under the recreational allocation at 235 tonnes (518,639 pounds)

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

The 2020 IPHC Regulatory Area 2A recreational allocation was 275 tonnes (605,675 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 32 tonnes (70,000 pounds) were allocated to the incidental Pacific halibut catch in the commercial sablefish fishery in Washington. This subdivision resulted in 126 tonnes (277,100 pounds) being allocated to Washington subareas, 131 tonnes (289,575 pounds) to Oregon subareas. In addition, California received an allocation of 18 tonnes (39,000 pounds). The IPHC Regulatory Area 2A recreational harvest totaled 185 tonnes (408,538 pounds), 33% under the recreational allocation.

Recreational fishery harvest seasons by subareas varied and were managed inseason with fisheries opening on 1 May.

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

A reverse slot limit allowing for the retention of Pacific halibut, if ≤ 114 cm (45 inches) or ≥ 203 cm (80 inches) in total length, was continued by the IPHC for the charter fishery in IPHC Regulatory Area 2C. During the 7th Special Session (SS07) on the 20 May the reverse slot limit was changed to allow retention if ≤ 102 cm (40 inches) or ≥ 203 cm (80 inches) in total length. In IPHC Regulatory Area 3A, charter anglers were allowed to retain two fish, but only one could exceed 66 cm (26 inches) in length, a four fish annual limit with a recording requirement, one trip per calendar day per charter permit, with no charter retention of Pacific halibut on Tuesdays or Wednesdays. During the 7th Special Session (SS07) on the 20 May the maximum length of the second fish was changed to 81 cm (32 inches) and all day closures were removed as well as the annual limit.

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 2020 is 482 tonnes (1,063,450 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. The 2019 final estimate of C&S was 14.6 tonnes (32,200 pounds) and this catch estimate became the 2020 C&S allocation. The estimate of the 2020 removals is 18 tonnes (39,726 pounds). This estimate is higher than previous years due to an increased usage for food security as a result of the COVID-19 pandemic.

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 136.1 tonnes (300,000 pounds) annually until 2006, and since 2007, the yearly estimate has been provided as 183.7 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. Yearly reports are available at http://www.fakr.noaa.gov/ram/ subsistence/halibut.htm. Each year, the data collection program included an annual voluntary survey of fishers conducted by mail or phone, with some onsite visits. The 2018 estimate has been carried forward for 2019 and 2020.

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, as long as 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 2020 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), with CVRF reporting no removals.

CDQ - Bristol Bay Economic Development Corporation (BBEDC)

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 equally at Dillingham and King Salmon, with a small amount landed in Togiak and Naknek. BBEDC reported 13 harvesters landed 91 U32 Pacific halibut (0.45 tonnes; 995 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 wash nor was the head removed. The U32 Pacific halibut were then returned to the harvester. NSEDC reported 196 U32 Pacific halibut weighing 0.9 tonnes (1,940 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 2020 are yet to be reported and will be 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 Canada British Columbia are comprehensively 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 those programs are used to estimate non-directed commercial discard mortality. A breakout of these removals 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 the NOAA Fisheries, following advice and recommendations developed by the Pacific Fishery Management Council.

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.

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 again rolled forward.

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

IPHC Regulatory Area 3 is comprised of Areas 3A and 3B. IPHC tracks non-directed commercial discard mortality for each IPHC Regulatory Area due to assessment and stock management needs, while groundfish fisheries operate throughout both areas. Trawl fisheries are responsible for the majority of the non-directed commercial discard mortality in these IPHC Regulatory Areas, 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 at low levels.

IPHC Regulatory Area 3 remains the area where non-directed commercial discard mortality is estimated most poorly. Observer coverage for most fisheries is relatively 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.). This, plus low coverage, lead 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)

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

Pots are used to fish for Pacific cod and sablefish and fish very selectively. 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.

Within the Bering Sea, non-directed commercial discard mortality estimates have typically been the highest in IPHC Regulatory Area 4CDE (Table 2). This is due to the groundfish fisheries which operate in the area, i.e., those for flatfish.

IPHC Fishery-independent setline survey and other research

The IPHC's FISS provides catch information and biological data on Pacific halibut (*Hippoglossus stenolepis)* that are independently collected from the commercial fishery. Approximately 407 tonnes (897,000 pounds) of Pacific halibut were landed from the FISS and other research in 2020 with the amount landed from each IPHC Regulatory Area documented in Table 2. For additional information on the FISS see **IPHC-2021-AM097-06**.

Recommendation/s

That the Commission **NOTE** paper IPHC-2021-AM097-05 Rev_1 which provides an overview of the key fishery statistics regarding Pacific halibut removals from fisheries catching Pacific halibut during 2020, including the status of landings compared to fishery limits implemented by the Contracting Parties of the Commission.

Appendices

Nil

IPHC Fishery-Independent Setline Survey (FISS) design and implementation in 2020

PREPARED BY: IPHC SECRETARIAT (L. ERIKSON, K. UALESI; 17 DECEMBER 2020)

PURPOSE

To provide results of the 2020 IPHC Fishery-Independent Setline Survey (FISS).

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 (Figure 1).

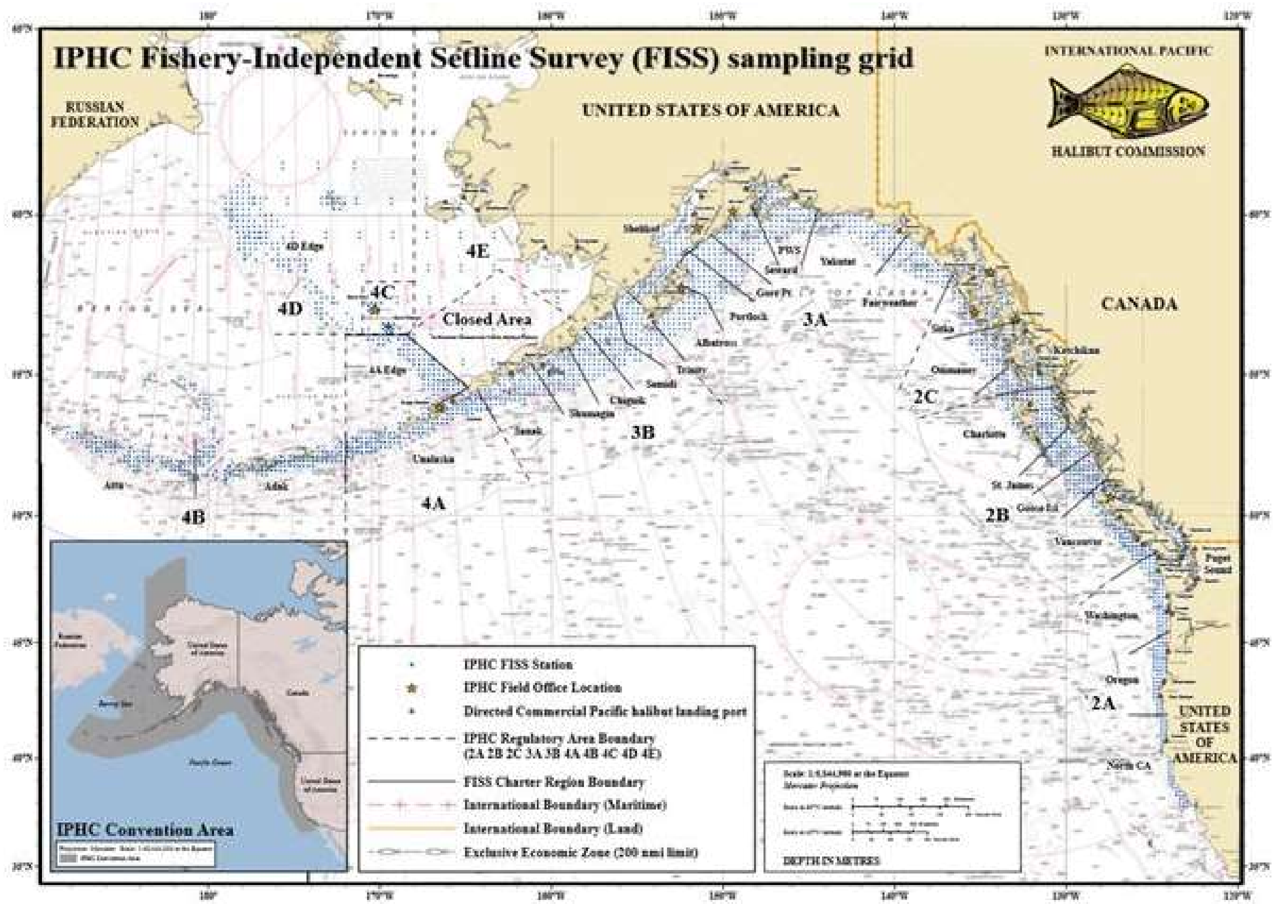

Figure 1. IPHC Fishery-Independent Setline Survey (FISS) with full sampling grid shown.

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 and again in 2020.

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.

Interactive views of some of the FISS results were provided via the IPHC website and can be found here:

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

Evolution of the 2020 FISS designs

At the 96th Session of the IPHC Annual Meeting (AM096), the Commission recommended an annual FISS design for 2020 that included 1,232 stations coastwide (Figure 2). That annual design comprised sampling of subareas within IPHC Regulatory Areas 2A, 4A (including a snap-fixed gear comparison), and 4B 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 surveys. Proposed 2020 sampling in IPHC Regulatory Areas 2B (except inside waters), 3A, and 3B in included random subsampling from the full design to provide for unbiased estimates, while increasing precision relative to recent surveys. Proposed sampling in IPHC Regulatory Area 4CDE included 100% of the full FISS design.

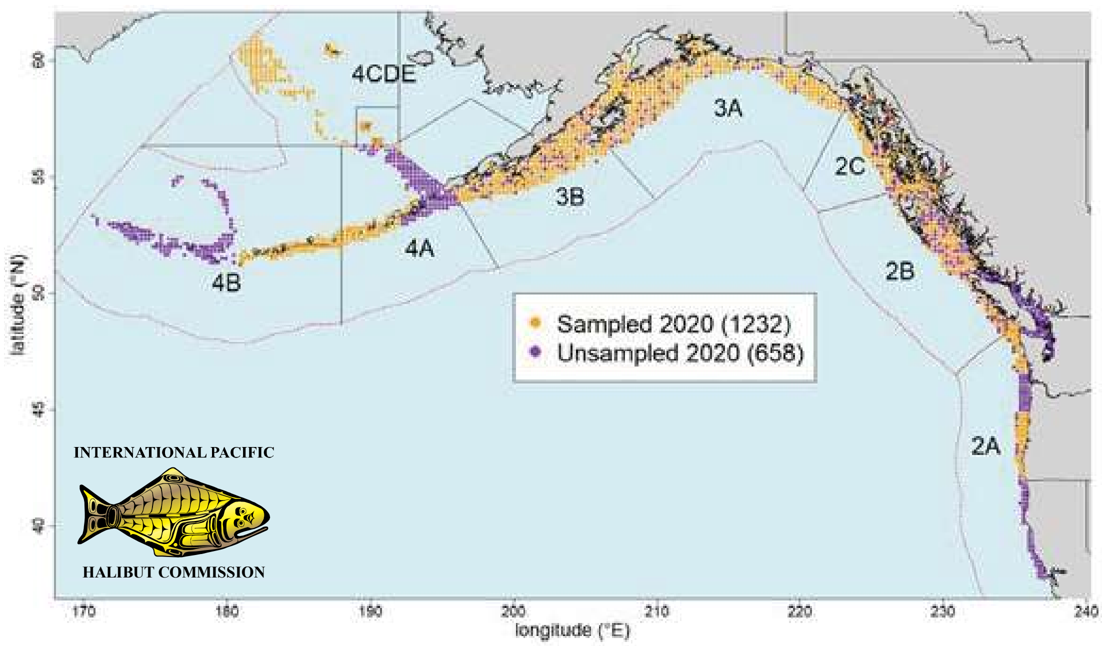

Figure 2. The IPHC Fishery-Independent Setline Survey (FISS) proposed design for 2020 from the 96th Session of the IPHC Annual Meeting (AM096).

At the 6th Special Session of the IPHC (SS06), the Commission endorsed a revised annual FISS design for 2020 that included 1,283 stations coastwide (Figure 3). The changes from the previous design included random subsampling of stations in IPHC Regulatory Area 4CDE, 100% sampling in IPHC Regulatory Areas 3A, 2C, and 2B (except inside waters), reduced random sampling in IPHC Regulatory Area 3B, a reduced subarea in IPHC Regulatory Area 2A and a relocation of the snap-fixed gear comparison to 2B.

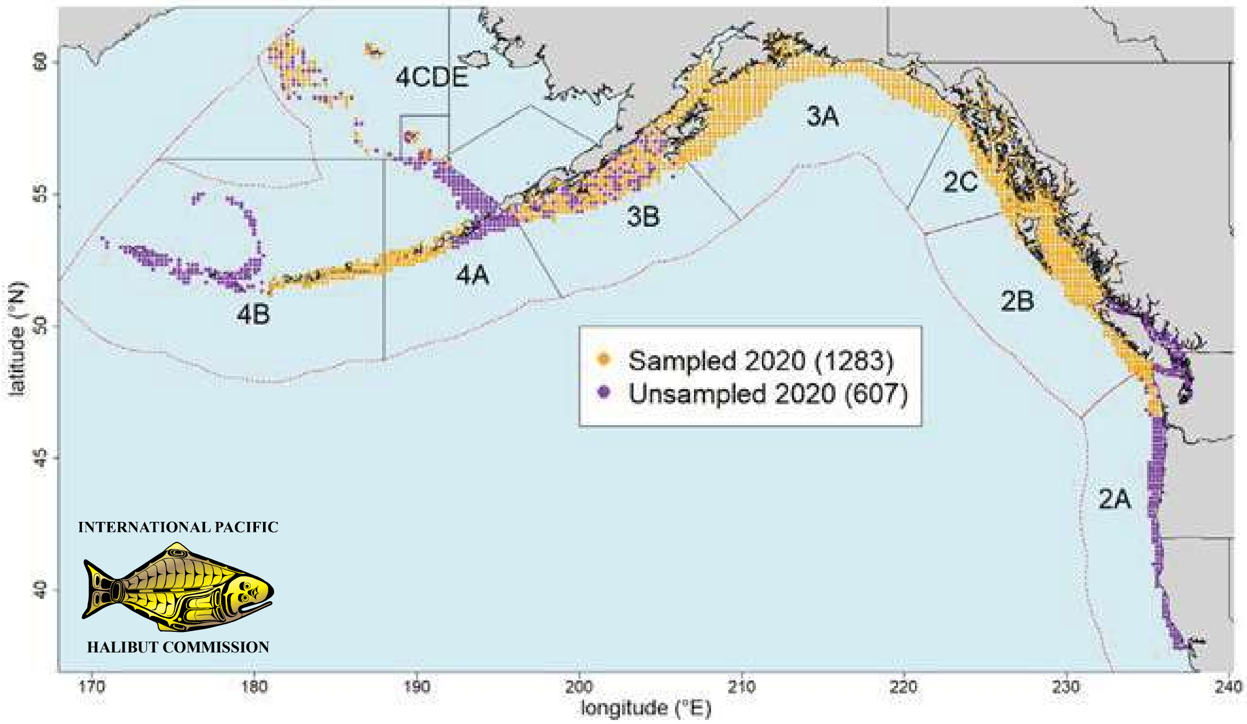

Figure 3. Map of the revised 2020 FISS design endorsed by the Commission at the 6th Special Session of the IPHC (SS06).

In light of the COVID-19 Pandemic and its impacts, on 29 May 2020, the Commission adopted (endorsed) a reduced 2020 FISS design consisting of 898 stations coastwide (Figure 4). This design included 100% sampling in IPHC Regulatory Areas 3A, 2C, and 2B (except inside waters and the outside of Vancouver Island), and random subsampling from the eastern half of IPHC Regulatory Area 3B. Additional details and a more in-depth review of the rationale leading to the evolution of the 2020 FISS designs and their implications may be found in the following document IPHC-2021-AM097-08 – Summary of data and stock assessment.

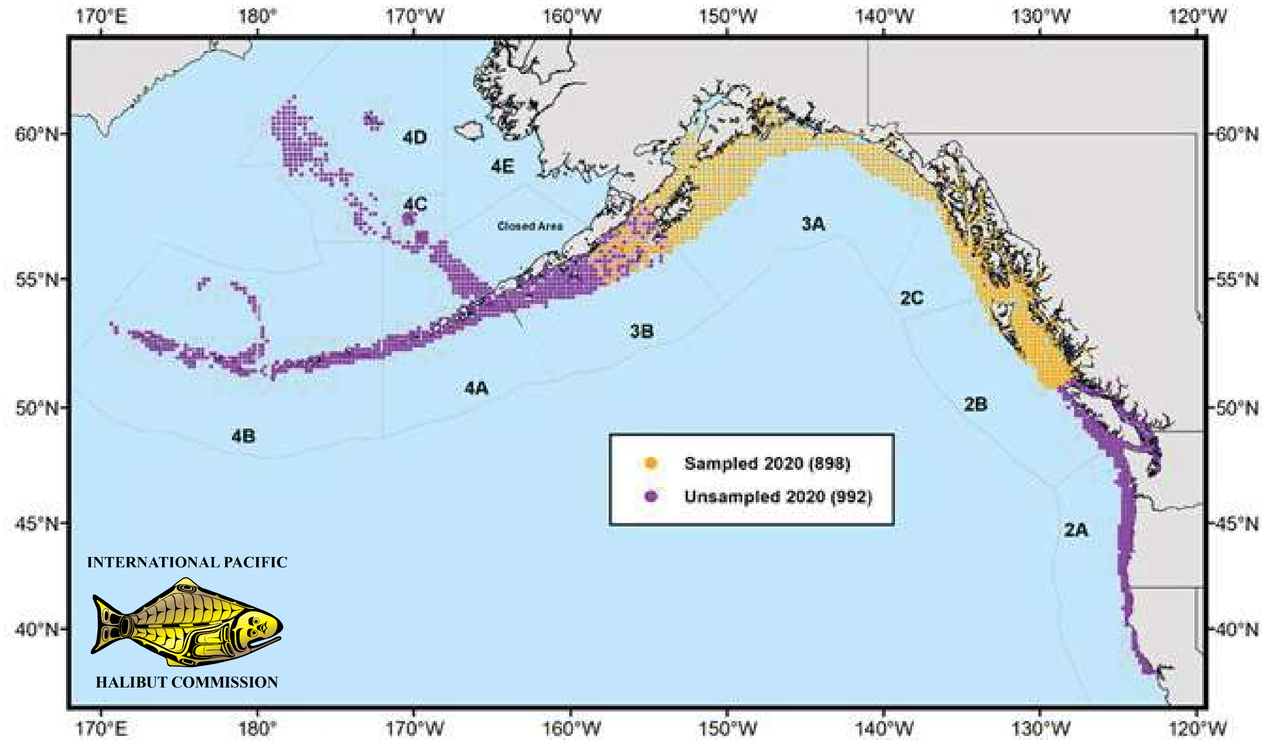

Figure 4. Map of the revised and final 2020 FISS design endorsed by the Commission on 29 May 2020.

INTRODUCTION

In most IPHC Regulatory Areas, prior to 2020, the FISS fished waters within the 37-503 m (20-275 fm) depth range. Information from commercial fishery data and other fishery-independent sources showed the presence of Pacific halibut down to depths of 732 m (400 fm) and in waters shallower than 37 m. Further, most IPHC Regulatory Areas had significant gaps in coverage within the standard 37-503 m depth range. The incomplete coverage of Pacific halibut habitat by the FISS had the potential to create bias in estimates of the weight per unit effort and numbers per unit effort (NPUE) density indices used in the stock assessment modelling and for stock distribution estimation. For this reason, the IPHC expanded the FISS to encompass these areas with stations added to cover habitat not previously sampled on the FISS. As a result, the 2020 FISS design was a selection of stations from the full FISS design of 1,890 stations. The 2020 FISS was to comprise a random subsample of 1,232 stations following decisions made at the 96th Session of the IPHC Annual Meeting (AM096). However, due to the impact of COVID-19, a reduced FISS was implemented totaling 898 stations with stations in IPHC Regulatory Areas 2B, 2C, 3A and 3B.

In 2020, a comparison of the use of snap gear to the use of fixed gear on the FISS was conducted in the St. James charter region (IPHC Regulatory Area 2B) to expand on data collected in 2019 in IPHC Regulatory Area 2C. The design featured each station being fished twice, once with fixed gear and once with snap gear, with randomisation of the order of the two gear types for each station. The comparison will provide data on any differences between catch (e.g. Pacific halibut catch rates, age and size distribution, bycatch species) on the two gears.

Beginning in 2019, individual Pacific halibut are weighed at sea throughout the FISS in order to improve the quality of estimates based on Pacific halibut weight. The use of direct weight measurements will lead to more accurate estimates of WPUE and other quantities based on weights, allow estimation of length-weight curves based on all sizes available to longline gear (whereas collections from directed commercial landings only measure fish greater than or equal to 81.3 cm in length) and provide additional information on biases in the standard curve and spatial differences in the length-weight relationship.

MATERIALS AND METHODS

The IPHC's FISS design encompasses nearshore and offshore waters of the IPHC Convention Area (Figure 5). 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 6 depicts the 2020 FISS station positions, charter region divisions, and IPHC Regulatory Areas.

Fishing vessels are chosen through a competitive bid process each year where up to three (3) regions per vessel may be awarded and typically 10-15 vessels are chosen.

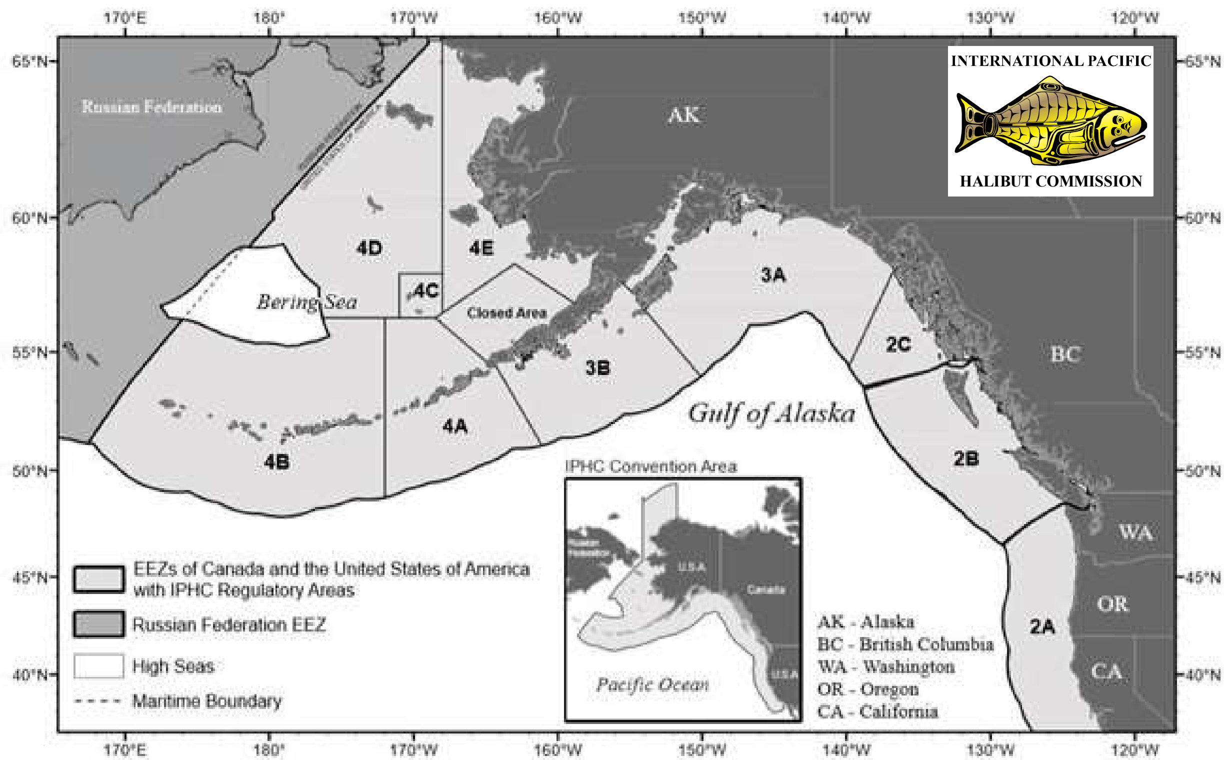

Figure 5. Map of the IPHC Convention Area (insert) and IPHC Regulatory Areas.

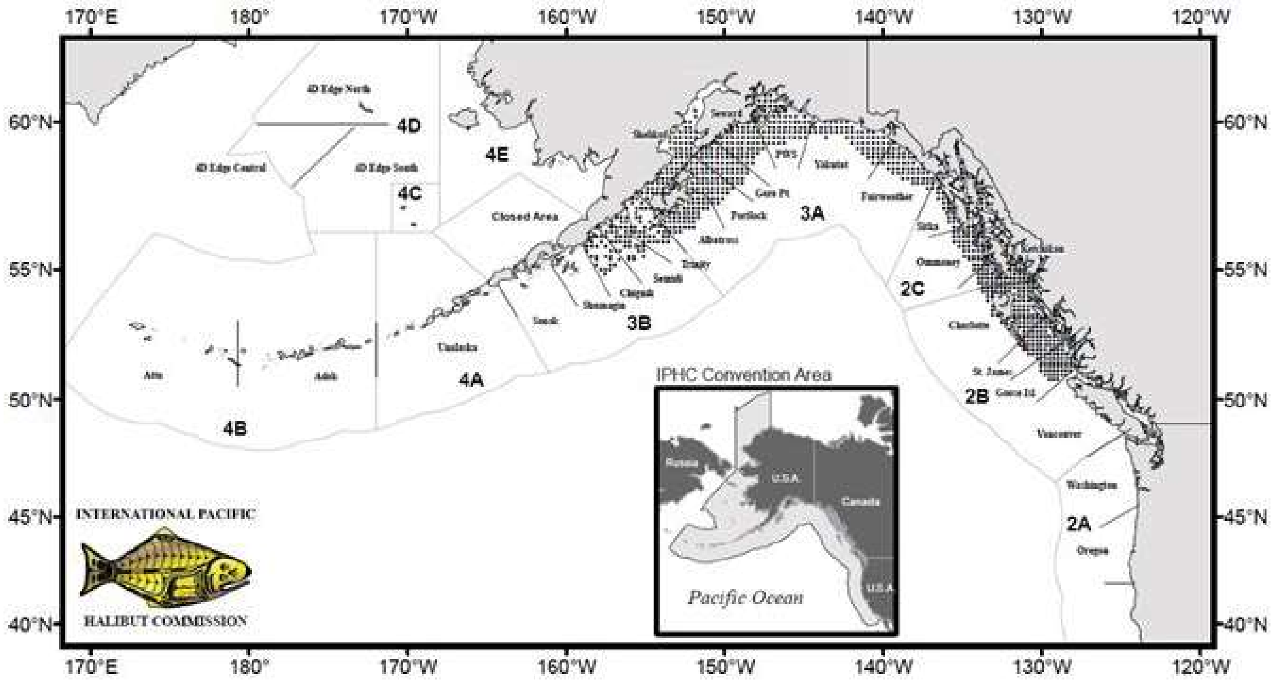

Figure 6. 2020 FISS station positions, charter region divisions, and IPHC Regulatory Areas.

Gear comparison

All stations in the St James charter region in IPHC Regulatory Area 2B were fished twice, once by the FISS standard of fixed-hook gear and once by snap gear. To accomplish this work, this charter region was divided into early and late stations by gear type. The stations for both gear types are shown in Figure 7 with the fixed-gear timing.

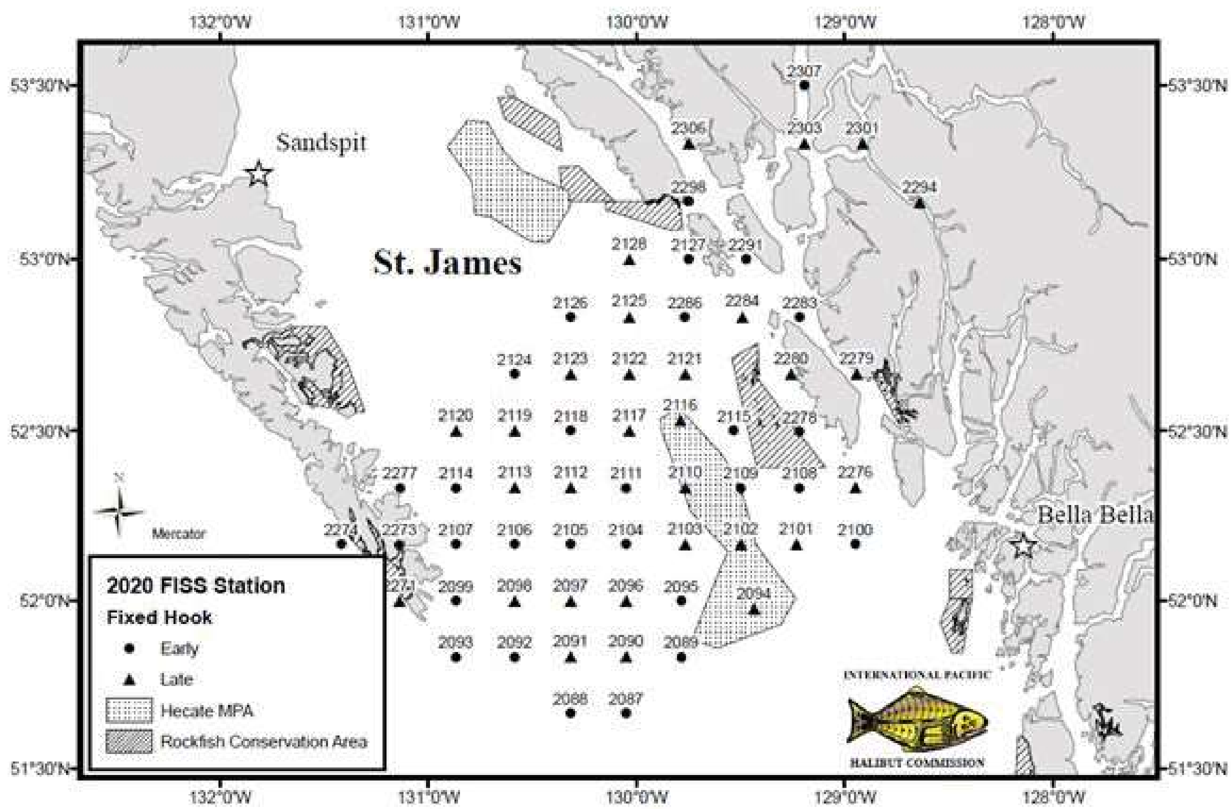

Figure 7. IPHC Regulatory Area 2B St James charter region fixed-hook gear timing.

Sampling protocols

IPHC Setline Survey Specialists collected data according to protocols established in the 2020 FISS Sampling Manual.

Bait purchase

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. The IPHC secures most of the bait needed to supply FISS operations at the end of the previous salmon season. In August 2019, staff began arranging bait purchases for the 2020 FISS. Approximately 122 tonnes of chum salmon were utilized from three suppliers in the United States of America. 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.

RESULTS AND REVENUE

Interactive views of some of the FISS results are provided via the IPHC website and can be found here: 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 2020 FISS chartered 11 commercial longline vessels (five Canadian and six USA) during a combined 62 trips and 558 charter days (Tables 1). Of the 898 FISS stations planned for the 2020 FISS season, excluding the 60 stations fished with snap gear, 872 (97%) were effectively completed. Five stations could not be fished. Twenty-one stations were deemed ineffective due to whale depredation (n=16), pinniped predation (n=1), gear soak time (n=1), shark depredation (n=1), and setting and gear issues (n=2). Otoliths were removed from 11,053 fish coastwide. Approximately 402 tonnes (887,000 pounds) of Pacific halibut, 11 tonnes (23,500 pounds) of Pacific cod, and 39 tonnes (85,600 pounds) of rockfish were landed from the FISS stations.

Table 1a. Effort and landing summary by FISS charter region and vessel for all 2020 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]
2B	Charlotte	Bold Pursuit	20875	51	84	83	26	58,255	$12.60	$5.72
2B	Goose Is.	Bold Pursuit	20875	25	56	56	14	30,294	$13.44	$6.10
2B	St. James	Hanna Lio (Snap)	23162	39	60	58	26	56,979	$12.93	$5.87
2B	St. James	Vanisle	21912	38	60	58	23	51,114	$13.34	$6.05
2C	Ketchikan	Star Wars II	20492	31	48	45	17	37,781	$9.23	$4.19
2C	Ommaney	Star Wars II	20492	37	52	52	35	76,079	$9.88	$4.48
2C	Sitka	Pender Isle	27282	34	52	48	31	68,369	$12.29	$5.57
3A	Albatross	Kema Sue	41033	26	49	49	25	55,114	$9.13	$4.14
3A	Fairweather	Pender Isle	27282	26	51	50	21	45,534	$7.61	$3.45
3A	Gore Pt.	Allstar	55922	27	48	46	21	46,324	$9.36	$4.25
3A	Portlock	Devotion	42892	27	51	47	18	39,268	$8.79	$3.99
3A	PWS	Polaris	19266	33	67	67	33	72,700	$9.28	$4.21
3A	Seward	Saint Nicholas	45399	15	17	17	9	20,491	$9.68	$4.39
3A	Seward	Polaris	19266	16	35	33	21	46,386	$9.93	$4.51
3A	Shelikof	Kema Sue	41033	29	64	63	32	71,505	$10.20	$4.63
3A	Yakutat	Seymour	17530	32	64	59	33	73,482	$10.17	$4.61
3B	Chignik	Devotion	42892	19	26	25	3	6,230	$8.73	$3.96
3B	Semidi	Saint Nicholas	45399	28	39	39	7	15,169	$7.93	$3.60
3B	Trinity	Saint Nicholas	45399	25	35	35	7	15,529	$11.88	$5.39
Total		**11 Vessels**		**558**	**958**	**930**	**402**	**886,603**	**$10.49**	**$4.76**

[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 2020 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]
2B	Charlotte	Bold Pursuit	20875	51	84	83	26	57,064	$12.62	$5.72
2B	Goose Is.	Bold Pursuit	20875	25	56	56	13	29,341	$13.43	$6.09
2B	St. James	Hanna Lio (Snap)	23162	39	60	58	26	56,809	$12.94	$5.87
2B	St. James	Vanisle	21912	38	60	58	23	50,630	$13.35	$6.05
2C	Ketchikan	Star Wars II	20492	31	48	45	17	37,193	$9.23	$4.19
2C	Ommaney	Star Wars II	20492	37	52	52	34	74,794	$9.90	$4.49
2C	Sitka	Pender Isle	27282	34	52	48	31	68,101	$10.75	$4.88
3A	Albatross	Kema Sue	41033	26	49	49	25	54,183	$9.14	$4.15
3A	Fairweather	Pender Isle	27282	26	51	50	21	45,511	$9.92	$4.50
3A	Gore Pt.	Allstar	55922	27	48	46	21	45,406	$9.39	$4.26
3A	Portlock	Devotion	42892	27	51	47	17	37,275	$8.92	$4.05
3A	PWS	Polaris	19266	33	67	67	33	72,128	$9.30	$4.22
3A	Seward	Saint Nicholas	45399	15	17	17	9	20,409	$9.68	$4.39
3A	Seward	Polaris	19266	16	35	33	21	46,060	$9.94	$4.51
3A	Shelikof	Kema Sue	41033	29	64	63	32	69,728	$10.25	$4.65
3A	Yakutat	Seymour	17530	32	64	59	33	73,482	$10.17	$4.61
3B	Chignik	Devotion	42892	19	26	25	2	4,111	$8.31	$3.77
3B	Semidi	Saint Nicholas	45399	28	39	39	6	13,055	$9.77	$4.43
3B	Trinity	Saint Nicholas	45399	25	35	35	7	15,496	$10.16	$4.61
Total		**11 Vessels**		**558**	**958**	**930**	**395**	**870,776**	**$10.51**	**$4.77**

[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 2020 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]
2B	Charlotte	Bold Pursuit	20875	51	84	83	1	1,191	$11.73	$5.32
2B	Goose Is.	Bold Pursuit	20875	25	56	56	0	953	$13.71	$6.22
2B	St. James	Hanna Lio (Snap)	23162	39	60	58	0	170	$11.80	$5.35
2B	St. James	Vanisle	21912	38	60	58	0	484	$12.65	$5.74
2C	Ketchikan	Star Wars II	20492	31	48	45	0	588	$9.27	$4.20
2C	Ommaney	Star Wars II	20492	37	52	52	1	1,285	$8.87	$4.02
2C	Sitka	Pender Isle	27282	34	52	48	0	268	$10.48	$4.75
3A	Albatross	Kema Sue	41033	26	49	49	0	931	$8.53	$3.87
3A	Fairweather	Pender Isle	27282	26	51	50	0	23	$9.48	$4.30
3A	Gore Pt.	Allstar	55922	27	48	46	0	918	$8.02	$3.64
3A	Portlock	Devotion	42892	27	51	47	1	1,993	$8.25	$3.74
3A	PWS	Polaris	19266	33	67	67	0	572	$7.03	$3.19
3A	Seward	Saint Nicholas	45399	15	17	17	0	82	$8.84	$4.01
3A	Seward	Polaris	19266	16	35	33	0	326	$8.82	$4.00
3A	Shelikof	Kema Sue	41033	29	64	63	1	1,777	$8.26	$3.75
3A	Yakutat	Seymour	17530	32	64	59	0	0	$ -	$ -
3B	Chignik	Devotion	42892	19	26	25	1	2,119	$7.65	$3.47
3B	Semidi	Saint Nicholas	45399	28	39	39	1	2,114	$9.19	$4.17
3B	Trinity	Saint Nicholas	45399	25	35	35	0	33	$9.70	$4.40
Total		**11 Vessels**		**558**	**958**	**930**	**7**	**15,827**	**$9.16**	**$4.16**

[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 13 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 were also selection criteria. Individual sales were evaluated after each event to ensure that the buyer was meeting IPHC standards. Average prices decreased from $12.31/kg in 2019 to $10.49/kg in 2020 (Tables 3). This represents a 14.8% drop in price, which is lower than the 25% drop predicted due to COVID-19 constraints.

Table 2a. FISS Pacific halibut landings by port for all Pacific halibut (sampled U32 and all O32), 2020[1,2].

Offload Port	Trips	Tonnes	Pounds	Total USD	Average Price (USD/kg)	Average Price (USD/lb)
Cordova	1	10	21911	$92,217	$9.28	$4.21
Craig	1	9	20,810	$97,053	$10.28	$4.66
Homer	7	36	79,270	$374,549	$10.42	$4.72
Juneau	2	17	37,606	$176,910	$10.37	$4.70
Ketchikan	5	24	52,557	$226,552	$9.50	$4.31
Kodiak	11	75	164,756	$681,845	$9.12	$4.14
Petersburg	2	18	40,493	$175,615	$9.56	$4.34
Port Hardy	12	63	139,377	$834,260	$13.20	$5.99
Prince Rupert	5	39	85,894	$480,254	$12.33	$5.59
Sand Point	1	2	4,590	$15,989	$7.68	$3.48
Seward	8	60	132,938	$579,382	$9.61	$4.36
Sitka	2	16	36,045	$157,815	$9.65	$4.38
Yakutat	5	32	70,356	$325,337	$10.19	$4.62
Grand Total	**62**	**402**	**886,603**	**$4,217,777**	**$10.49**	**$4.76**

[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, 2020[1,2].

Offload Port	Trips	Tonnes	Pounds	Total USD	Average Price (USD/kg)	Average Price (USD/lb)
Cordova	1	10	21595	$91,406.68	$9.33	$4.23
Craig	1	9	20430	$95,381.10	$10.29	$4.67
Homer	7	35	77519	$367,810.84	$10.46	$4.74
Juneau	2	17	37606	$176,909.61	$10.37	$4.70
Ketchikan	5	23	51587	$222,399.03	$9.50	$4.31
Kodiak	11	72	159742	$663,100.68	$9.15	$4.15
Petersburg	2	18	39970	$173,798.60	$9.59	$4.35
Port Hardy	12	62	137770	$824,644.49	$13.20	$5.99
Prince Rupert	5	38	84435	$472,645.24	$12.34	$5.60
Sand Point	1	1	2954	$10,426.25	$7.78	$3.53
Seward	8	59	130790	$570,417.13	$9.62	$4.36
Sitka	2	16	36045	$157,814.51	$9.65	$4.38
Yakutat	5	32	70333	$325,238.05	$10.19	$4.62
Grand Total	**62**	**395**	**870,776**	**$4,151,992**	**$10.51**	**$4.77**

[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, 2020[1,2].

Offload Port	Trips	Tonnes	Pounds	Total USD	Average Price (USD/kg)	Average Price (USD/lb)
Cordova	1	<1	316	$810.00	$5.65	$2.56
Craig	1	<1	380	$1,672.00	$9.70	$4.40
Homer	7	1	1751	$6,738.54	$8.48	$3.85
Juneau	2	0	0	$ -	$ -	$ -
Ketchikan	5	<1	970	$4,153.20	$9.44	$4.28
Kodiak	11	2	5014	$18,744.77	$8.24	$3.74
Petersburg	2	<1	523	$1,816.50	$7.66	$3.47
Port Hardy	12	1	1607	$9,615.09	$13.19	$5.98
Prince Rupert	5	1	1459	$7,609.08	$11.50	$5.22
Sand Point	1	1	1636	$5,562.40	$7.50	$3.40
Seward	8	1	2148	$8,964.80	$9.20	$4.17
Sitka	2	0	0	$ -	$ -	$ -
Yakutat	5	<1	23	$98.90	$9.48	$4.30
Grand Total	**62**	**7**	**15,827**	**$65,785.28**	**$9.16**	**$4.16**

[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 2020[1].

IPHC Regulatory Area	2B	2C	3A	3B	Combined
Tonnes	89	83	214	17	402
Pounds	196,642	182,229	470,804	36,928	886,603
Price USD/kg	$13.02	$10.07	$9.66	$9.62	$10.49
Price USD/lb	$5.90	$4.57	$4.38	$4.36	$4.76

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

Table 3b. FISS landings (total pounds and price) of O32 Pacific halibut by IPHC Regulatory Area in 2020[1].

IPHC Regulatory Area	2B	2C	3A	3B	Combined
Tonnes	88	82	211	15	395
Pounds	193,844	180,088	464,182	32,662	870,776
Price USD/kg	$13.02	$10.08	$9.68	$9.77	$10.51
Price USD/lb	$5.91	$4.57	$4.39	$4.43	$4.77

[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 2020[1].

IPHC Regulatory Area	2B	2C	3A	3B	Combined
Tonnes	1	1	3	2	7
Pounds	2,798	2,141	6,622	4,266	15,827
Price USD/kg	$12.57	$9.18	$8.19	$8.43	$9.16
Price USD/lb	$5.70	$4.16	$3.72	$3.82	$4.16

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

FISS timing

Each year, the months of June, July, and August are targeted for FISS fishing. In 2020, this activity took place from 27 June through 9 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 early-September.

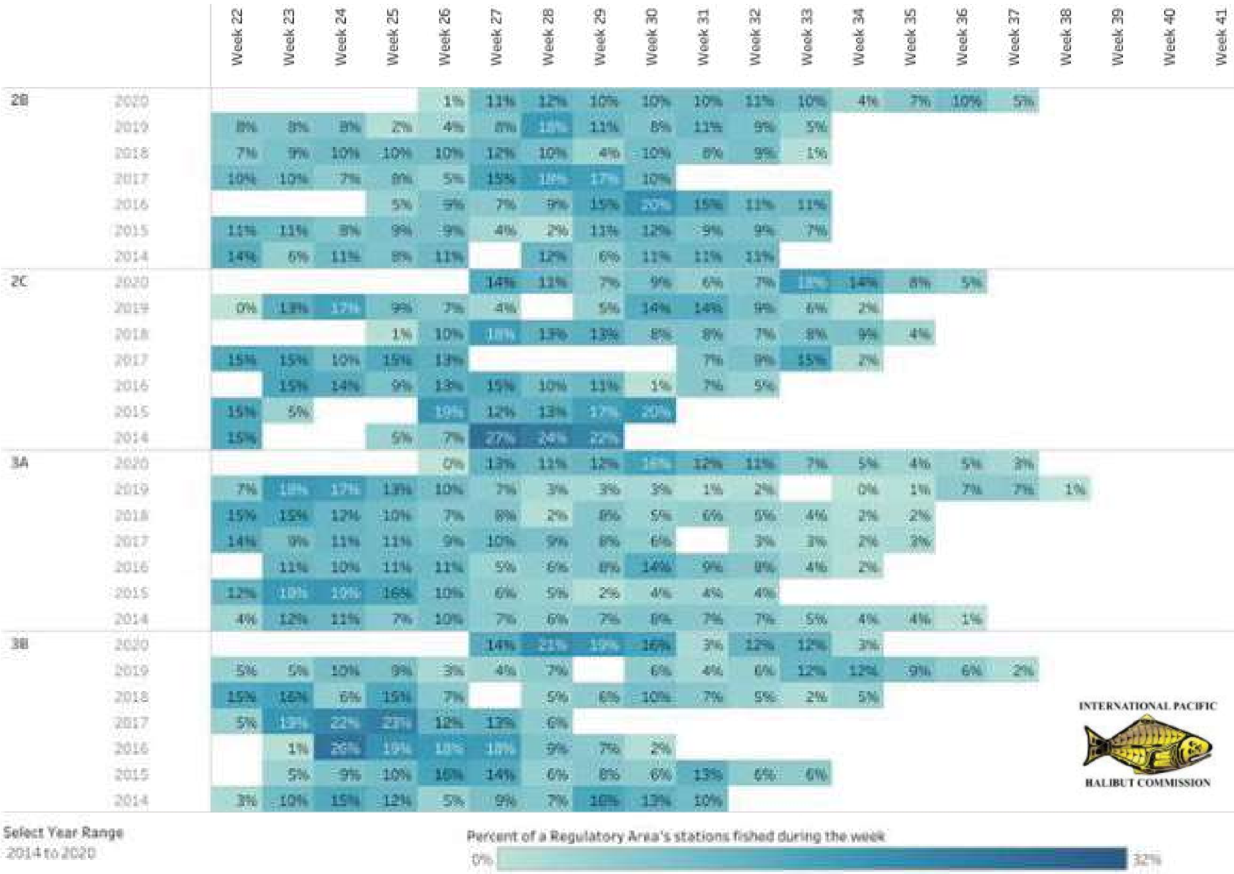

Figure 8. Percent of the total FISS stations completed by IPHC Regulatory Area during each week of the year (2014-2020). Week 22 begins in late May or early June depending on the year.

RECOMMENDATION/S

That the Commission **NOTE** paper IPHC-2021-AM097-06 which provided an overview of the IPHC's FISS design and implementation in 2020.

APPENDICES

Nil

Space-time modelling of survey data and FISS designs for 2021-23

PREPARED BY: IPHC SECRETARIAT (R. WEBSTER; 22 DECEMBER 2020)

PURPOSE

To provide results of the space-time modelling of fishery-independent survey data for Pacific halibut in 2020, and to present IPHC FISS designs for 2021-23.

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. Space-time modelling is used to estimate the time series of mean weight-per-unit effort (WPUE) for each IPHC Regulatory Area, both O32 (greater than or equal to 32" or 81.3cm in length) and all sizes of Pacific halibut. WPUE indices are used to estimate the distribution of the stock among IPHC Regulatory Areas and Biological Regions. Mean numbers-per-unit-effort (NPUE) are also estimated from space-time modelling, and is used to index the trend in Pacific halibut density for use in the stock assessment models.

FISS history 1993-2010

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 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 NOAA-Fisheries trawl survey (Webster et al. 2020).

FISS expansions 2011-19

Examination of commercial logbook data and information from other sources, it became clear by 2010 that the 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 regions 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 within 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 fishing 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, with the goal of sampling the entire FISS design of 1,890 stations in the shortest time logistically possible. Each year included FISS expansions in one or two IPHC Regulatory Areas:

- 2014: IPHC Regulatory Areas 2A and 4A
- 2015: IPHC Regulatory Area 4CDE eastern Bering Sea flats
- 2016: IPHC Regulatory Area 4CDE shelf edge
- 2017: IPHC Regulatory Areas 2A and 4B
- 2018: IPHC Regulatory Areas 2B and 2C
- 2019: IPHC Regulatory Areas 3A and 3B

The FISS expansion program has 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. This has also allowed the Commission to, for the first time, fully quantify the uncertainty associated with estimates based on partial sampling of the species range. It has also provided us with a complete set of observations over the full FISS design (Figure 1) from which an optimal subset of stations can be selected when devising annual FISS designs. 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 shown in Figure 1).

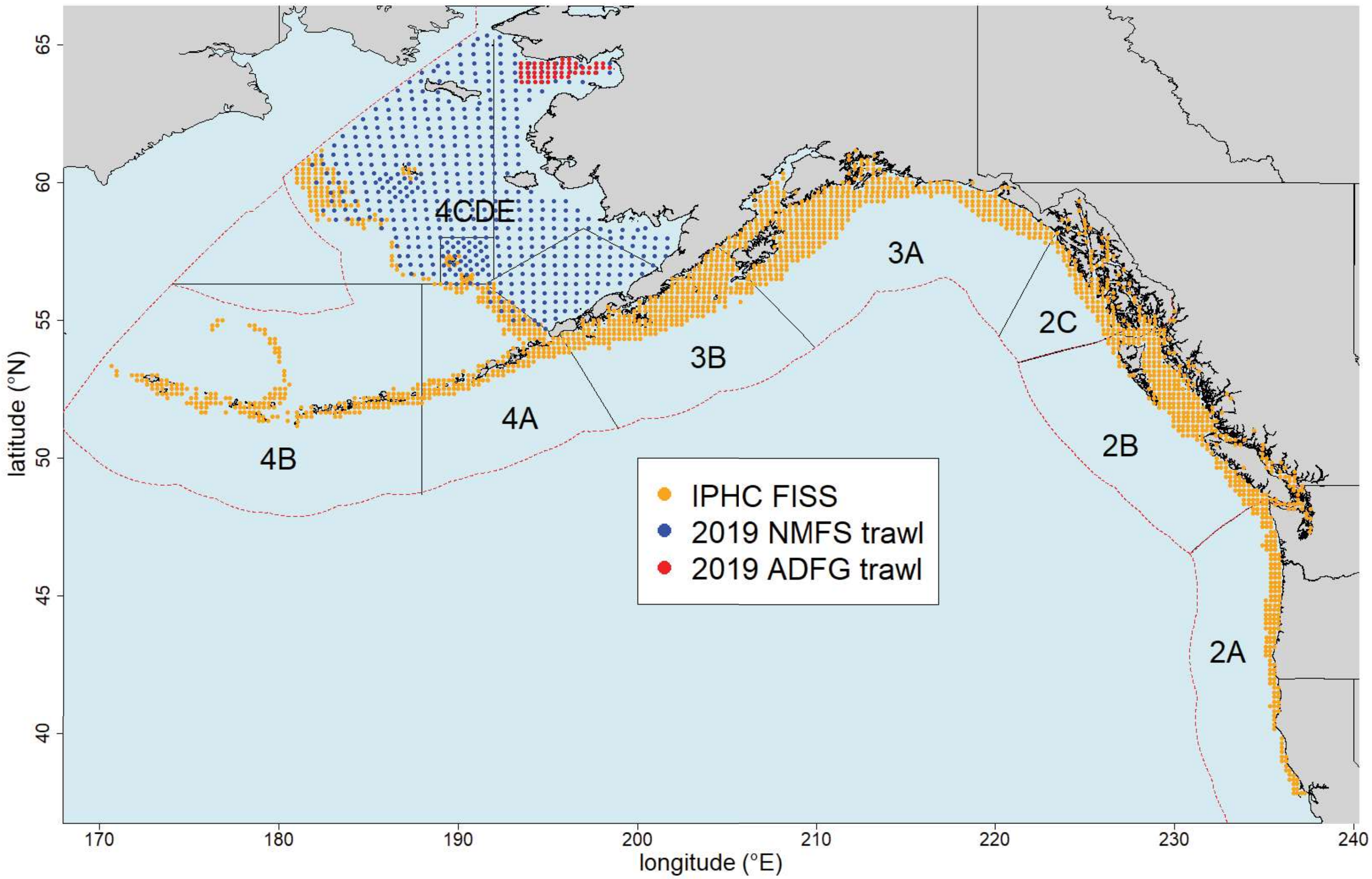

Figure 1. Map of the full 1890 station FISS design, with orange circles representing stations available for inclusion in annual sampling designs, and other colours representing trawl stations from 2019 NOAA-Fisheries and ADFG surveys used to provide complementary data for Bering Sea modelling.

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. 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 were recently published in a peer-review journal (Webster et al. 2020).

FISS design objectives

The primary purpose of the annual FISS is to sample Pacific halibut to provide data for the stock assessment and estimates of stock distribution for use in the development of an IPHC management procedure. The priority of a 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.

Table 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

Review process

At the 96th Session of the IPHC Annual Meeting (AM096) in February 2020, alternative designs were presented to IPHC Commissioners that had been evaluated based on scientific criteria (IPHC-2020-AM096-07), in particular, meeting specific precision targets (coefficients of variation, CVs, below 15%) for WPUE and NPUE indices, and ensuring low probability of large bias in estimators of those indices. These evaluation methods had been previously reviewed by the SRB at SRB014 (IPHC-2019-SRB014-05 Rev_1) with application to IPHC Regulatory Areas 4B and (in presentation) 2A, and introduced to Commissioners at IM095 (IPHC-2019-IM095-07 Rev_1). While development of the proposed designs focused on the Primary Objective of the FISS (Table 1), logistics and cost (Secondary Objective) were also considered in developing proposals based on annual sampling of subareas of each IPHC Regulatory Area on a rotating basis.

Following the completion of the coastwide FISS expansion efforts, 2019/2020 was the first year fully rationalised designs could be proposed. It is expected that the design proposal and review process going forward will be as follows:

- The Secretariat present design proposals to SRB for three subsequent years at the June meeting;
- First review of design proposals by Commissioners will occur at the September work meeting, revised if necessary based on June SRB input;
- Presentation of proposed designs for approval at the November Interim Meeting;
- Ad-Hoc modifications possible at Annual Meeting (due to unforeseen issues arising);
- Adopted AM design for current year modified for cost and logistical reasons prior to summer implementation in FISS (February-April).

Consultation with industry and stakeholders occurs throughout the FISS planning process, and particularly in finalizing design details as part of the FISS charter bid process, when stations can be added to provide for improved logistical efficiency. We also note the opportunities for stakeholder input during public meetings (Interim and Annual Meetings) and through the IPHC's Research Advisory Board.

Results of space-time modelling in 2020

Revisions to the data inputs for space-time modelling of survey data included the use of a smoother curve for calibrating NMFS trawl survey data with IPHC FISS data in the Bering Sea, and the inclusion of snap-gear data in IPHC Regulatory Area 2B modelling. The former was a result of recommendations from reviewers of Webster et al. (2020), in which we presented methods for space-time modelling of Bering Sea survey data.

Figures 2 and 3 show time series estimates of O32 WPUE (most comparable to fishery catch-rates) and all sizes NPUE over the 1993-2020 period included in the 2020 space-time modelling. Overall there was an estimated increase of 6% in the coastwide O32 WPUE index, due largely to a 16% increase in Region 3, offset by a 7% decrease in Region 2 (Figure 2). Coastwide all sizes NPUE was stable, with just a 1% estimated decrease (Figure 3). Estimated 1993-20 time series by IPHC Regulatory Area are in Appendix A.

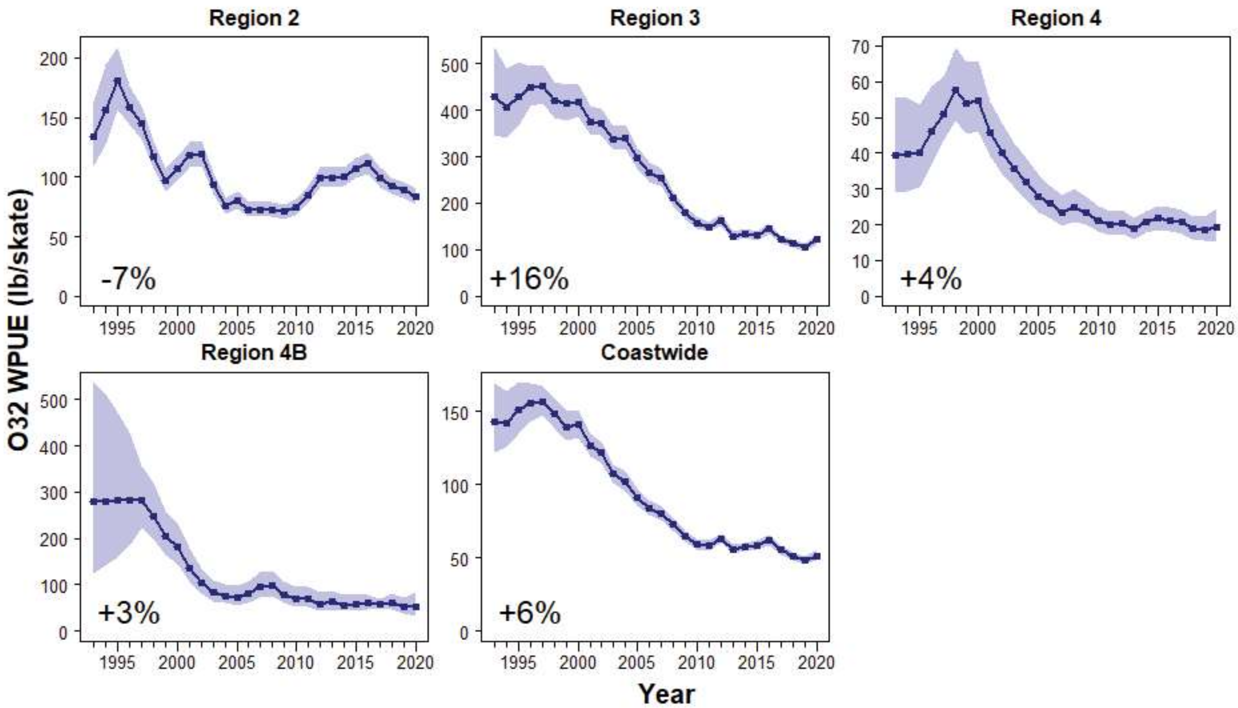

Figure 2. Space-time model output for O32 WPUE for 1993-2020 for Biological Regions. Filled circles denote the posterior means of O32 WPUE for each year. Shaded regions show posterior 95% credible intervals, which provide a measure of uncertainty: the wider the shaded interval, the greater the uncertainty in the estimate. Numeric values in the lower left-hand corners are estimates of the change in mean O32 WPUE from 2019 to 2020.

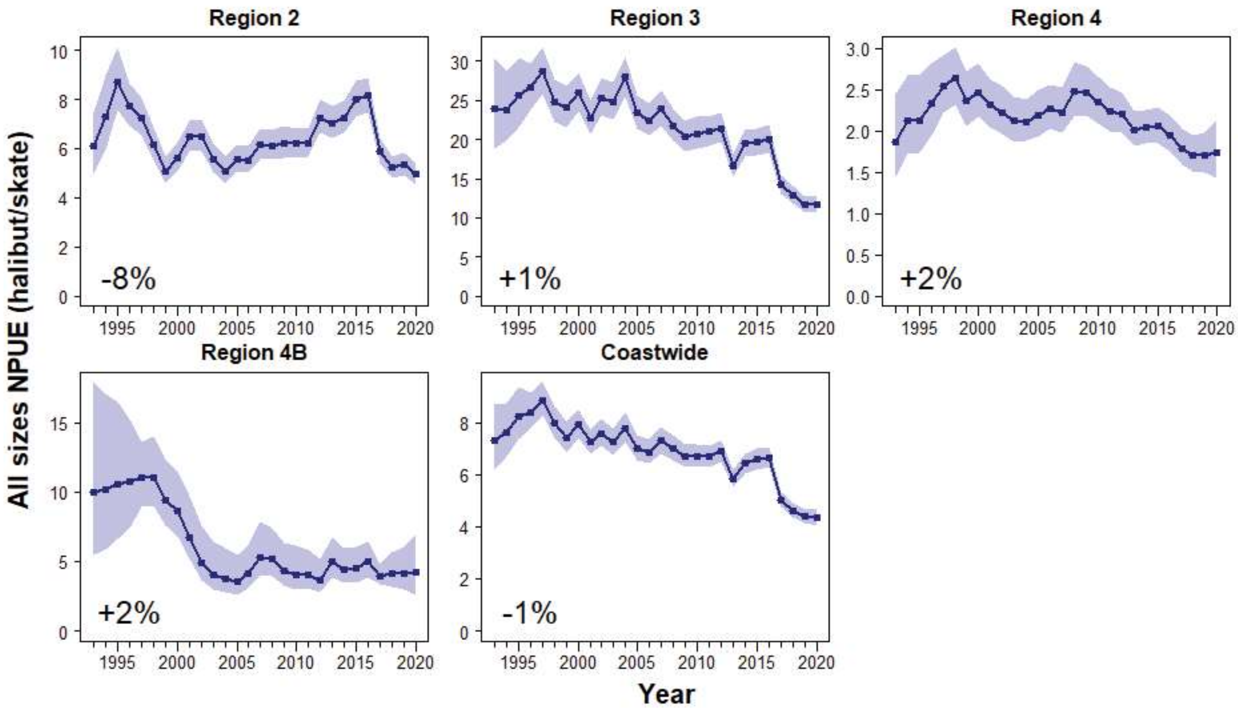

Figure 3. Space-time model output for all sizes NPUE for 1993-2020 for Biological Regions. Filled circles denote the posterior means of all sizes NPUE for each year. Shaded regions show posterior 95% credible intervals, which provide a measure of uncertainty: the wider the shaded interval, the greater the uncertainty in the estimate. Numeric values in the lower left-hand corners are estimates of the change in mean all sizes NPUE from 2019 to 2020.

In Regulatory Area 2B, data from both fixed and snap gears were used in the modelling. Parameters allowing for different catch rates of the two gears were included in the models, and estimates of WPUE and NPUE series were based on model predictions assuming fixed gear to ensure consistency with other Regulatory Areas. Parameter estimates of gear type differences all implied that snap gear catch rates were lower on average (Table 2), with estimated catch rate ratios of 0.72 to 0.83 for the three indices modelled in 2020 (i.e. we estimate snap gear had 72% to 83% of the catch of fixed gear, depending on the index). Posterior 95% credible intervals were all wide, and included the value 1, i.e. no difference in catch rate, meaning that no clear conclusions regarding the relative effectiveness of the two gear types can be drawn from this project on its own. However, the results are generally consistent with those of the much larger gear comparison study in 2019, which estimated a ratio of 0.86 for all three indices. Additional modelling will be used to combine the data from both studies and from future studies to be conducted elsewhere, which will lead to more precise overall estimates of the ratio of catch rates across all IPHC Regulatory Areas.

Table 2. Posterior estimates of the ratio of snap to fixed gear catch rates for O32 and all sizes WPUE, and all sizes NPUE, from space-time modelling of data from the St James charter region in Regulatory Area 2B in 2020.

Variable	**Ratio of snap to fixed catch rate**	
	Posterior mean	**95% credible interval**
O32 WPUE	0.83	0.63 – 1.10
All sizes WPUE	0.79	0.60 – 1.03
All sizes NPUE	0.72	0.60 – 1.17

PROPOSED FISS DESIGNS FOR 2021-23

Due to budgetary constraints and the impact of COVID-19, neither the proposed nor adopted AM096 designs described below were implemented in 2020. Instead, a design with sampling only within the core areas was undertaken for the 2020 FISS (IPHC-2020-CR-013; Figure 4). Because of this, our proposal for 2021-23 is to shift the 2020-22 Secretariat-preferred compromise proposal presented at AM096 (see below) to instead be implemented in 2021-23 (Figures 5-7). This design uses efficient subarea sampling in IPHC Regulatory Areas 2A, 4A and 4B, but incorporates a randomized design 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 1,000 stations in an average year. Outside the core areas, the subarea design allows for logistically efficient sampling, and therefore accounts for the Secondary Objective discussed above (Table 1). It is likely that this design represents the maximum effort that can be deployed outside the core areas in coming years, while still meeting the Secondary Objective. These designs were reviewed by the SRB at SRB016 (IPHC-2020-SRB016-R), and SRB017 (IPHC-2020-SRB017-R). In the report of the latter meeting, the SRB stated the following:

> *"The SRB RECOMMENDED that the Commission endorse the final 2021 FISS design as proposed by IPHC Secretariat, and provided at Appendix IVa."; and*
>
> *"The SRB provisionally ENDORSED the 2022 and 2023 FISS design proposals provided at Appendix IVb and IVc, recognizing that these will be reviewed again at subsequent SRB meetings."*

The Commission reviewed the designs at IM096 (IPHC-2020-IM096-R) and the subsequent Special Session SS09 (IPHC-2020-SS09-R). At the latter meeting, the Commission recommended that the IPHC Secretariat proceed with an "optimised" version of the design in Figure 5 for 2021, in which stations are added to core IPHC Regulatory Areas and skates per station are increased in those areas to optimise the 2021 FISS design for revenue (Figure 8).

> IPHC-2020-ID016 (para. 8) *The Commission* ***RECOMMENDED*** *that the IPHC Secretariat proceed with an 'optimised' version of the 'minimum 2021 FISS design', involving adding an additional ~398 stations within the areas covered by the 'minimum 2021 FISS design' and where feasible, adding additional skates on each station (Fig. 2). The Commission reserved the right to make ad-hoc adjustments to the 2021 FISS at the 97th Session of*

the IPHC Annual Meeting (AM097), based on updated information to be provided by the IPHC Secretariat on IPHC Regulatory Areas 4B and 2A.

RECOMMENDATION

That the Commission **NOTE** paper IPHC-2021-AM097-07 that provides results of space-time modelling of survey data in 2020 and presents FISS designs for 2021-23.

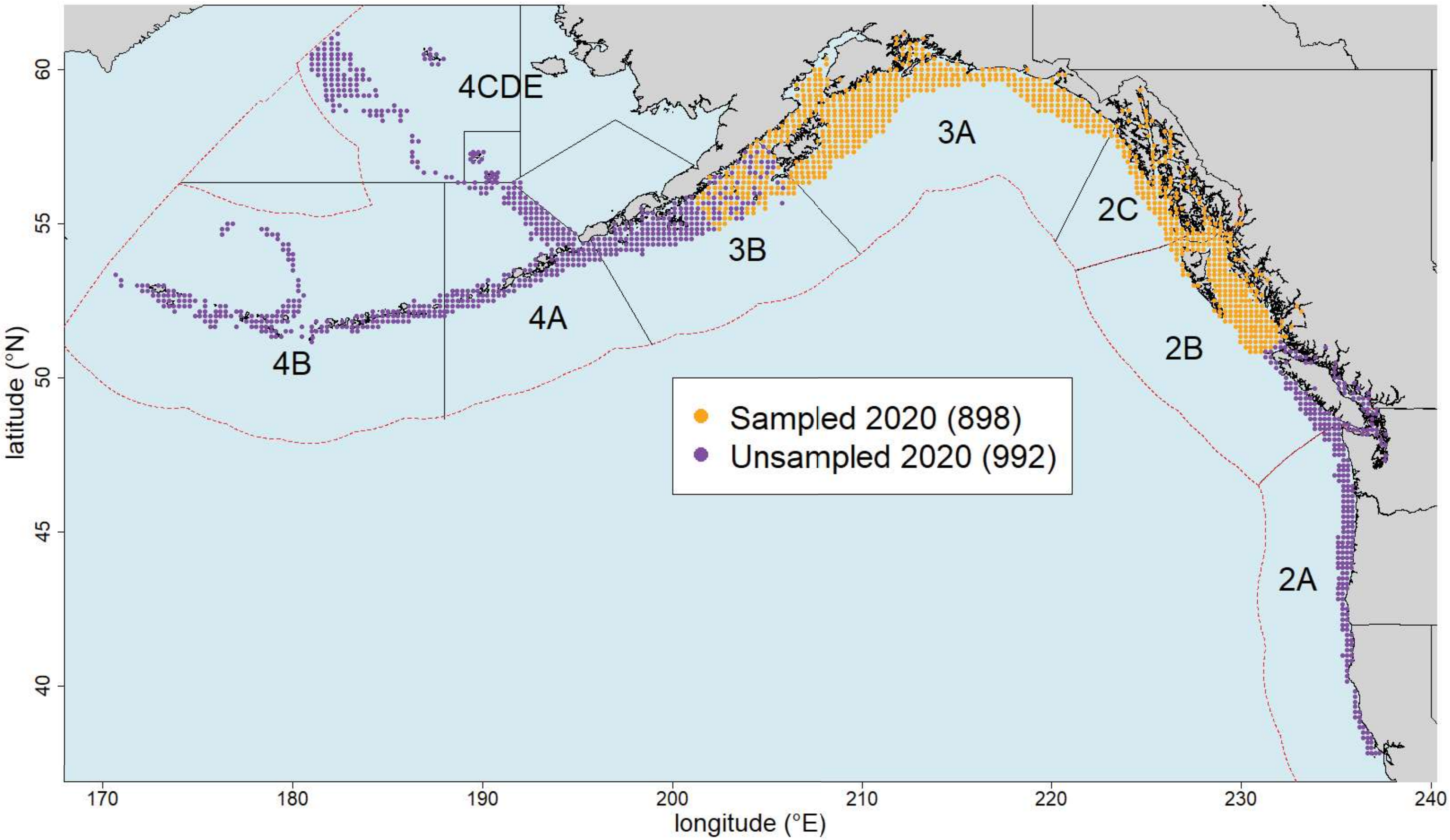

Figure 4. Map of the implemented 2020 FISS design, with orange circles representing those stations to be fished in 2020, and purple circles representing stations to be next fished in subsequent years.

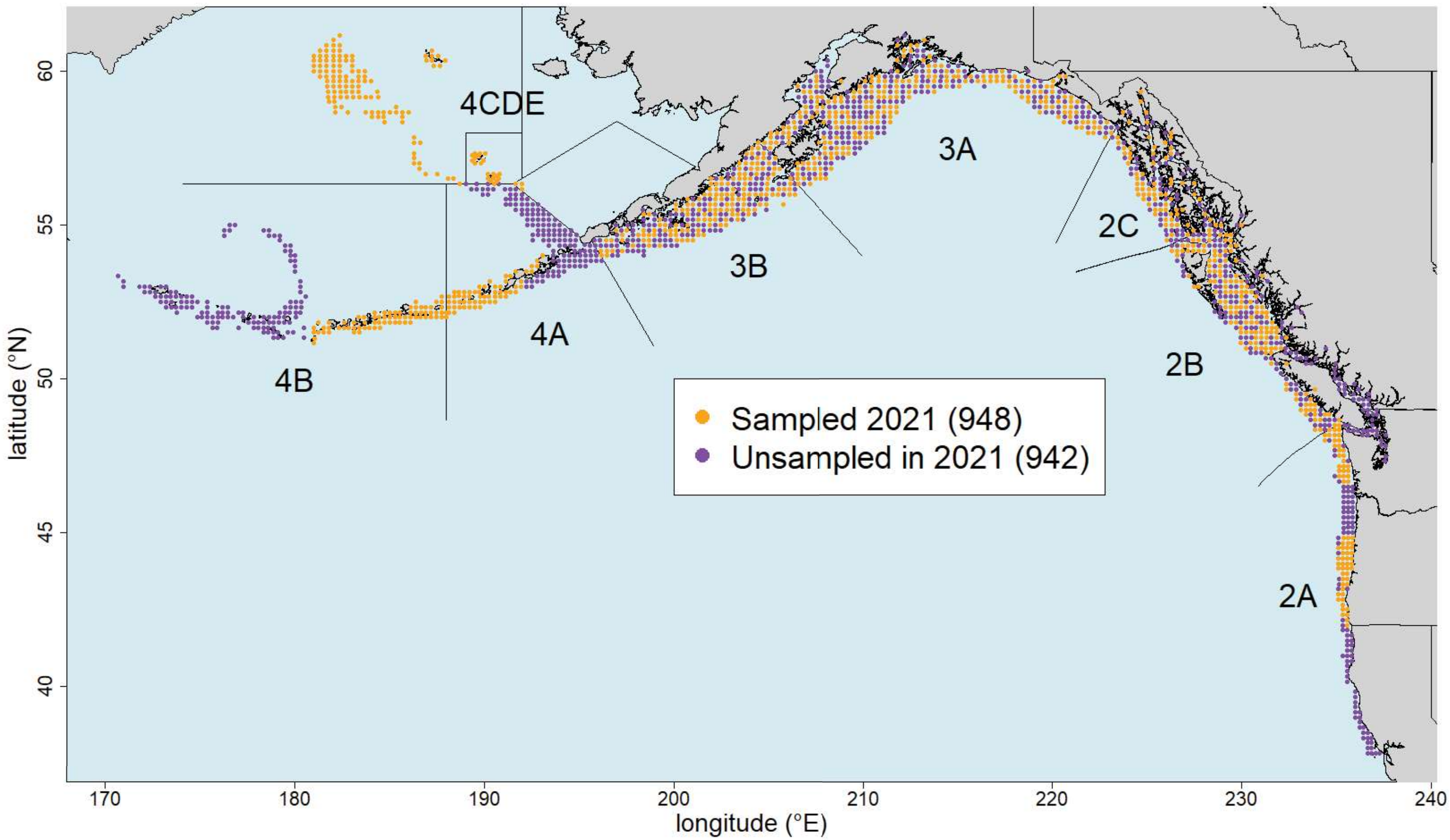

Figure 5. Proposed '*minimum 2021 FISS design*' (orange circles) based on randomized sampling in 2B-3B, and a subarea design elsewhere. Purple circles are optional for meeting data quality criteria.

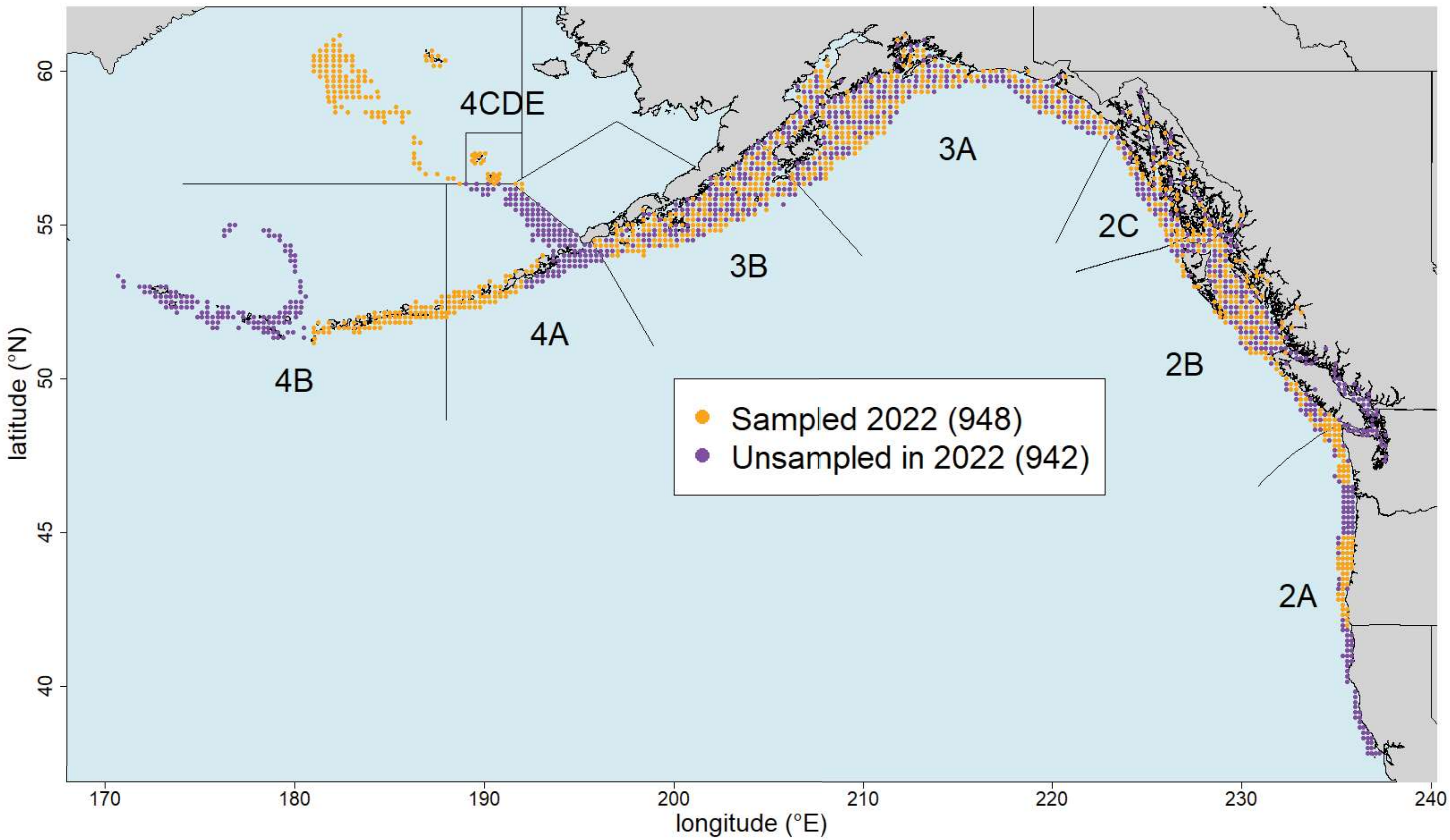

Figure 6. Proposed '*minimum 2022 FISS design*' (orange circles) based on randomized sampling in 2B-3B, and a subarea design elsewhere. Purple circles are optional for meeting data quality criteria.

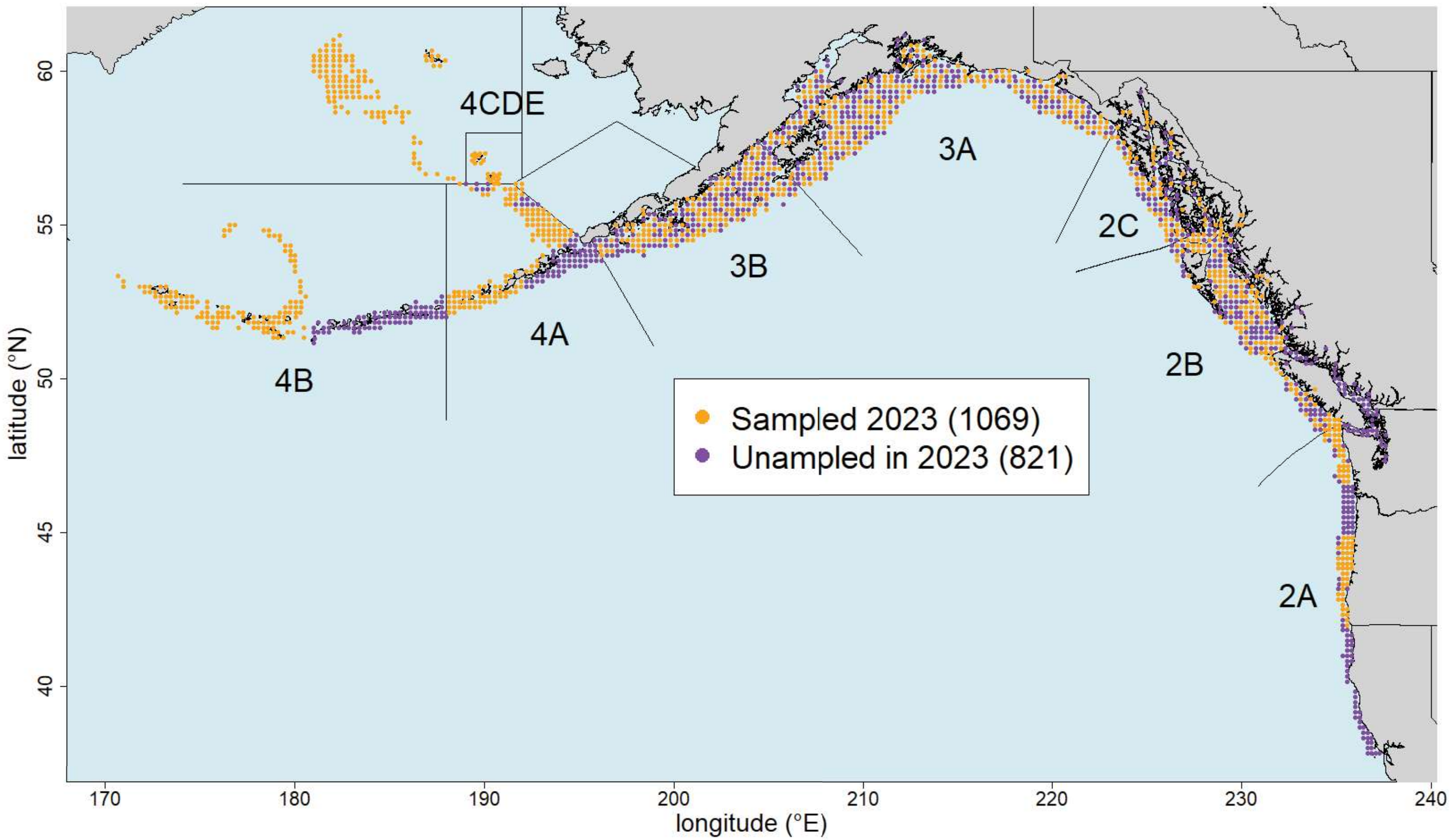

Figure 7. Proposed *'minimum 2023 FISS design'* (orange circles) based on randomized sampling in 2B-3B, and a subarea design elsewhere. Purple circles are optional for meeting data quality criteria.

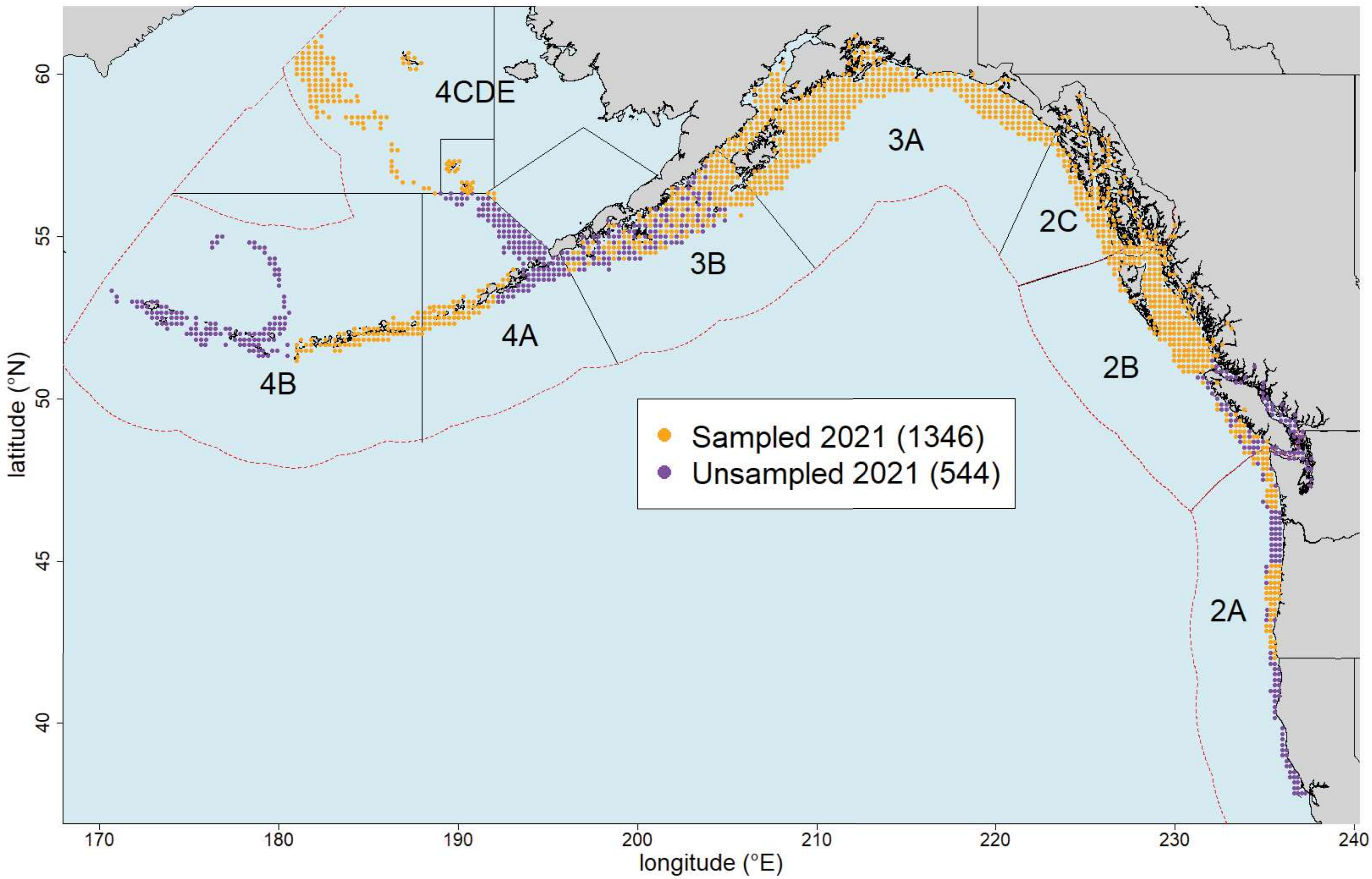

Figure 8. '*Optimised minimum 2021 FISS design*' (orange circles). Stations represented by purple circles are not planned for sampling in 2021.

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APPENDIX A

Space-time modelling results by IPHC Regulatory Area

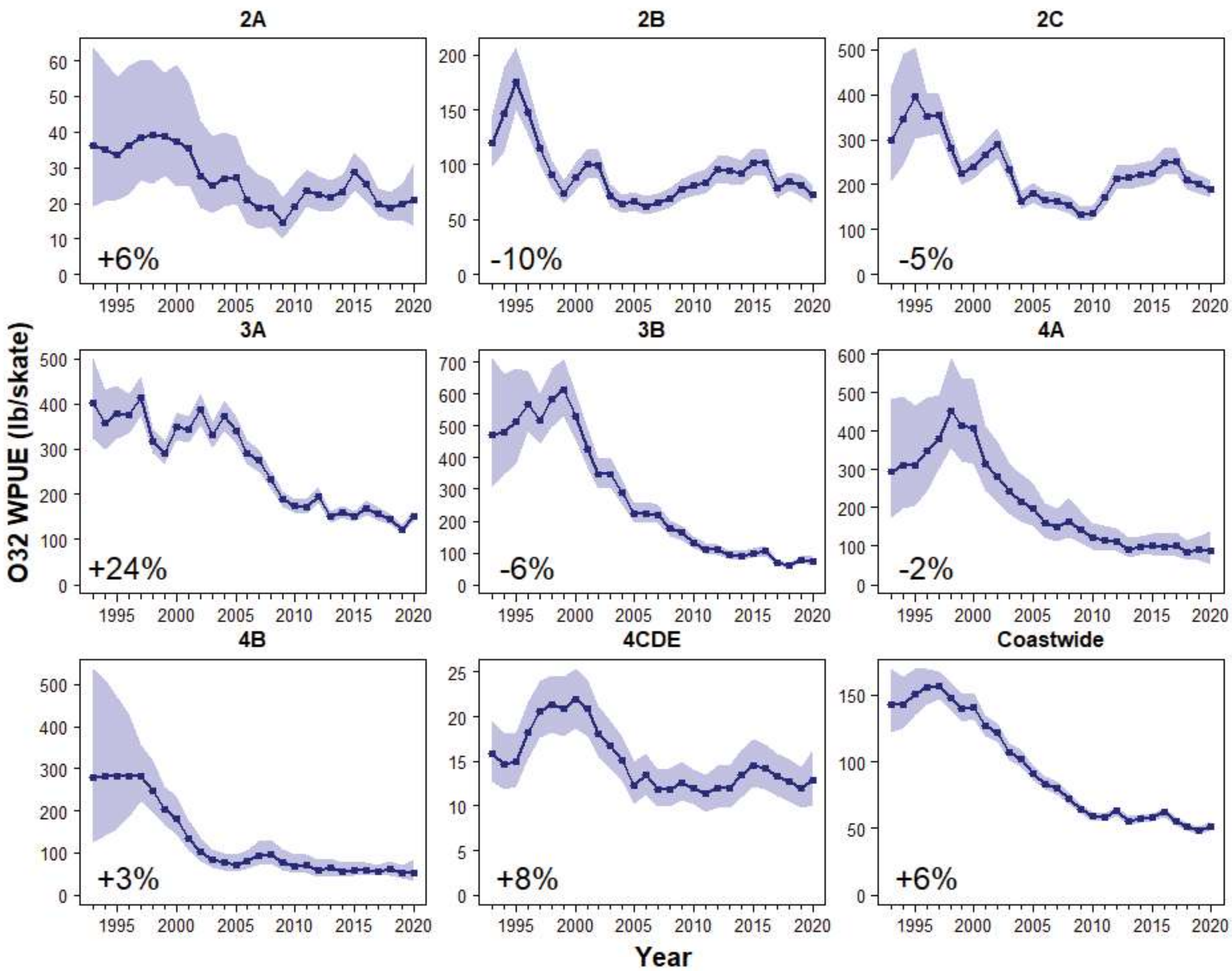

Figure A.1. Space-time model output for O32 WPUE for 1993-2020. Filled circles denote the posterior means of O32 WPUE for each year. Shaded regions show posterior 95% credible intervals, which provide a measure of uncertainty: the wider the shaded interval, the greater the uncertainty in the estimate. Numeric values in the lower left-hand corners are estimates of the change in mean O32 WPUE from 2019 to 2020.

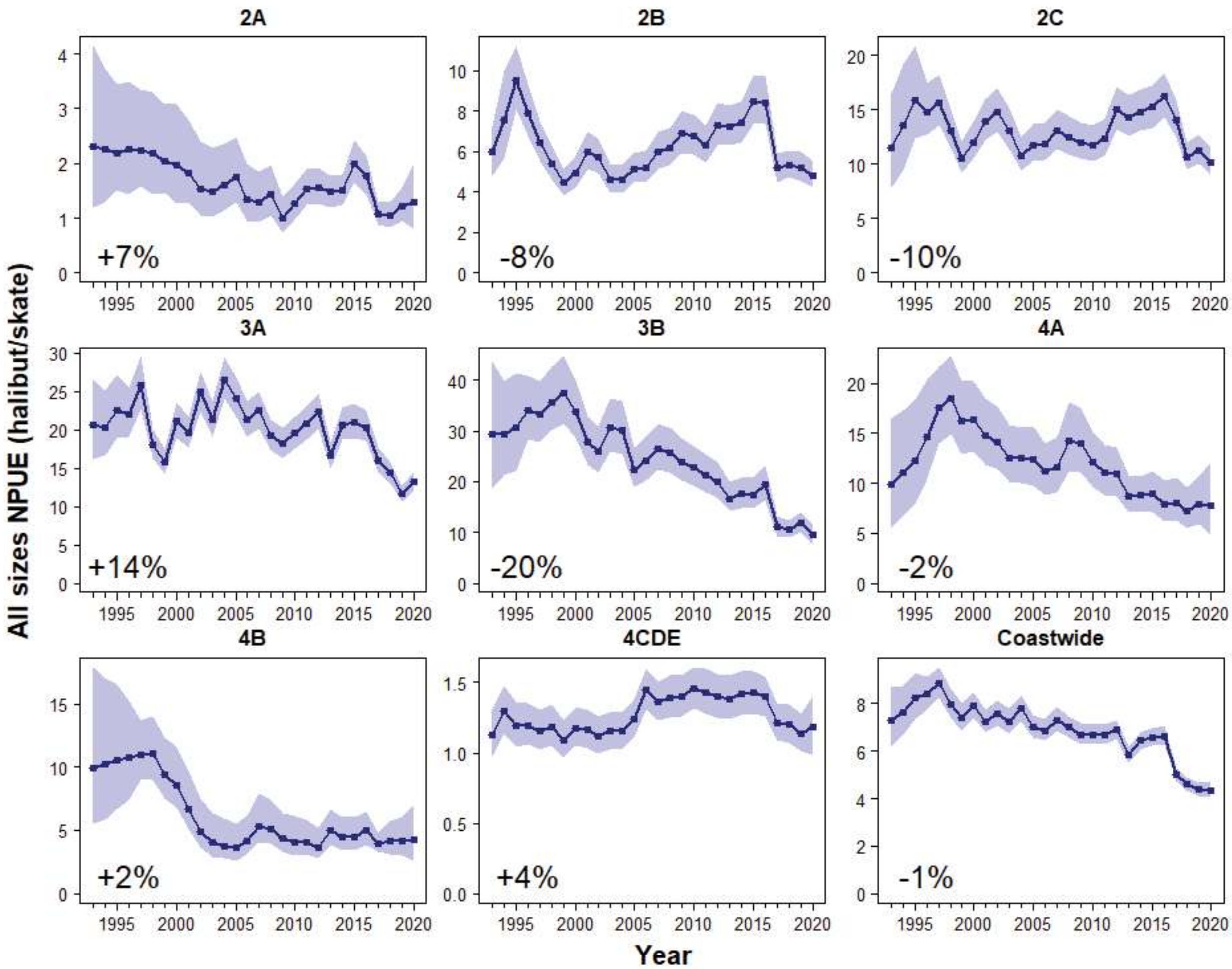

Figure A.2. Space-time model output for all sizes NPUE for 1993-2020. Filled circles denote the posterior means of all sizes NPUE for each year. Shaded regions show posterior 95% credible intervals, which provide a measure of uncertainty: the wider the shaded interval, the greater the uncertainty in the estimate. Numeric values in the lower left-hand corners are estimates of the change in mean total NPUE from 2019 to 2020.

INTERNATIONAL PACIFIC HALIBUT COMMISSION

Stock Assessment: Summary of the data, stock assessment, and harvest decision table for Pacific halibut (*Hippoglossus stenolepis*) at the end of 2020

PREPARED BY: IPHC SECRETARIAT (I. STEWART, A. HICKS, R. WEBSTER, & D. WILSON; 15 DECEMBER 2020)

PURPOSE

To provide the Commission with a summary of the data, stock assessment, and harvest decision table at the end of 2020.

INTRODUCTION

In 2020 the International Pacific Halibut Commission (IPHC) undertook its annual coastwide stock assessment of Pacific halibut (*Hippoglossus stenolepis*). This assessment represents an update to the 2019 stock assessment (Stewart and Hicks 2020), with incremental changes documented through a two-part review by the IPHC's Scientific Review Board (SRB; IPHC-2020-SRB016-R, IPHC-2020-SRB017-R). Changes, new data, and extensions to existing time-series for 2020 include:

1) Update the version of stock synthesis used for the analysis (3.30.15.09).
2) Add sex-specific recreational age composition data from IPHC Regulatory Area 3A (and allow for sex-specific differences in selectivity) where previously only sexes-aggregated age compositions were available.
3) Include newly available sex-ratios-at-age for the 2019 commercial fishery (building on the 2017 and 2018 sex-ratios used in the 2019 stock assessment).
4) New modelled trend information from the 2020 fishery-independent setline survey (FISS) including predictions covering both sampled and unsampled (but informed by covariates and the temporal correlation parameters) IPHC Regulatory Areas.
5) Age, length, individual weight, and average weight-at-age estimates from the 2020 FISS for all sampled IPHC Regulatory Areas.
6) 2020 (and a small amount of 2019) commercial fishery logbook trend information from all IPHC Regulatory Areas.
7) 2020 commercial fishery biological sampling (age, length, individual weight, and average weight-at-age) from all IPHC Regulatory Areas.
8) Biological information (lengths and/or ages) from non-directed discards (all IPHC Regulatory Areas) and the recreational fishery (IPHC Regulatory Area 3A only) from 2019.
9) Updated mortality estimates from all sources for 2019 (where preliminary values were used) and estimates for all sources in 2020.

Overall, model results remain highly consistent with those of recent stock assessments. Spawning biomass trends continue downward, although the 2020 assessment reports less decline than anticipated, partly as a function of mortality reductions in 2020. The 2011 and 2012 year-classes, estimated to be stronger than any since 2005 remain uncertain and are highly important to short-term projections of stock and fishery dynamics.

This document provides an overview of the final data sources available for the 2020 Pacific halibut stock assessment including the population trends and distribution among Regulatory

Areas based on the modelled IPHC FISS, directed commercial fishery data, and results of the stock assessment including all data available through 2020.

STOCK AND MANAGEMENT

The stock assessment reports the status of the Pacific halibut 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).

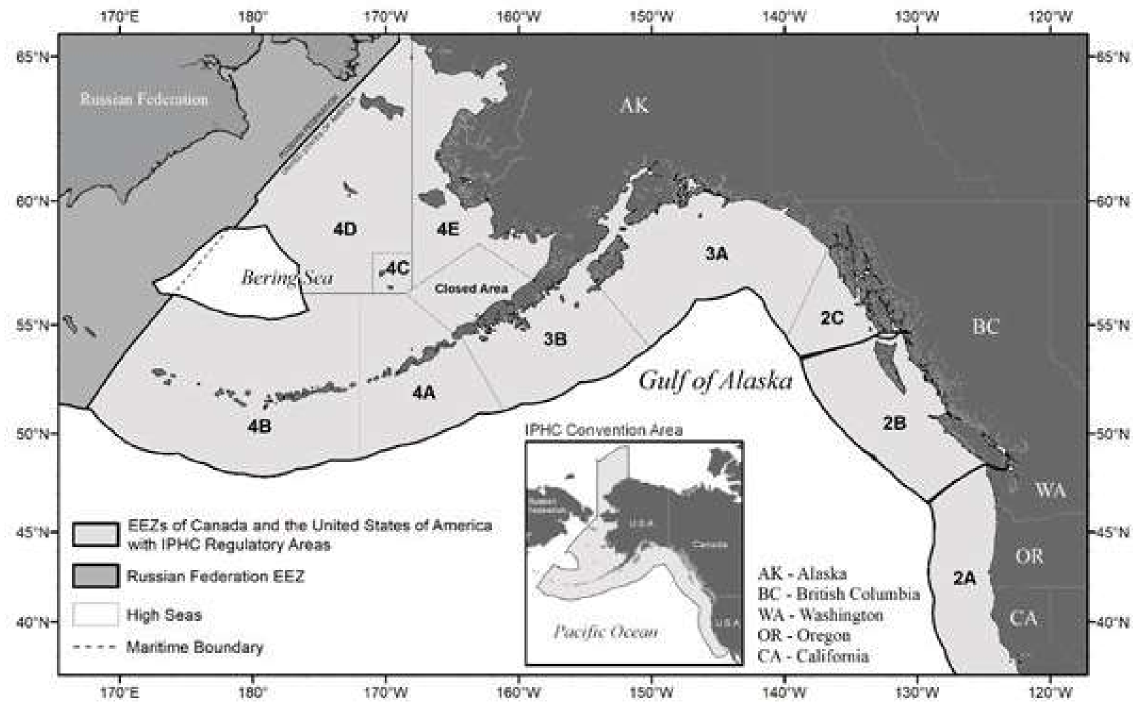

FIGURE 1. IPHC Convention Area (insert) and IPHC Regulatory Areas.

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) can be explored via the IPHC's mortality projection tool.

DATA

Historical mortality

Known Pacific halibut mortality consists of target 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

[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.

prohibited). Over the period 1921-2020 mortality has totaled 7.3 billion pounds (~3.3 million metric tons, t), ranging annually from 34 to 100 million pounds (16,000-45,000 t) with an annual average of 63 million pounds (~29,000 t; Figure 2). Annual mortality was above this long-term average from 1985 through 2010, and has averaged 40 million pounds (~18,000 t) from 2016-20.

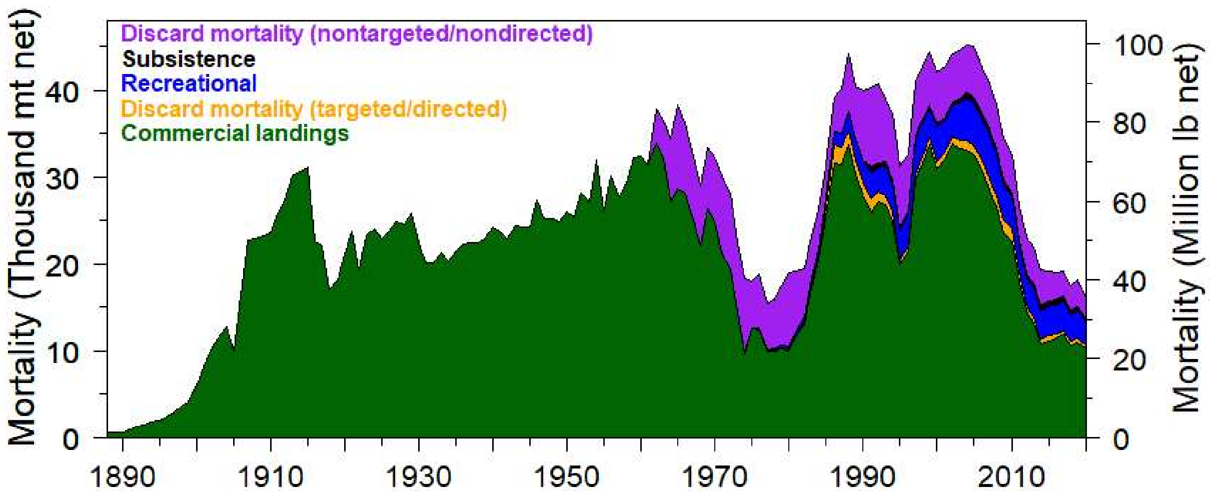

FIGURE 2. Summary of estimated historical mortality by source (colours), 1888-2020.

2020 Fishery and IPHC fishery-independent setline survey (FISS) statistics

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 2020, the most important information came from the modelled index of abundance reflecting the 2020 FISS, and the associated biological sampling. Sex-ratios at age were available for the first time from: 1) commercial fishery landings in 2019 (building on the data for 2017 and 2018 previously available), and 2) the full time-series (1994-2019) of age data from recreational fisheries in the Gulf of Alaska (IPHC Regulatory Area 3A) provided by Alaska Department of Fish and Game. Routine updates of logbook records from the 2019 (and earlier) directed commercial fishery, as well as age-frequency observations and individual weights from the commercial fishery were also included. Beginning in 2019, individual weights have been collected during FISS operations such that WPUE and stock distribution estimates are calculated directly, without the use of the historical weight-length relationship. All mortality estimates (including changes to the existing time-series where new estimates have become available) were extended to include 2020. All available information was finalized on 31 October 2020 in order to provide adequate time for analysis and modeling. As has been the case in all years, some data are incomplete (i.e. commercial fishery logbook and age information), or include projections for the remainder of the year (i.e. mortality estimates for ongoing fisheries or for fisheries where final estimation is still pending).

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). In addition to the aggregate mortality (including all sizes of Pacific halibut), the assessment includes data from both fishery dependent and fishery independent sources as well as auxiliary biological information, with the most spatially complete data available since the late-1990s. Primary sources of information for this assessment include mortality estimates from all sources, modelled indices of abundance (IPHC-2020-IM096-06 based on the IPHC's annual fishery-independent setline survey (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).

Coastwide commercial Pacific halibut fishery landings (including research landings) in 2020 were approximately 22.7 million pounds (~11,400 t), down 6% from 2019[2]. Discard mortality in non-directed fisheries was estimated to be 5.0 million pounds in 2020 (~2,280 t)[3], down 23% from 2019 and representing the smallest estimate in the time-series. The total recreational mortality (including estimates of discard mortality) was estimated to be 6.0 million pounds (~2,700 t) down 15% from 2019 due to several sectors not reaching the full regulatory limit or projected level. Mortality from all sources decreased by 11% to an estimated 35.5 million pounds (~16,100 t) in 2020 based on preliminary information available through 31 October 2020.

The 2020 modelled FISS results detailed a coastwide aggregate NPUE which decreased by 1% from 2019 to 2020, the fourth consecutive year of a decreasing trend (Figure 3). Biological Region 2 declined by 8% to the lowest estimate in the time-series, while Biological Region 3 increased by 1%. Although not directly sampled in 2020, Biological Regions 4, and 4B were projected to go up slightly; uncertainty intervals were correspondingly large. The 2019 modelled coastwide WPUE of legal (O32) Pacific halibut, the most comparable metric to observed commercial fishery catch rates, increased by 6% from 2019 to 2020. This positive trend relative to that for NPUE indicates that somatic growth, primarily of O32 Pacific halibut is contributing more to current stock productivity than incoming recruitment. Individual IPHC Regulatory Areas varied from a 24% increase (Regulatory Area 3A) to a 10% decrease (Regulatory Area 2B; Figure 4) in O32 WPUE. Uncertainty was greater in IPHC Regulatory Areas that were not directly sampled in 2020 (2A, 4A, 4B, and 4CDE), but still comparable with the recent time-series due to the spatial and temporal correlations in the data that are captured in the space-time modelling.

[2] The mortality estimates reported in this document are those available at the end of October 2020, and used in the assessment analysis; they include projections through the end of the fishing season.

[3] The IPHC receives preliminary estimates of the current year's non-directed commercial discard mortality in from the NOAA-Fisheries National Marine Fisheries Service Alaska Regional Office, Northwest Fisheries Science Center, and Fisheries and Oceans Canada in late October. Where necessary, projections are added to approximate the total mortality through the end of the calendar year. Further updates are anticipated in January 2021 and will be incorporated into final projections for 2021.

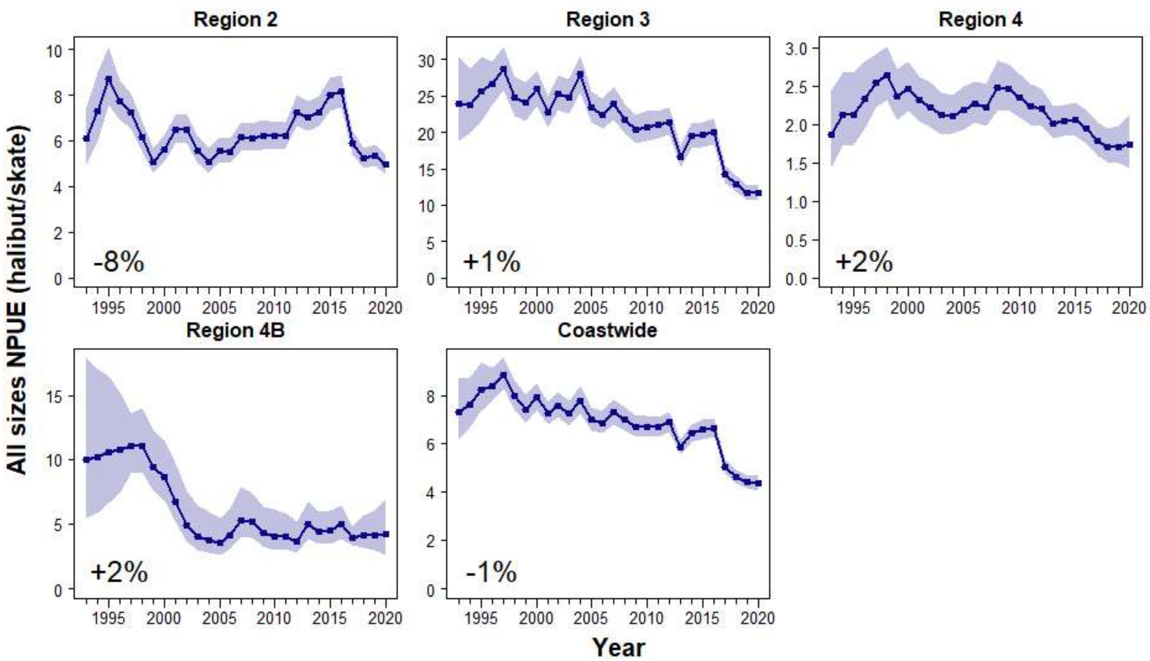

FIGURE 3. Trends in modelled FISS NPUE by Biological Region, 1993-2020. Percentages indicate the change from 2019 to 2020. Shaded zones indicate approximate 95% credible intervals.

Preliminary commercial fishery WPUE estimates from 2020 logbooks increased by 2% at the coastwide level (Figure 5). The bias correction to account for additional logbooks compiled after the fishing season resulted in an estimate of no change coastwide. Trends varied among IPHC Regulatory Areas and gears, with generally positive trends observed in IPHC Regulatory Areas 2A, 2C, 3B, 4C and 4D. The largest decreases were observed in IPHC Regulatory Areas 2B and 4B, and these are likely to be even larger when 2020 logbook records are complete.

Biological information (ages and lengths) from the commercial fishery continue to show the 2005 year-class as the largest coastwide contributor (in number) to the fish encountered. In the 2020 fishery, for the first time the 2011 and 2012 year-classes were clearly present, indicating that their individual growth rates have moved them partially above the current 32 inch (81.3 cm) minimum size limit. The age data collected by the FISS observed the 2011 and 2012 cohorts (now 8 and 9 years old), for the third consecutive year. These cohorts represented the largest proportions in the total catch for some IPHC Regulatory Areas. Recognizing that no sampling occurred in IPHC Regulatory Areas 2A, 4A, 4B and 4CDE in 2020, historical cohorts have generally been widely and relatively uniformly distributed by ages 8-10. Individual size-at-age appears to be increasing for younger ages (<14) in some IPHC Regulatory Areas (particularly notable in 3A). Size-at-age trends tend to take years to change appreciably, so it may be some time before strong conclusions can be drawn regarding whether recent observations represent a change in long-term trends or annual variability. Direct estimates of the sex-ratio at age for the directed commercial fishery were first available for 2017 and 2018 in the 2019 stock assessment. For 2020, the 2019 observations (identified via genetic assays of samples from the commercial landings) again indicated a high percentage of female Pacific halibut in the landings (78% coastwide) and a slight downward trend over the three years with data (from 82% in 2017).

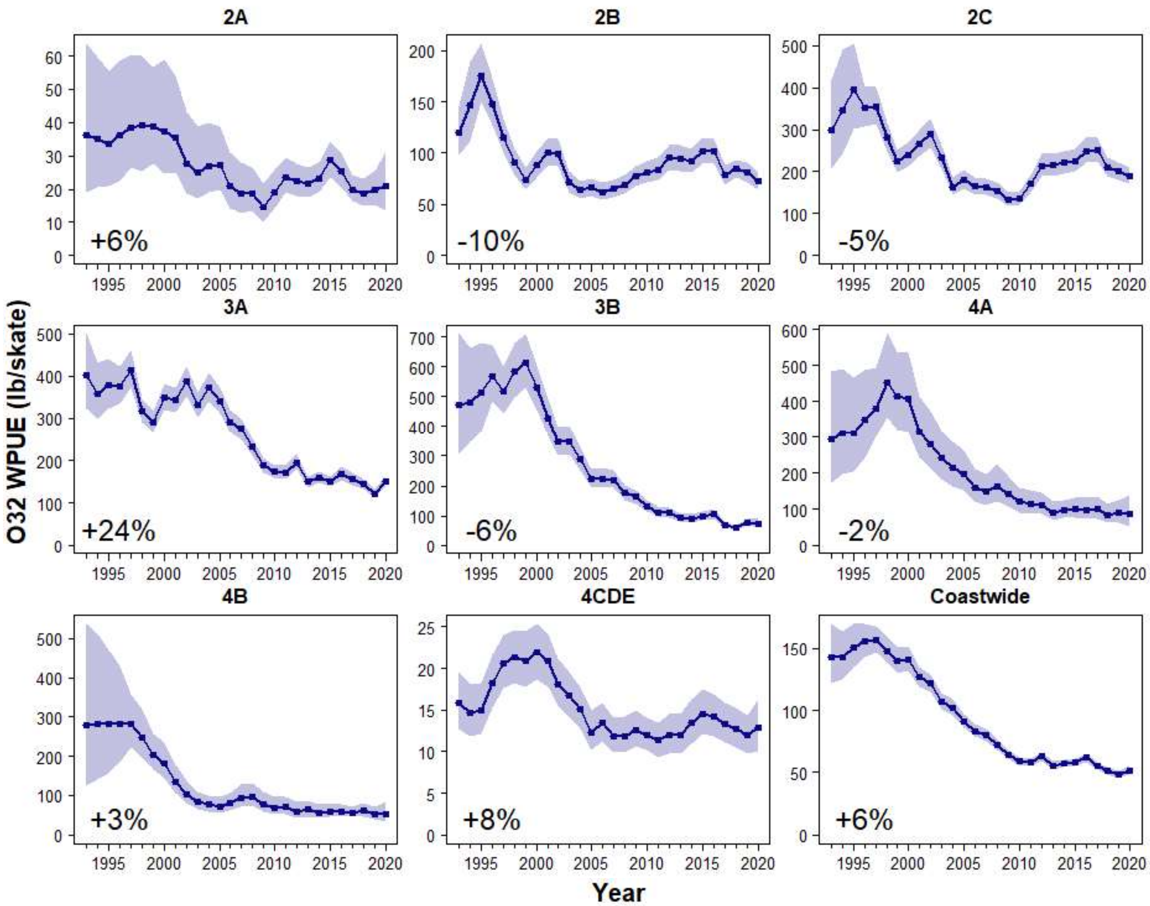

FIGURE 4. Trends in modelled FISS legal (O32) WPUE by IPHC Regulatory Area, 1993-2020. Percentages indicate the change from 2019 to 2020. Shaded zones indicate approximate 95% credible intervals. Note that IPHC Regulatory Areas 2A, 4A, 4B and 4CDE represent projections based on the space-time model in the absence of 2020 sampling.

Biological stock distribution

Updated trends indicate that population distribution (measured via the modelled FISS catch in weight of all Pacific halibut) has largely been decreasing in Biological Region 3 since 2004, and increasing in Biological Regions 2 and 4 (Figure 6; recent years in Table 1). However, in 2020 there was a notable increase in Biological Region 3 and a decrease in Biological Region 2. Biological Region 4 remained near the historical high, with the caveat that the 2020 value represents a space-time model prediction in the absence of direct sampling. Survey data are insufficient to estimate stock distribution prior to 1993. It is therefore unknown how historical distributions or the average distribution in the absence of fishing mortality may compare with recent observations.

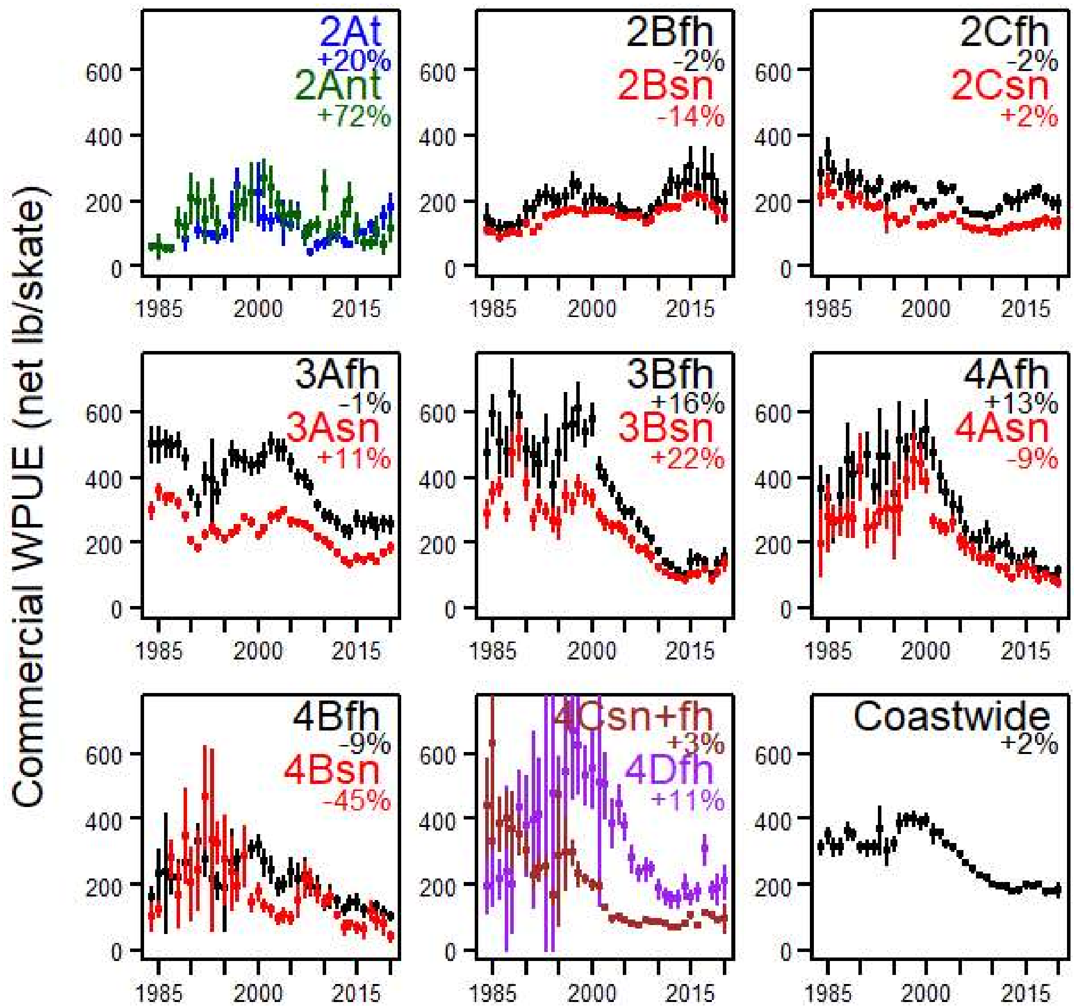

FIGURE 5. Trends in commercial fishery WPUE by IPHC Regulatory Area and fishery or gear, 1984-2020. The tribal fishery in 2A is denoted by “2At”, non-tribal by “2Ant”, fixed hook catch rates by “fh” and snap gear catch rates by “sn” for IPHC Regulatory Areas 2B-4D. Percentages indicate the change from 2019 to 2020 uncorrected for bias due to incomplete logbooks (see text above). Vertical lines indicate approximate 95% confidence intervals.

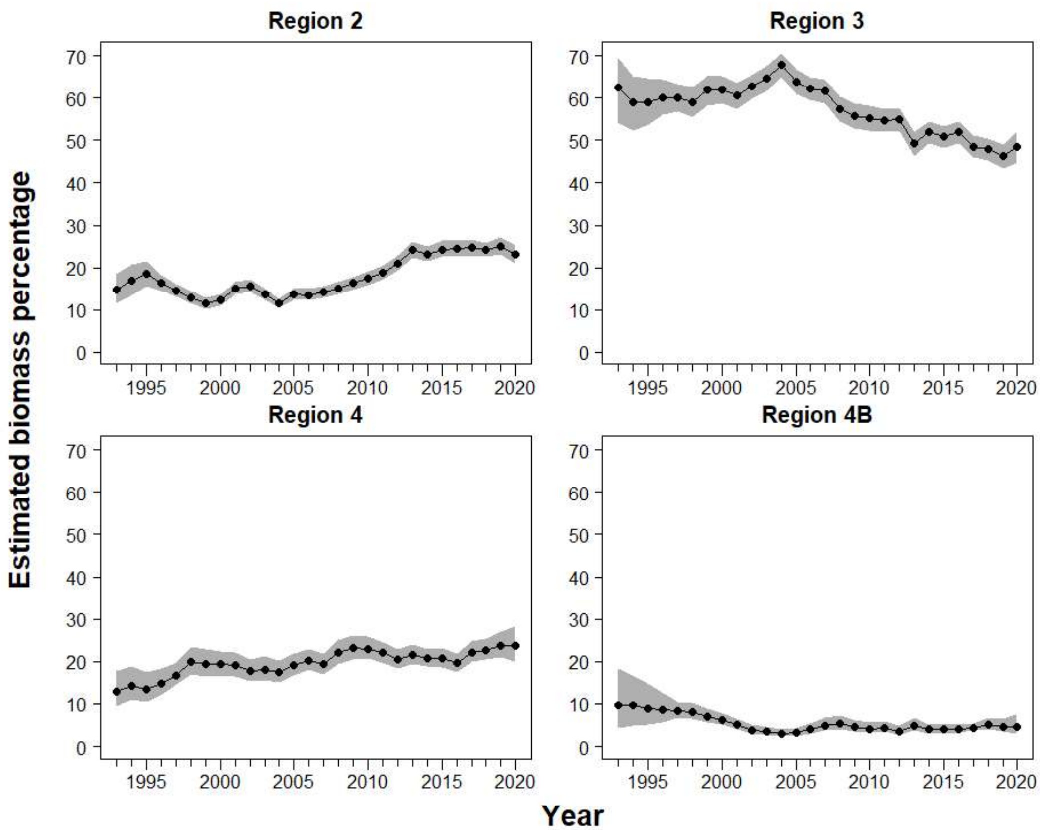

FIGURE 6. Estimated stock distribution (1993-2020) based on modelled survey catch of all sizes of Pacific halibut. Shaded zones indicate approximate 95% credible intervals.

TABLE 1. Recent stock distribution estimates by Biological Region based on modelling of all Pacific halibut captured by the FISS.

Year	Region 2 (2A, 2B, 2C)	Region 3 (3A, 3B)	Region 4 (4A, 4CDE)	Region 4B
2016	24.4%	51.9%	19.6%	4.1%
2017	24.7%	48.6%	22.3%	4.5%
2018	24.2%	47.9%	22.8%	5.2%
2019	25.0%	46.4%	23.9%	4.7%
2020	23.1%	48.5%	23.6%	4.7%

STOCK ASSESSMENT

This stock assessment continues to be implemented using the generalized software stock synthesis (Methot and Wetzel 2013). The analysis consists of an ensemble of four equally weighted models: two long time-series models, reconstructing historical dynamics back to the beginning of the modern fishery, and two short time-series models incorporating data only from 1992 to the present, a time-period for which estimates of all sources of mortality and survey indices are available for all regions. For each time-series length, there are two models: one fitting to coastwide aggregate data, and one fitting to data disaggregated into the four Biological Regions. This combination of models includes uncertainty in the form of alternative hypotheses about several important axes of uncertainty, including: natural mortality rates (estimated in the long time-series models, fixed in the short time-series models), environmental effects on recruitment (estimated in the long time-series models), and other model parameters.

The 2019 stock assessment was a full analysis, including a complete re-evaluation of all data sources and modelling choices, particularly those needed to accommodate the newly available sex-ratio at age data from the commercial fishery. The 2020 stock assessment represents an update to the 2019 analysis, adding data sources where available, but retaining the same basic model structure for each of the four component models. Incremental changes made during 2020 were documented through a two-part review by the IPHC's scientific review process (IPHC-2020-SRB016-R, IPHC-2020-SRB017-R).

The results of this stock assessment are based on the approximate probability distributions derived from the ensemble of models, thereby incorporating the uncertainty within each model (parameter or estimation uncertainty) as well as the uncertainty among models (structural uncertainty). This uncertainty provides a basis for risk assessment and reduces the potential for abrupt changes in management quantities as improvements and additional data are added to individual models. The four models continue to be equally weighted. Within-model uncertainty was propagated through to the ensemble results via the maximum likelihood estimates and an asymptotic approximation to individual model variance estimates. Point estimates in this stock assessment correspond to median values from the ensemble with the simple probabilistic interpretation that there is an equal probability above or below the reported value.

BIOMASS AND RECRUITMENT TRENDS

The results of the 2020 stock assessment indicate that the Pacific halibut stock declined continuously from the late 1990s to around 2012 (Figure 7). That trend is estimated to have been largely a result of decreasing size-at-age, as well as somewhat weaker recruitment strengths than those observed during the 1980s. The spawning biomass (SB) is estimated to have increased gradually to 2016, and then decreased to an estimated 192 million pounds (~87,050 t) at the beginning of 2021, with an approximate 95% credible interval ranging from 125 to 292 million pounds (~56,800-132,600 t; Figure 8). The recent spawning biomass estimates from the 2020 stock assessment are very consistent with previous analyses, back to 2012 (Figure 9). Prior to that period, the current assessment indicates a high probability of larger biomass than estimated prior to the 2019 stock assessment; this is largely the result of the addition of sex-ratio information for the directed commercial landings. All assessments since 2015 have indicated a decreasing spawning biomass in the terminal year.

Average Pacific halibut recruitment is estimated to be higher (70 and 75% for the coastwide and AAF models respectively) during favorable Pacific Decadal Oscillation (PDO) regimes, a widely used indicator of productivity in the north Pacific. Historically, these regimes included positive conditions prior to 1947, poor conditions from 1947-77, positive conditions from 1978-2006, and poor conditions from 2007-13. Annual averages from 2014 through 2019 were positive, with 2020 showing negative average conditions through September. Although strongly correlated with historical recruitments, it is unclear whether recent anomalous conditions in both the Bering Sea and Gulf of Alaska (especially since 2014) are comparable to those observed in previous decades.

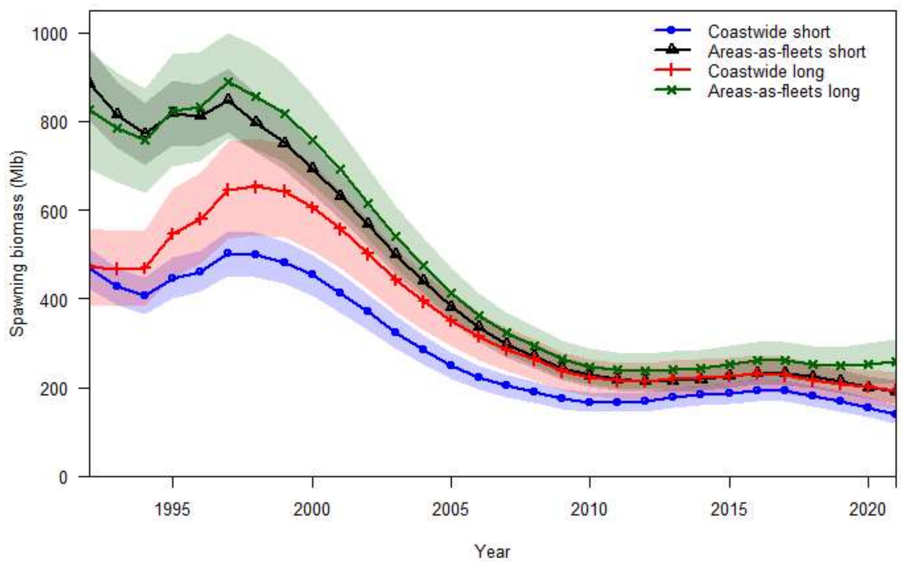

FIGURE 7. Estimated spawning biomass trends (1992-2021) based on the four individual models included in the 2020 stock assessment ensemble. Series indicate the maximum likelihood estimates; shaded intervals indicate approximate 95% credible intervals.

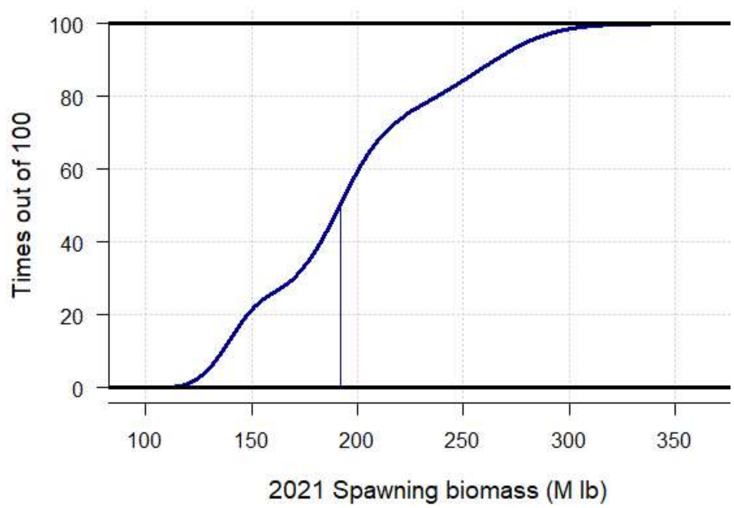

FIGURE 8. Cumulative distribution of the estimated spawning biomass at the beginning of 2020. Curve represents the estimated probability that the biomass is less than or equal to the value on the x-axis; vertical line represents the median (192 million pounds, ~87,050 t).

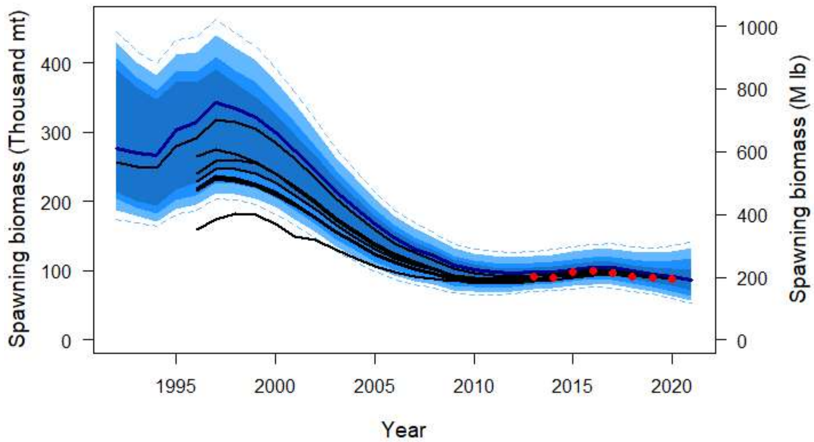

FIGURE 9. Retrospective comparison among recent IPHC stock assessments. Black lines indicate estimates of spawning biomass from assessments conducted in 2012-2019 with the terminal estimate shown as a red point. The shaded distribution denotes the 2020 ensemble: the dark blue line indicates the median (or "50:50 line") with an equal probability of the estimate falling above or below that level; and colored bands moving away from the median indicate the intervals containing 50/100, 75/100, and 95/100 estimates; dashed lines indicating the 99/100 interval.

Pacific halibut recruitment estimates show the large cohorts in 1999 and 2005 (Figure 10). Cohorts from 2006 through 2010 are estimated to be much smaller than those from 1999-2005, which results in a high probability of near-term decline in both the stock and fishery yield as these low recruitments become increasingly important to the age range over which much of the harvest and spawning takes place. Based on age data through 2020, individual models in this assessment produced estimates of the 2011 and 2012 year-classes that ranged extensively: from below to above the magnitude of the 2005 year-class. Even with a third year of observation from the FISS, and now a year from the commercial fishery, these two important year-classes remain uncertain. Some of this uncertainty is due to the relatively flat trends observed which do not clearly identify these cohorts as being above average, despite the strong representation in the age structure of the samples. The projected spawning biomass over the next 3 years includes the effects of these year classes maturing at ages 8-12.

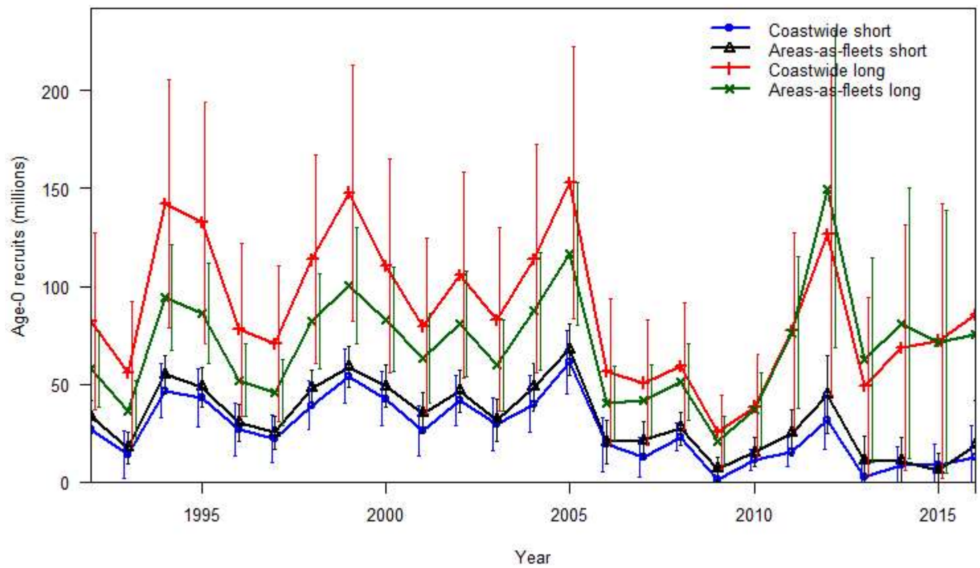

FIGURE 10. Estimated age-0 recruitment trends (1992-2016) based on the four individual models included in the 2020 stock assessment ensemble. Series indicate the maximum likelihood estimates; vertical lines indicate approximate 95% credible intervals.

The IPHC's interim management procedure uses a relative spawning biomass of 30% as a trigger, below which the target fishing intensity is reduced. At a spawning biomass limit of 20%, directed fishing is halted due to the critically low biomass condition. Beginning with the 2019 stock assessment, this calculation has been based on recent biological conditions rather than a long-term static average. By using current weight-at-age and estimated recruitments influencing the current stock only, the 'dynamic' calculation measures the effect of fishing on the spawning biomass. The relative spawning biomass in 2021 was estimated to be 33% (credible interval: 22-52%) down slightly from 34% in 2020, but greater than the values estimated for the previous decade. The probability that the stock is below the $SB_{30\%}$ level is estimated to be 41% at the beginning of 2021, with less than a 1% chance that the stock is below $SB_{20\%}$. The two long time-series models (coastwide and areas-as-fleets) show different results when comparing the current stock size to that estimated at the historical low in the 1970s. The AAF model estimates that recent stock sizes are well below those levels, and the coastwide model above. The relative differences among models reflect both the uncertainty in historical dynamics as well as the importance of spatial patterns in the data and population processes, for which all of the models represent only simple approximations.

The IPHC's current interim management procedure specifies a target level of fishing intensity of a Spawning Potential Ratio (SPR) corresponding to an $F_{43\%}$; this equates to the level of fishing that would reduce the lifetime spawning output per recruit to 43% of the unfished level given current biology, fishery characteristics and demographics. Based on the 2020 assessment, the 2020 fishing intensity is estimated to correspond to an $F_{48\%}$ (credible interval: 34-65%; Table 2), less than values estimated over the previous decade. This drop in fishing intensity corresponds to the reduction in mortality limits adopted for 2020 and the actual mortality of several sectors totaling less than predicted. Comparing the relative spawning biomass and fishing intensity over the recent historical period provides for an evaluation of trends conditioned on the currently defined reference points via a 'phase' plot. The phase plot for Pacific halibut shows that the relative spawning biomass decreased as fishing intensity increased through 2010, then increased as the fishing intensity decreased through 2016, and has been relatively stable since then (Figure 11).

TABLE 2. Status summary of Pacific halibut in the IPHC Convention Area at beginning of 2021.

Indicators	Values	Trends	Status
Total mortality 2020: Retained catch 2020: Average removals 2016–20:	35.50 MLBS, 16,103 T[1] 29.65 MLBS, 13,449 T 39.59 MLBS, 17,959 T	MORTALITY DECREASED FROM 2019 TO 2020	**2020 MORTALITY NEAR 100-YEAR LOW**
SPR_{2020}: P(SPR<43%): P(SPR<limit):	48% (34-65%)[2] 38% LIMIT NOT SPECIFIED	FISHING INTENSITY DECREASED FROM 2019 TO 2020	**FISHING INTENSITY BELOW REFERENCE LEVEL**[3]
SB_{2021} (MLBS): SB_{2021}/SB_0: $P(SB_{2021}<SB_{30})$: $P(SB_{2021}<SB_{20})$:	192 MLBS (125–292) 33% (22-52%) 41% <1%	SB DECREASED 17% FROM 2016 TO 2021	**NOT OVERFISHED**[4]
Biological stock distribution:	SEE TABLES AND FIGURES	REGION 4 INCREASING	**REGION 4 NEAR HISTORICAL HIGH**

[1] Weights in this document are reported as 'net' weights, head and guts removed; this is approximately 75% of the round (wet) weight.
[2] Ranges denote approximate 95% credible intervals from the stock assessment ensemble.
[3] Status determined relative to the IPHC's interim reference Spawning Potential Ratio level of 43%.
[4] Status determined relative to the IPHC's interim management procedure biomass limit of $SB_{20\%}$.

MAJOR SOURCES OF UNCERTAINTY

This stock assessment includes uncertainty associated with estimation of model parameters, treatment of the data sources (e.g. short and long time-series), natural mortality (fixed vs. estimated), approach to spatial structure in the data, and other differences among the models included in the ensemble. Although this is an improvement over the use of a single assessment model, there are important sources of uncertainty that are not included.

The assessment utilized three years (2017-19) of sex-ratio information from the directed commercial fishery landings. However, uncertainty in historical ratios, and the degree of variability likely present in those and future fisheries remains unknown. Additional years of data are likely to further inform selectivity parameters and cumulatively reduce uncertainty in stock size in the future; efforts to better understand historical sex-ratios are underway. The treatment of spatial dynamics and movement rates among Biological Regions, which are represented via the coastwide and AAF approaches, has large implications for the current stock trend, as evidenced by the different results among the four models comprising the stock assessment ensemble. This assessment also does not include mortality, trends or explicit demographic linkages with Russian waters, although such linkages may be increasingly important as warming waters in the Bering Sea allow for potentially important exchange across the international border.

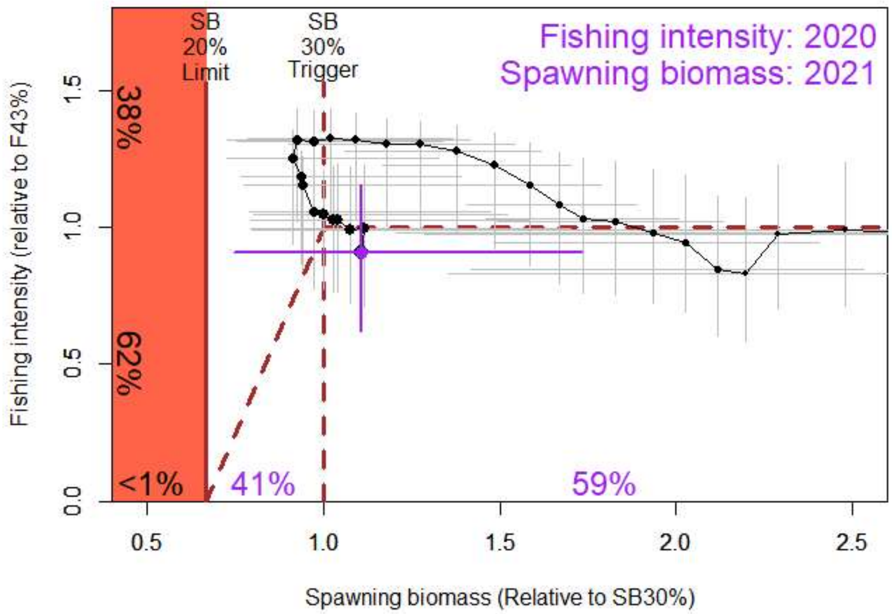

FIGURE 11. Phase plot showing the time-series (1992-2021) of estimated spawning biomass and fishing intensity relative to the reference points specified in the IPHC's interim management procedure. Dashed lines indicate the current $F_{43\%}$ (horizontal) reference fishing intensity, with linear reduction below the $SB_{30\%}$ (vertical) trigger, the red area indicates relative spawning biomass levels below the $SB_{20\%}$ limit. Each year of the time series is denoted by a solid point (credible intervals by horizontal and vertical whiskers), with the relative fishing intensity in 2020 and spawning biomass at the beginning of 2021 shown as the largest point (purple). Percentages along the y-axis indicate the probability of being above and below $F_{43\%}$ in 2020; percentages on the x-axis the probabilities of being below $SB_{20\%}$, between $SB_{20\%}$ and $SB_{30\%}$ and above $SB_{30\%}$ at the beginning of 2021.

Additional important contributors to assessment uncertainty (and potential bias) include factors influencing recruitment, size-at-age, and some estimated components of the fishery removals. The link between Pacific halibut recruitment strengths and environmental conditions remains poorly understood, and although correlation with the Pacific Decadal Oscillation is currently useful, it may not remain so in the future. Therefore, recruitment variability remains a substantial source of uncertainty in current stock estimates due to the lack of mechanistic understanding and the lag between birth year and direct observation in the fishery and survey data (6-10 years). Reduced size-at-age relative to levels observed in the 1970s have been a critically important driver of stock trends, but its cause also remains unknown. Like most stock assessments, mortality estimates are assumed to be accurate. Therefore, uncertainty due to discard mortality estimation (observer sampling and representativeness), discard mortality rates, and any other unreported sources of removals in either directed or non-directed fisheries (e.g., whale depredation) could create bias in this assessment.

Maturation schedules are currently under renewed investigation by the IPHC. Currently used historical values are based on visual field assessments, and the simple assumption that fecundity is proportional to spawning biomass and that Pacific halibut do not experience appreciable skip-spawning (physiologically mature fish which do not actually spawn due to environmental or other conditions). To the degree that maturity, fecundity or skip spawning may be temporally variable, the current approach could result in bias in the stock assessment trends and reference points. New information will be incorporated as it becomes available; however, it may take years to better understand these biological processes at the scale of the entire population.

Due to the many remaining uncertainties in Pacific halibut biology and population dynamics, a high degree of uncertainty in both stock scale and trend will continue to be an integral part of an annual management process. Results of the IPHC's Management Strategy Evaluation (MSE) process can inform management procedures that are robust to estimation uncertainty via the stock assessment, and to a wide range of hypotheses describing population dynamics.

OUTLOOK

Stock projections were conducted using the integrated results from the stock assessment ensemble in tandem with summaries of the 2020 directed and non-directed fisheries. The harvest decision table (Table 3) provides a comparison of the relative risk (in times out of 100), using stock and fishery metrics (rows), against a range of alternative harvest levels for 2021 (columns). The block of rows entitled "Stock Trend" provides for evaluation of the risks to short-term trend in spawning biomass, independent of all harvest policy calculations. The remaining rows portray risks relative to the spawning biomass reference points ("Stock Status") and fishery performance relative to the approach identified in the interim management procedure. The alternatives (columns) provided include several levels of mortality intended for evaluation of stock and management procedure dynamics including:

- No mortality (useful to evaluate the stock trend due solely to population processes)
- The mortality at which there is a 50% chance that the spawning biomass will be smaller in three years than in 2021 ("*3-year surplus*")
- The mortality consistent with repeating the TCEY set for 2019 (36.6 million pounds, 16,600 t; *"status quo"*).
- The mortality consistent with the current "Reference" SPR ($F_{43\%}$) level.
- A 60 million pound (~27,200 t) 2021 TCEY

A grid of alternative TCEY values corresponding to SPR values from 40% to 46% is also provided to allow for finer detail across the range of estimated SPR values identified by the MSE process as performing well with regard to stock and fishery objectives. For each row of the decision table, the mortality (including all sizes and sources), the coastwide TCEY and the associated level of fishing intensity projected for 2021 (median value with the 95% credible interval below) are reported.

The projections for this assessment are slightly more optimistic than in the 2019 assessment; however, a high probability of stock decline (approximately 2/3) is estimated for the entire range of SPR values from 40-46%. The stock is projected to decrease with at least a 51% chance over the period from 2021-23 for all TCEYs greater than the "3-year surplus" of 24.4 million pounds (~11,068 t), corresponding to a projected SPR of 58% (credible interval 39-76%; Table 3, Figure 12). At the *status quo* TCEY (36.6 million lb, (~16,600 t), the probability of spawning biomass declines is 62 and 61% for one and three years respectively. At the reference level (a projected SPR of 43%) the probability of spawning biomass decline to 2022 is 65%, decreasing to 63% in three years, as the 2011 and 2012 cohorts mature. The one-year risk of the stock dropping below

$SB_{30\%}$ ranges from 35% (at the 3-year surplus level) to 41% at the reference TCEY. Over three years these probabilities range from 29% to 44% depending on the level of mortality.

TABLE 3. Harvest decision table for 2021 mortality limits. Columns correspond to yield alternatives and rows to risk metrics. Values in the table represent the probability, in "times out of 100" (or percent chance) of a particular risk.

2021 Alternative				3-Year Surplus		Status quo		Reference $F_{43\%}$					
		Total mortality (M lb)	0.0	25.7	36.8	37.9	39.1	40.3	41.5	42.9	44.1	61.3	
		TCEY (M lb)	0.0	24.4	35.5	36.6	37.8	39.0	40.3	41.6	42.8	60.0	
		2021 fishing intensity	$F_{100\%}$	$F_{58\%}$	$F_{46\%}$	$F_{45\%}$	$F_{44\%}$	$F_{43\%}$	$F_{42\%}$	$F_{41\%}$	$F_{40\%}$	$F_{30\%}$	
		Fishing intensity interval	–	39-76%	29-65%	29-64%	28-63%	27-62%	26-61%	26-60%	25-59%	18-49%	
Stock Trend (spawning biomass)	in 2022	is less than 2021	<1	42	61	62	64	65	66	67	69	82	a
		is 5% less than 2021	<1	7	32	34	36	39	41	44	46	66	b
	in 2023	is less than 2021	<1	51	62	63	64	65	66	67	69	81	c
		is 5% less than 2021	<1	32	53	54	55	56	57	59	59	74	d
	in 2024	is less than 2021	<1	50	60	61	62	63	64	66	67	80	e
		is 5% less than 2021	<1	40	55	56	57	57	58	59	60	74	f
Stock Status (Spawning biomass)	in 2022	is less than 30%	29	35	39	40	40	41	41	42	42	47	g
		is less than 20%	<1	<1	<1	<1	1	1	1	1	1	4	h
	in 2023	is less than 30%	23	32	39	40	40	41	42	43	43	49	i
		is less than 20%	<1	<1	2	2	3	3	4	5	5	19	j
	in 2024	is less than 30%	12	29	38	39	40	41	42	43	44	50	k
		is less than 20%	<1	<1	4	5	6	8	9	10	12	25	l
Fishery Trend (TCEY)	in 2022	is less than 2021	0	17	48	49	50	50	50	51	51	77	m
		is 10% less than 2021	0	6	41	44	46	48	49	50	50	63	n
	in 2023	is less than 2021	0	21	49	50	50	50	50	51	51	75	o
		is 10% less than 2021	0	11	45	47	48	49	50	50	50	64	p
	in 2024	is less than 2021	0	23	49	50	50	50	50	51	51	74	q
		is 10% less than 2021	0	13	47	48	49	49	50	50	50	64	r
Fishery Status (Fishing intensity)	in 2021	is above $F_{43\%}$	0	15	48	49	50	50	50	51	51	78	s

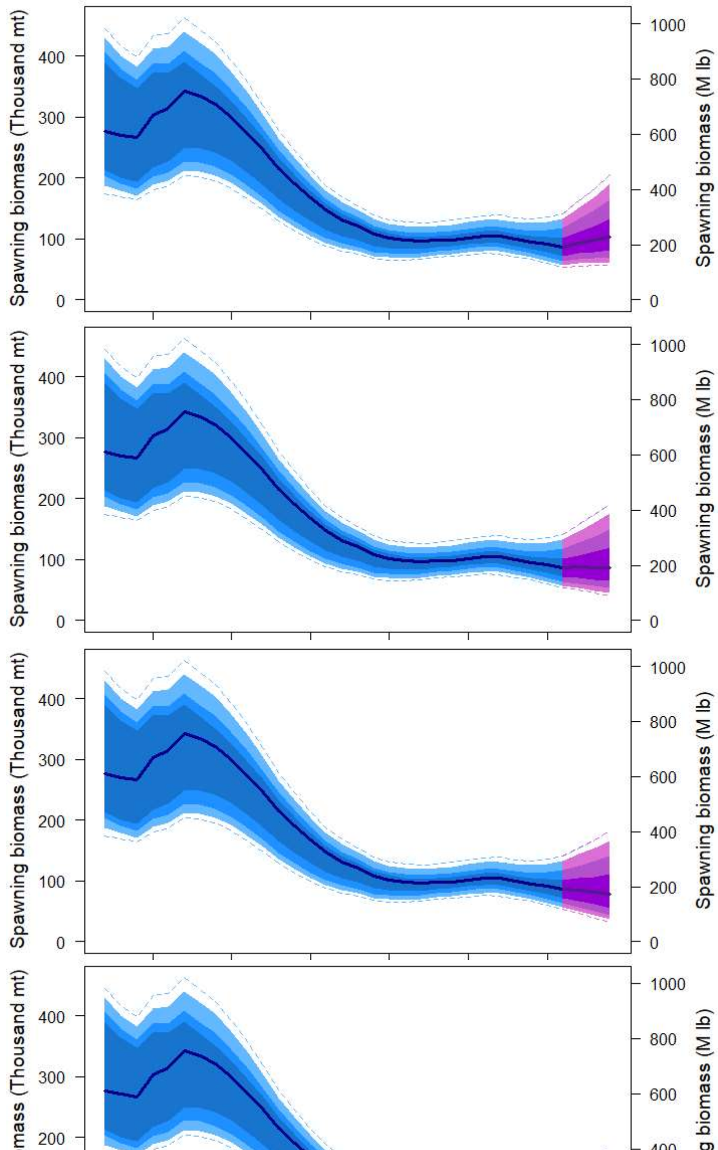

FIGURE 12. Three-year projections of stock trend under alternative levels of mortality: no fishing mortality (upper panel), the 3-year surplus (a TCEY of 24.4 million pounds, ~11,068 t; second panel), the *status quo* TCEY from 2020 of 36.6 million pounds, 16,600 t; third panel), and the TCEY projected for the IPHC's interim management procedure (39.0 million pounds, 17,690 t; lower panel).

SCIENTIFIC ADVICE

Sources of mortality: In 2020, total Pacific mortality due to fishing was down to 35.50 million pounds (16,103 t) from 39.87 million pounds (18,086 t) in 2019 (updated for this assessment). Of that total, 84% comprised the retained catch, up from 81% in 2019 (Table 3).

Fishing intensity: The 2020 mortality corresponded to a point estimate of SPR = 48%; there is a 38% chance that fishing intensity exceeded the IPHC's current reference level of 43% (Table 3). The Commission does not currently have a coastwide fishing intensity limit reference point.

Stock status (spawning biomass): Current (beginning of 2021) female spawning biomass is estimated to be 192 million pounds (87,050 t), which corresponds to an 41% chance of being below the IPHC trigger reference point of $SB_{30\%}$, and less than a 1% chance of being below the IPHC limit reference point of $SB_{20\%}$. The stock is estimated to have declined by 17% since 2016 but is currently at 33% of the unfished state. Therefore, the stock is considered to be '**not overfished**'. Projections indicate that mortality consistent with the interim management procedure reference fishing intensity ($F_{43\%}$) is likely to result in further declining biomass levels in the near future.

Stock distribution: The proportion of the coastwide stock represented by Biological Region 3 has been largely decreasing since 2004 (Figure 6), and increasing in Biological Regions 2 and 4. However, there was an increase in Biological Region 3 in 2020 and a decrease in Biological Region 2. Biological Region 4 is near the historical high estimated for 2019, and has shown an increasing trend since the early 1990s.

RESEARCH PRIORITIES

Research priorities for the stock assessment and related analyses have been consolidated with those for the IPHC's MSE and the Biological Research program and are included in the IPHC's five-year research plan.

DETAILED MANAGEMENT INFORMATION

The IPHC's current interim management procedure, in place for 2021-22, includes setting a coastwide TCEY, and also a method for distributing that TCEY among IPHC Regulatory Areas. The distribution method includes the current estimate of stock distribution, relative harvest rates by IPHC Regulatory Area, specific adjustments to the TCEY in IPHC Regulatory Areas 2A and 2B, as well as an increase in the TCEY in IPHC Regulatory Area 2B accounting for the U26 non-directed discard mortality in Alaska. Details of the calculation framework are provided in IPHC-2021-AM097-INF02. The 2021 mortality projection tool will be produced in early January 2021, and will include any end-of-year revisions to mortality estimates from 2020 that are used as a basis for projection in 2021.

ADDITIONAL INFORMATION

A more detailed description of the data sources and stock assessment results will be available on the IPHC's website stock assessment page prior to the 97th Session of the IPHC's Annual Meeting (AM097). That page also includes recent peer review documents and previous stock assessment documents. Further, the IPHC's website contains many interactive tools for both FISS and commercial fishery information, as well as historical data series that replace appendices and tables from previous year's documents.

RECOMMENDATION/S

That the Commission:

a) **NOTE** paper IPHC-2021-AM097-08 which provides a summary of data, the 2020 stock assessment and the harvest decision table for 2021.

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Evaluation of directed commercial fishery size limits in 2020

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PURPOSE

To provide the Commission with an evaluation of directed commercial fishery size limits in response to the discussion and request from AM096:

AM096 (para. 157):

> *"The Commission **NOTED** the stakeholder questions regarding the current minimum size limit applied to the directed commercial Pacific halibut fishery. In light of the newly available sex-ratio information from the directed commercial fishery, the Commission identified the need for a better understanding of the effects of the minimum size limit on available fishery yield and potential changes from previous analyses. Further, investigation of the use of a maximum size limit has also been a topic on ongoing discussion."*

AM096–Req.08 (para. 158):

> *"The Commission **REQUESTED** that the IPHC Secretariat prepare an updated discussion of the costs and benefits of removing or adjusting the current minimum size limit and/or adding a maximum size limit. This analysis would be presented during the 2020 Work Meeting and IM096."*

SUMMARY

Since 1973, the International Pacific Halibut Commission (IPHC) has restricted the directed commercial fishery for Pacific halibut (*Hippoglossus stenolepis*) with a 32 inch (81.3 cm) Minimum Size Limit (MinSL). We find that in 2020 the MinSL reduced fishery landed yield by 7% at the Spawning Potential Ratio (SPR) projected for the adopted catch limits ($F_{42\%}$; Table 1). This loss in potential yield is due to a projected 0.80 million net pounds (~363 mt) of discard as well as increased harvest of fish larger than would provide the peak yields under current estimated size-at-age and sex-ratios. If the relative price for Pacific halibut less than 32" (U32) is at least 63% of the price of current catch of fish larger than 32" (O32), then the fishery as a whole is projected to achieve equal or increased value if the MinSL is removed. Additional benefits of removing the MinSL include a projected 18% increase in fishery efficiency (landings relative to total catch), improved data on total catch through port sampling, assuming full retention of all legal catch is retained in regulation, and improved public perception of the fishery.

Introduction of a Maximum Size Limit (MaxSL; a regulation prohibiting the retention of all fish larger than a specified length) is projected to result in little net change to fishery yield based on evaluation of a 60 inch (152 cm) MaxSL in place for 2020. However, a MaxSL would create a new (and largely unobserved) source of mortality through discarding of large female Pacific halibut: approximately 0.12 million pounds (~54 mt) at the 2020 adopted mortality limits (based on a 16% discard mortality rate). This discard mortality would be approximately offset by increased yield due to a higher fraction of males in the retained catch and average size closer to the peak yields under current size-at-age. If the relative price of fish larger than 60" (O60) remains slightly lower than the average for fish less than 60" (U60), then the average fish size in the landings is projected to result in no change in aggregate fishery value. Introduction of a MaxSL would provide an increase in the proportion of the Spawning Biomass (SB) comprised of large female Pacific halibut, and increased opportunity to encounter these fish in recreational fisheries in some IPHC Regulatory Areas (e.g. IPHC Regulatory Area 2C). The change in age composition of the SB will depend on future spatial and overall patterns of stock productivity and fishery management. It is unlikely, given the data available at this time on stock-recruitment,

fecundity, and maternal effects, that a MaxSL would increase recruitment. A 60” MaxSL would reduce fishery efficiency by approximately 3%, and also reduce the data quality on fish in the total vs. landed commercial fishery catch.

The effects of removing the MinSL or implementing a MaxSL are not estimated to be uniformly distributed among Biological Regions, IPHC Regulatory Areas, or fishing grounds within Areas. In some places, there is little projected change (e.g., removing the MinSL in IPHC Regulatory Area 2C, or implementing a MaxSL in Area 2A), and in others fishery efficiency and composition of the landings would differ importantly (removing the MinSL in Regulatory Area 3B and 4A). This analysis focuses on short-term effects; long-term changes in stock and fishery distribution and productivity would be best addressed through the Management Strategy Evaluation (MSE) process.

Table 1. Evaluation summary of removal of the current minimum size limit (MinSL) and/or addition of a maximum size limit (MaxSL) of 60” (152 cm) in 2020 relative to the *status quo*.

	Management action	
Response	Remove MinSL	Add MaxSL = 60”
Fishery yield	7% increase	No change
Fishery value	Increased if U32 price >= 63% of O32 price	No change
Discard mortality	Decreased by 0.80 million pounds	Increased by 0.12 million pounds, may increase further over time
Fishery efficiency (landings/catch)	18% increase	3% decrease
Data on total fishery catch and biology	Improved	Degraded
Recreational encounters with large fish	No change	Increased
Abundance/biomass of old females	No change	Increased
Average projected recruitment	No change	No change

BACKGROUND/INTRODUCTION

The IPHC introduced the first MinSL for the directed commercial Pacific halibut fishery in 1940 (Myhre 1973). The 5 pound (2.27 kg) limit was based on “dressed” weight (gilled and gutted), and was converted to length (26”; 66 cm) in 1944 in order to facilitate easier compliance. Due to increases in size-at-age, the quantity of small fish encountered and discarded by the fishery during this time period was likely low and declining from the 1940s through the 1970s, based on contemporary reports (Myhre 1974), and historical age composition data (Stewart and Webster 2020). In 1973, the MinSL was revised to 32” (81.3 cm; Myhre 1973). Yield-Per-Recruit (YPR) analysis in the 1960s indicated that the age of entry to the fishery was near optimal under equilibrium conditions based on the landed catch from the 26” MinSL (IPHC 1960), and very large size at age in the 1970s (relative to the historical record) was not likely resulting in substantial amounts of discard mortality (fish that are captured, discarded, and subsequently die). Therefore, discard mortality was not identified as a significant concern at that time.

After an apparent peak in the late 1970s, Pacific halibut size-at-age declined through approximately 2010, and has been relatively stable since, although trends differ among Biological Regions (Stewart and Webster 2020). The largest declines in size-at-age have been observed in the Gulf of Alaska (GOA), which also represents the geographical and demographic center of the stock. During this period of changing size-at-age, there have been many analyses evaluating the effects of the MinSL on the Pacific halibut stock and fishery. Myhre (1974) found that a 32” (81.3 cm) MinSL was ‘optimal’ (with regard to fishery yield and value of fish sales) only under the lowest discard mortality rates, and that discard mortality rates above 25% would favor a 29.5” (75 cm) or lower MinSL. Clark and Parma (1995) also used equilibrium methods (YPR and Spawning Biomass Per Recruit, SBPR) to evaluate the MinSL based on sampled landings in 1990-91. Their analysis found that the 32” MinSL was near optimal, but noted that revised analysis was already underway due to observations in the early 1990s of continued decline in size-at-age (and that removing the MinSL in IPHC Regulatory Area 2B would result in no loss in YPR). Parma (1999) provided an update to previous analyses, with similar conclusions: small gains in YPR would occur under smaller MinSLs, but these were slightly offset by losses in SBPR suggesting that retaining the 32” MinSL was still optimal.

Valero and Hare (2012) used a broader suite of analyses, including female maturity-at-age, YPR, SBPR, and a migratory model to evaluate the MinSL. They found that YPR and SBPR would both decrease with greatly reduced size-limits under the assumption that the fishery selectivity would resemble that of the IPHC’s Fishery-Independent Setline Survey (FISS). Small reductions (3-12 cm) in the MinSL were found to have a slight positive effect on YPR (<=3%; partially due to increasing the proportion of males in the landings by <10%). Larger reductions in the MinSL were found to reduce both YPR and SBPR. The migratory analysis was the first to clearly identify differential effects of the MinSL among the IPHC Regulatory Areas. Their analysis was based on the Spawning Biomass Per Recruit ratio ($SBPR_{ratio}$); however, their calculation of $SBPR_{ratio}$ used long-term average conditions rather than current size-at-age and selectivity. They identified the precautionary nature of retaining the MinSL, and potential risks to spawning biomass of eliminating it.

The next MinSL analysis occurred in 2014-15 (Martell et al. 2015a; Martell et al. 2015b; presented at AM091), in response to a Commission request to evaluate reducing the MinSL from 32” to 30”. That analysis used equilibrium methods to compare Maximum Sustainable Yield (MSY; adjusting the fishing intensity to produce the largest long term-average landed catch) under alternative MinSLs. Fishery yield and efficiency was found to be increased for all reductions in the MinSL down to 26” (the smallest evaluated). However, reducing the MinSL below 30” was found to result in a slight loss in total fishery value due to the reduced price assumed for smaller fish. That study also identified fishery selectivity, discard mortality rates, and bycatch in non-directed commercial fisheries as important contributors to the optimal level of fishing intensity and overall fishery yield.

The IPHC Secretariat most recently evaluated the MinSL in 2018 (IPHC-2018-AM094-14). That analysis found that discard mortality in the directed commercial fishery was an important component of the total, leading to foregone yield, as well as reduced fishery efficiency. Specifically, that study determined that 4% more commercial fishery landings could be achieved at the same level of fishing intensity if the 32” MinSL was removed; a result that was relatively insensitive to potential shifts in fishery selectivity toward targeting of smaller fish (Stewart and Hicks 2018). However, U32 Pacific halibut comprised approximately 25% of the projected commercial landings in the absence of a MinSL. Considerable discussion of potential low prices for these smaller fish led to concern that the fishery as a whole could lose value, even at a slightly higher biological yield. That analysis found no compelling evidence that the current minimum size limit was providing protection of the spawning biomass given slow growth, late maturity, and considerable fishery mortality on juvenile female Pacific halibut, and noted that under the

Commission's interim management procedure using a constant SPR ensured that the lifetime reproductive output was maintained regardless of the demographics of the sources of mortality.

The trend among historical studies has been toward decreasing support for the current MinSL as size-at-age declined and other factors such as discard mortality and fishery efficiency have become more routinely included in annual considerations. A fully re-evaluated and reviewed stock assessment for 2019 (Stewart and Hicks 2020), as well as newly available direct estimates of the sex-ratio of the commercial landings (Stewart and Webster 2020), have led to renewed interest in the topic of size-limits, both the current MinSL and the potential utility of a MaxSL. This document provides a response to the requests from AM096, extending historical analyses with new information and providing a basis for developing short-term IPHC policy on size limits and/or structuring future investigation through the MSE process.

METHODS

This analysis is divided into four components, each utilizing differing data and methods:

1) A description of the data on discard mortality and age-structure of discards associated with the current MinSL.
2) A description of data on encounter rates and age-structure of large Pacific halibut that could be included in a potential MaxSL.
3) An evaluation of removing the MinSL using the 2019 stock assessment models as a tool to simultaneously evaluate the effects of shifting sex-ratio, age composition of the catch (landings plus discards), and allocation among IPHC Regulatory Areas on the available yield.
4) A similar evaluation using the 2019 stock assessment to explore the effects of one potential MaxSL (60", 152 cm).

Data relevant to the current MinSL

Discard mortality in the directed commercial fishery is estimated each year using a combination of fishery-dependent and fishery-independent information along with historically estimated discard mortality rates (Stewart and Webster 2020). Specifically, U32 encounter rates by IPHC Regulatory Area observed during FISS sampling are used to provide an estimate of likely U32 encounter rates in the directed commercial fishery. The exception to this method occurs in IPHC Regulatory Area 2B, where logbooks are required to include U32 discards (in numbers of Pacific halibut) and therefore a direct estimate is available. The average encounter rate for each IPHC Regulatory Area is applied to the total landings (to account for landings that lack a corresponding logbook records) to generate an estimate of total discarded U32 Pacific halibut. A discard mortality rate of 16% (25% in IPHC Regulatory Area 2A where the fishery operates under 'derby' conditions) is applied to total discards to generate an estimate of discard mortality (Stewart and Webster 2020). Finally, sex-specific age distributions were summarized from 2019 FISS catches in order to better understand the biological properties of U32 Pacific halibut.

Data relevant to a MaxSL

A similar approach was taken to summarize large Pacific halibut encountered by the recent (2017-2019) directed commercial fishery (and subsequently sampled as part of the landings). For a range of large sizes (55-70"; 140-178 cm) the average individual fish weight, average age (and distribution of ages), percent female (by weight) and percent of the landings comprising fish larger than the specified size was summarized. For the commercial fishery, weights were derived from measured individual fish sampled by IPHC field staff. Sex-specific information was only available for 2017-2018.

For comparison with fishery observations, the percent of FISS catches comprising the same large fish sizes was also summarized; however, this summary relied on predicted weights derived from the general length-weight relationship (Stewart and Webster 2020), as sampled weights were only available for individual fish captured in 2019 (Erikson 2020).

Removing the MinSL

In order to evaluate the MinSL, the 2019 stock assessment ensemble (including all updated sex-ratio information) was used to compare key management quantities for 2020 mortality limits (last year's decision) in the absence of the MinSL. The specific process for making the yield calculations is outlined in Appendix A. In short, the SPR, which represents the lifetime reproductive output of the stock, is used to measure and balance the effects of removing differing total mortality and demographic components from the population. The results can therefore be interpreted simply, as: How would the mortality limits need to change in order for fishing intensity to remain constant if the MinSL were removed?

In order to characterize the sensitivity of the results to alternative fishery responses, six alternative cases were also investigated: 10, 20 and 30% avoidance, and 10, 20 and 30% targeting of U32 Pacific halibut. For the base analysis and each sensitivity, the change in yield to the directed commercial fishery, the percent of that yield comprised of U32 Pacific halibut and the 'critical price ratio' (see Appendix B for calculation details) were estimated. The critical price ratio indicates the price that would need to be paid for U32 Pacific halibut as a percentage of the price paid for O32 fish in order for the fishery to be of equal or larger value in the absence of the MinSL (assuming no difference in O32 price between the two regulatory setups).

Implementing a MaxSL

Based on the summary of data relevant to a MaxSL, an example MaxSL of 60 inches (152 cm) was selected for further evaluation. This size of fish represents a compromise in that it is large enough to avoid converting a substantial fraction of the current landings to discards, but small enough to represent a demographically meaningful portion of the current spawning biomass. The approach taken for evaluation of potential MaxSLs was similar to that for the MinSL, although slightly more complex as it required additional modeled fleets and partitioning of existing age data in order to approximate the fishery landings and discards under a MaxSL (Appendix A).

RESULTS

Data relevant to the current MinSL

The FISS and mandatory logbook information available in IPHC Regulatory Area 2B provided similar estimates of the fraction of the total catch comprised of U32 Pacific halibut (Figure 1). Not only was a similar scale estimated from both series, but the relative trend was also very similar, including an increase in the proportion of U32 fish in 2019, apparently due to the 2011 and 2012 year-classes which comprised a large proportion of the age distributions observed in the FISS in most IPHC Regulatory Areas (especially for female Pacific halibut (Figure 2). Of note in both data summaries is the variability among IPHC Regulatory Areas. In recent years the percent of the total catch comprised of U32 fish has ranged from near 20% in IPHC Regulatory Area 4B to around 65-70% in IPHC Regulatory Areas 3B and 4A. Similarly, in the age composition information there are male Pacific halibut greater than 15 years old in all IPHC Regulatory Areas; however, Area 3A has a much higher overall fraction of older males than any other Area. A detailed summary of the size structure of U32 FISS catches is provided in Appendix C.

When the FISS and commercial data are used in tandem with discard mortality rates to estimate the total discard mortality of U32 Pacific halibut, there is a clear decreasing trend over the last 10 years, with a notable increase in 2019 (Table 2). The magnitude of discard mortality by IPHC Regulatory Area is a function of both the landings as well as the encounter rate, with considerable differences among Areas. In aggregate, this source of mortality contributes 0.88 (the three-year average) to 1.49 (the ten-year average) million pounds representing 3-5% of the coastwide total (Table 3). These fish are legally required to be discarded, so they provide no value to the fishery, although they are included in all assessment calculations and in the estimate of overall fishing intensity.

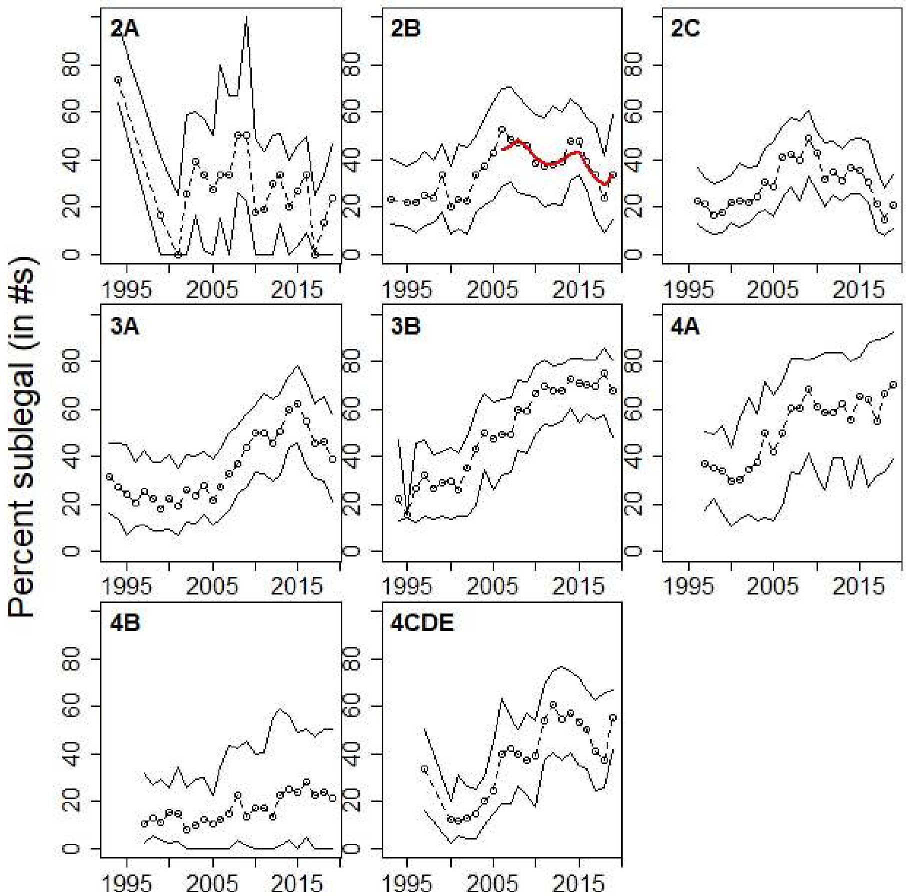

Figure 1. Percent sublegal (U32) in recent (1993-2019) FISS catches (median station value indicated by the connected black circles, 25th and 75th percentiles of station values indicated by solid black lines) and reported commercial fishery logbooks (IPHC Regulatory Area 2B, 2006-2019 average annual value across sets; solid red line).

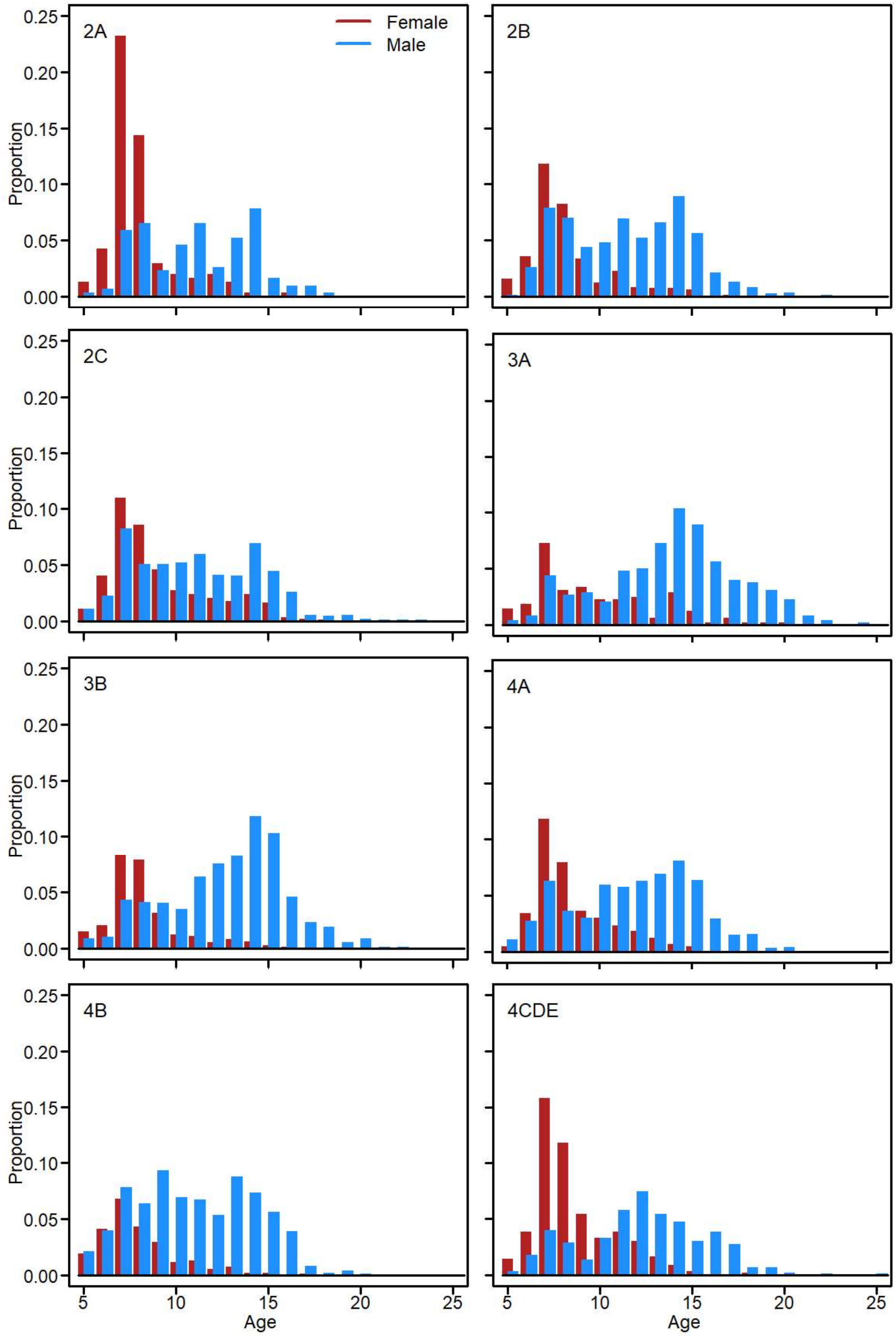

Figure 2. Sex-specific age distributions (by number) for U32 Pacific halibut captured by the 2019 FISS. Females (red bars) and males (blue bars) sum to a value of 1.0 in each panel (IPHC Regulatory Area).

Table 2. Recent discard mortality estimates from the directed commercial fishery for Pacific halibut less than the 32 inch (81.3 cm) minimum size limit length (U32; million net pounds).

Year	2A	2B	2C	3A	3B	4A	4B	4CDE	Coastwide
2010	0.03	0.28	0.26	1.47	0.88	0.13	0.04	0.08	3.16
2011	0.02	0.26	0.08	0.91	0.77	0.14	0.04	0.17	2.39
2012	0.02	0.21	0.09	0.59	0.52	0.09	0.04	0.08	1.62
2013	0.01	0.20	0.09	0.53	0.39	0.06	0.03	0.05	1.37
2014	0.01	0.23	0.12	0.45	0.32	0.03	0.05	0.05	1.26
2015	0.02	0.23	0.12	0.52	0.22	0.07	0.04	0.05	1.26
2016	0.03	0.21	0.12	0.39	0.23	0.05	0.05	0.06	1.15
2017	0.01	0.17	0.08	0.36	0.23	0.06	0.03	0.03	0.97
2018	0.01	0.12	0.05	0.28	0.21	0.07	0.02	0.03	0.78
2019	0.03	0.13	0.07	0.32	0.16	0.09	0.03	0.07	0.90
3-year average	0.02	0.14	0.07	0.32	0.20	0.07	0.03	0.04	0.88
5-year average	0.02	0.17	0.09	0.37	0.21	0.07	0.03	0.05	1.01
10-year average	0.02	0.20	0.11	0.58	0.39	0.08	0.04	0.07	1.49

Table 3. Recent U32 percent mortality (discard mortality/(discard mortality + landings), by weight) from the directed commercial fishery for Pacific halibut.

Year	2A	2B	2C	3A	3B	4A	4B	4CDE	Coastwide
2010	6%	4%	5%	7%	8%	5%	2%	2%	6%
2011	3%	4%	3%	6%	9%	6%	2%	5%	6%
2012	3%	3%	3%	5%	9%	5%	2%	3%	5%
2013	3%	3%	3%	5%	9%	5%	2%	3%	5%
2014	2%	4%	3%	6%	10%	3%	4%	4%	5%
2015	4%	4%	3%	6%	7%	5%	3%	4%	5%
2016	5%	3%	3%	5%	8%	3%	5%	4%	4%
2017	2%	3%	2%	4%	7%	4%	3%	2%	4%
2018	2%	2%	1%	4%	8%	5%	2%	2%	3%
2019	3%	2%	2%	4%	6%	6%	3%	4%	4%
3-year average	2%	2%	2%	4%	7%	5%	3%	3%	3%
5-year average	3%	3%	2%	5%	7%	5%	3%	3%	4%
10-year average	3%	3%	3%	5%	8%	5%	3%	3%	5%

Data relevant to a MaxSL

The relative catch of large Pacific halibut varied substantially across the coast, ranging from <1% for fish greater than 55 inches (140 cm) in IPHC Regulatory Area 2A to 17% in Area 2C (Table 4). A MaxSL of 70 inches (178 cm), would affect less than 2% of the commercial landings in any IPHC Regulatory Area coastwide. Larger potential MaxSLs corresponded to larger average weights of fish above these limits; however, there was again considerable variability among IPHC Regulatory Areas. Although almost all large fish were found to be female (92-100%), there was a considerable range of ages represented even among females larger than 60 inches (152 cm; Figure 3). These fish ranged in age from nine to 42 years, depending on the Area, with the youngest fish on average in IPHC Regulatory Area 2C and the oldest in Area 4B. This pattern illustrates clearly that a MaxSL would not map directly to a maximum age limit, and that even at 70 inches (178 cm) there is the potential for some female Pacific halibut to remain immature. The FISS observed relatively higher catches of large Pacific halibut when compared to the commercial fishery, and showed differing relative patterns among IPHC Regulatory Areas (discussed below).

Table 4. Summary of 2017-2019 commercial fishery landings and FISS catch of large Pacific halibut by IPHC Regulatory area. Values in italics represent only a single fish.

IPHC Regulatory Area	Length greater than (in, cm)	Average net weight (lb, kg)	Average age (range)	% female (weight)[1]	% of Landings (weight)	% of legal FISS catch (weight)[2]
2A	55, 140	66, 30	16 (10-23)	100%	<1%	2%
	60, 152	*109, 49*	*22 (22-22)*	*100%*	*<1%*	<1%
	65, 165	*109, 49*	*22 (22-22)*	*100%*	*<1%*	<1%
	70, 178	NA	NA	NA	0%	0%
2B	55, 140	75, 34	18 (9-39)	100%	8%	16%
	60, 152	92, 42	20 (14-39)	100%	4%	8%
	65, 165	112, 51	22 (15-31)	100%	1%	3%
	70, 178	129, 59	21 (17-25)	100%	<1%	1%
2C	55, 140	71, 32	17 (9-36)	100%	17%	26%
	60, 152	86, 39	17 (9-36)	100%	6%	15%
	65, 165	114, 52	18 (13-36)	100%	2%	8%
	70, 178	148, 67	20 (15-32)	100%	<1%	4%
3A	55, 140	69, 31	16 (11-31)	100%	4%	28%
	60, 152	85, 39	18 (12-31)	100%	2%	18%
	65, 165	119, 54	20 (18-21)	100%	<1%	11%
	70, 178	119, 54	20 (18-21)	100%	<1%	6%
3B	55, 140	70, 32	14 (11-23)	96%	5%	17%
	60, 152	92, 42	16 (13-23)	100%	1%	11%
	65, 165	144, 65	20 (17-23)	100%	<1%	6%
	70, 178	194, 88	23 (23-23)	100%	<1%	3%
4A	55, 140	70, 32	18 (11-39)	100%	5%	10%
	60, 152	100, 45	19 (12-39)	100%	1%	6%
	65, 165	118, 54	23 (14-39)	100%	1%	3%
	70, 178	137, 62	32 (25-39)	100%	<1%	2%
4B	55, 140	80, 36	21 (8-42)	94%	11%	18%
	60, 152	100, 45	23 (12-42)	92%	7%	11%
	65, 165	120, 54	23 (12-40)	100%	4%	6%
	70, 178	147, 67	26 (20-40)	100%	2%	3%
4CDE	55, 140	74, 34	16 (11-24)	100%	9%	14%
	60, 152	88, 40	17 (11-24)	100%	4%	8%
	65, 165	108, 49	18 (11-22)	100%	1%	4%
	70, 178	112, 51	17 (11-20)	100%	<1%	2%

[1]Sex-specific information from the commercial fishery was only available from 2017-2018 for this analysis.
[2]Percent of O32 catch was predicted from individual lengths and the historical length-weight relationship, and therefore may not be comparable with fishery catch percentages.

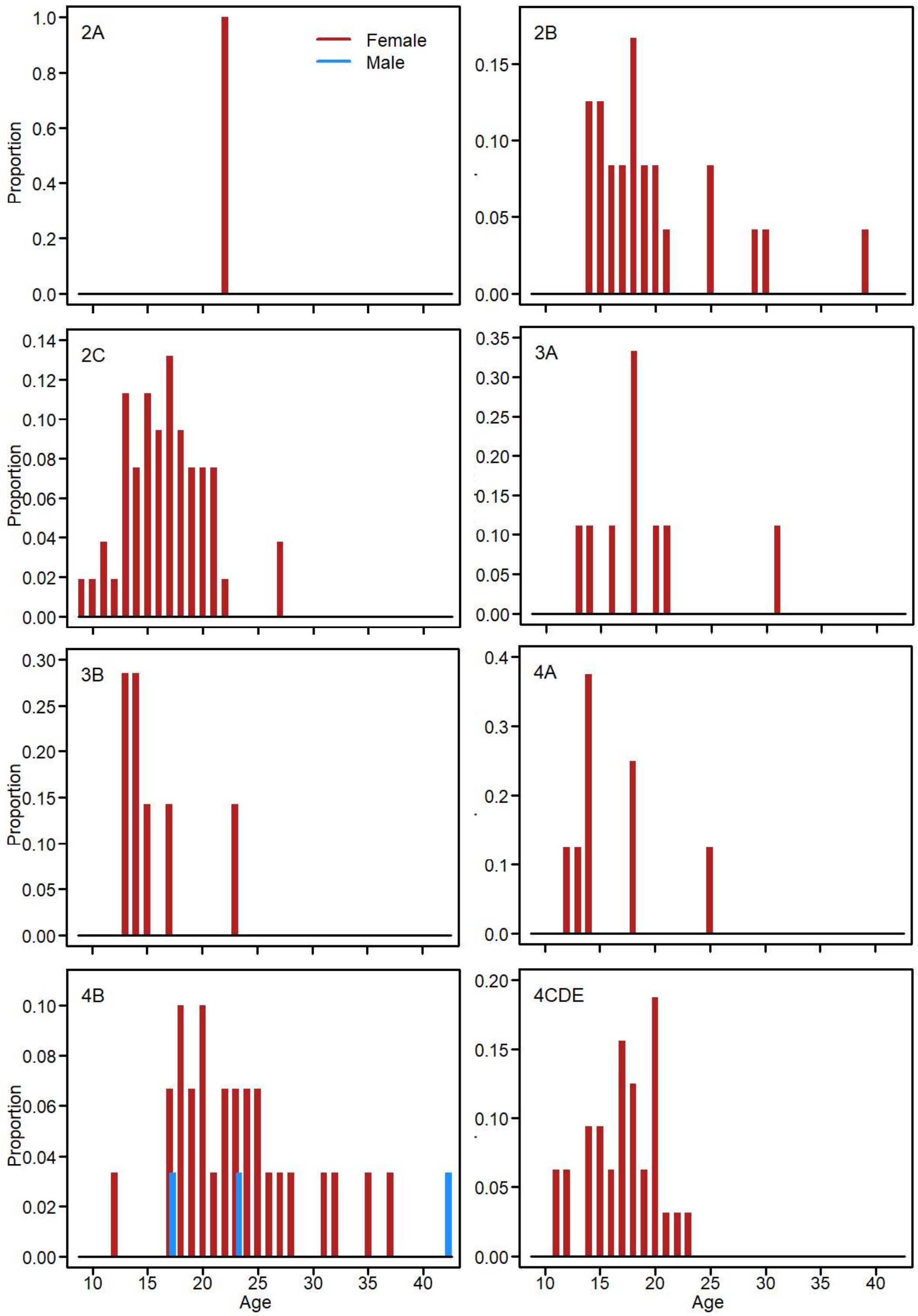

Figure 3. Sex-specific age composition distributions (by number) for Pacific halibut greater than 60 inches (152 cm) in length captured by the commercial fishery in 2017-2018. Females (red bars) and males (blue bars) sum to a value of 1.0 in each panel (IPHC Regulatory Area). Note that the y-axes differ by panel.

Removing the MinSL

If the Commission had removed the MinSL for 2020, the coastwide mortality limit could have been increased to 107% of the adopted limits with the same projected level of fishing intensity (Table 5, Figure 4). This indicates that the additional effects of harvesting smaller and younger Pacific halibut would be more than offset by the reduction in discard mortality (converted to retained catch) and increased yield associated with harvesting fish closer to the ages producing peak yields under current size-at-age and sex-ratios. The additional yield would not be uniformly distributed across the coast, as the proportional increase would depend on the absolute amount of discard mortality converted to landings within the TCEY as well as the distribution of TCEY among Biological Regions and IPHC Regulatory Areas. Not surprisingly, the largest gains would be realized in IPHC Regulatory Areas 3B and 4A, where the highest encounter rates of U32 fish currently occur, even under the same coastwide TCEY distribution (discard mortality currently taken off the TCEY to project commercial landings could be landed in the absence of the MinSL). This general result was found to be largely insensitive to either targeting or avoidance of U32 Pacific halibut: under all alternatives evaluated there was a potential gain in yield by removing the MinSL (Table 5, Figure 4).

Table 5. Yield changes (commercial landings without MinSL/commercial landings with MinSL) for alternatives removing the current commercial fishery minimum size limit.

Fishery	No MinSL	U32 avoidance			U32 targeting		
		10%	20%	30%	10%	20%	30%
Coastwide	107%	107%	106%	106%	107%	108%	108%
Region 2	105%	105%	105%	104%	106%	106%	107%
2A	106%	106%	106%	105%	107%	107%	108%
2B	106%	106%	105%	105%	106%	107%	107%
2C	105%	105%	104%	104%	106%	106%	106%
Region 3	108%	107%	107%	106%	108%	109%	109%
3A	107%	107%	107%	106%	108%	108%	108%
3B	110%	109%	109%	110%	110%	111%	111%
Region 4	110%	109%	109%	109%	110%	111%	111%
4A	109%	109%	108%	108%	110%	110%	110%
4CDE	108%	107%	107%	107%	108%	109%	109%
Region 4B	106%	106%	106%	105%	107%	107%	108%

The projected coatswide landings would be comprised of 18% U32 Pacific halibut in the absence of the current MinSL, ranging from 13 to 22% under the avoidance and targeting alternatives evaluated (Table 6, Figure 4). As observed in other results, there were important differences among Biological Regions and IPHC Regulatory Areas, spanning 7% U32 fish (Area 2C with 30% avoidance) up to 33% (Area 3B with 30% targeting). Biological Region 2, with the lowest encounter rates for U32 fish was the most insensitive to targeting or avoidance, ranging from 9-15% among alternatives.

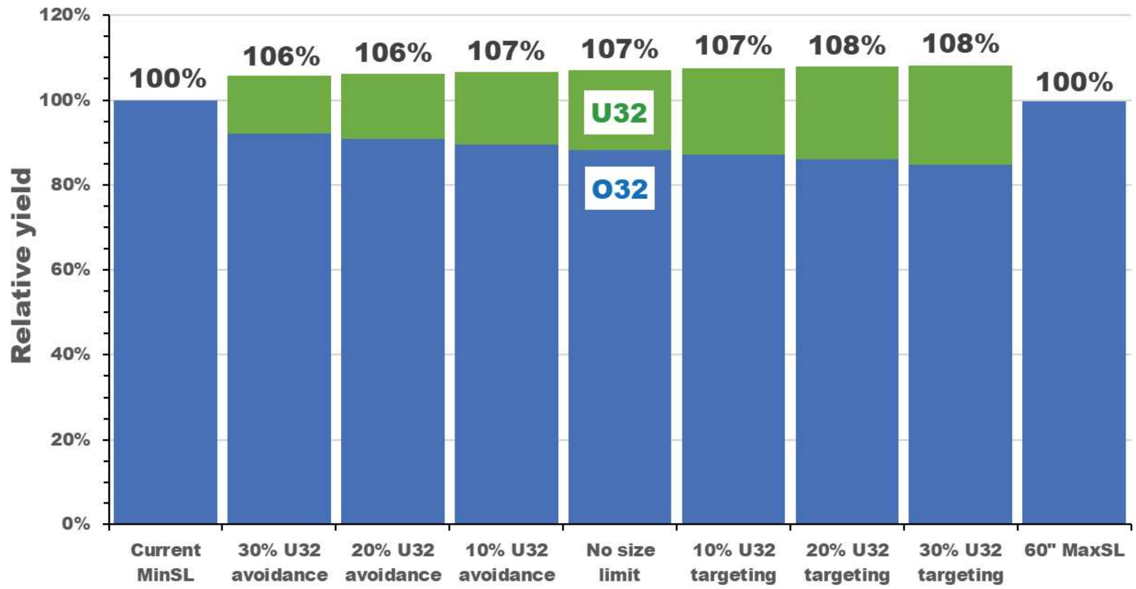

Figure 4. Relative yield (height of bars) for size limit alternatives considered in this analysis, colors indicate the component contributions (O32 and U32) of the total. Refer to Table 6 for percent U32 values.

Table 6. Percent U32 in the landed catch for alternatives removing the current commercial fishery minimum size limit.

Fishery	No MinSL	U32 avoidance			U32 targeting		
		10%	20%	30%	10%	20%	30%
Coastwide	18%	16%	15%	13%	19%	20%	22%
Region 2	12%	11%	10%	9%	13%	14%	15%
2A	15%	14%	13%	11%	17%	18%	19%
2B	13%	12%	11%	10%	14%	15%	16%
2C	9%	8%	7%	7%	10%	11%	12%
Region 3	21%	20%	18%	16%	23%	24%	26%
3A	19%	17%	16%	14%	20%	22%	23%
3B	28%	26%	23%	21%	30%	31%	33%
Region 4	23%	21%	19%	17%	25%	27%	28%
4A	26%	24%	22%	19%	27%	29%	31%
4CDE	21%	19%	17%	16%	23%	24%	26%
Region 4B	16%	15%	13%	12%	18%	19%	20%

The critical price ratio was projected to be 63% coastwide (Table 7); this means that if the price for U32 Pacific halibut is greater than 63% of the price for O32 fish then the fishery will increase in value if the MinSL is removed. Prices are known to vary substantially among IPHC Regulatory Areas, and the critical price ratio was also projected to vary, from a low of 47% in Area 2C (a low price is less important where encounter rates are lowest as U32 fish are projected to comprise a smaller fraction of the total landings) to a high of 68% in IPHC Regulatory Area 3B. Targeting or avoidance further changes the critical price ratio; however, even under the most extreme targeting alternative the fishery value would be equal or larger to that under the current

MinSL in all IPHC Regulatory Areas if the price for U32 Pacific halibut was at least 70% of that for O32 fish.

Table 7. Critical price ratio (price for U32/price for O32; see Appendix B) at which fishery value is unchanged from that under the current MinSL for alternatives removing the current commercial fishery minimum size limit.

Fishery	No MinSL	U32 avoidance			U32 targeting		
		10%	20%	30%	10%	20%	30%
Coastwide	63%	61%	59%	58%	63%	64%	65%
Region 2	57%	55%	54%	53%	57%	57%	58%
2A	61%	59%	57%	56%	62%	62%	63%
2B	58%	56%	54%	53%	58%	59%	59%
2C	47%	45%	43%	43%	47%	48%	49%
Region 3	67%	65%	63%	62%	67%	68%	68%
3A	64%	63%	61%	59%	65%	65%	66%
3B	68%	66%	65%	63%	69%	69%	70%
Region 4	62%	60%	57%	55%	63%	64%	65%
4A	67%	66%	64%	62%	68%	69%	70%
4CDE	66%	64%	62%	60%	66%	67%	68%
Region 4B	62%	60%	58%	57%	62%	63%	64%

Implementing a MaxSL

Implementing a 60 inch (152 cm) MaxSL is projected to result in little net change to fishery yield (Figure 4). However, this MaxSL would create a new (and largely unobserved) source of mortality through discarding of approximately 0.12 million pounds (~54 mt) large female Pacific halibut at the 2020 adopted mortality limits. As this is a one-year calculation, and Pacific halibut can live to at least 55 years of age, it is expected that the level of discard mortality would increase gradually over many years until the abundance of large fish equilibrated with average fishing intensity. At least in the short-term, discard mortality would be approximately offset by increased yield due to a higher fraction of males in the retained catch and average size closer to the peak yields under current size-at-age. If the relative price of fish larger than 60” (O60) remains slightly lower than the average for fish less than 60” (U60), then the average fish size in the landings is projected to result in no change in the aggregate fishery value (Appendix D).

Introduction of a MaxSL would provide an increase in the proportion of the Spawning Biomass (SB) comprised of large female Pacific halibut, and increased opportunity to encounter these fish in recreational fisheries in some IPHC Regulatory Areas (e.g., IPHC Regulatory Area 2C). The long-term change in age composition of the SB and its distribution among Biological Regions and IPHC Regulatory Areas will depend on future spatial patterns and overall levels of stock productivity and fishery management. A 60” MaxSL would reduce fishery efficiency by approximately 3%, and also reduce the data quality on fish in the total vs. landed commercial fishery catch.

DISCUSSION

Summary

This evaluation has provided a general framework for consideration of size limits for Pacific halibut. It includes series of projected responses, both positive and negative to the removal of the MinSL or implementation of a MaxSL (Table 1) as well as detail on the IPHC Regulatory Area specific results likely to be realized. Specific projected results are a key component in informed decision-making and recommended by the IPHC's Scientific Review Board (SRB) during the most recent size limit analysis. That review highlighted the adaptive management aspects of a potential action on the size limit (see Appendix E).

Removing the current MinSL is projected to increase potential yield by 7%, using the 2020 adopted mortality limits for comparison. This yield comes from a combination of reduced discard mortality, as well as harvest of fish sizes closer to the peak yields under current estimated size-at-age and sex-ratios. Building on concerns raised during the previous evaluation of size limits, we explored the relative price at which the fishery would be of equal of greater net value (accounting for the change in size structure of the landings), and found the critical price ratio for U32 Pacific halibut to be 63% of the price for O32 fish. This calculation likely provides a slight (but unknown) underestimate of the fishery value, implying the realized critical price ratio may be somewhat lower (Appendix B). With increased landings and decreased discards, the fishery efficiency (landings relative to total catch) is projected to increase by 18%. Improved efficiency should result in some level of savings to operational costs (fuel, bait, trip duration, etc.); however, such changes will be highly dependent on individual business plans and fishing grounds. Currently, discarding of U32 Pacific halibut creates an important data gap, due to sparse to no sampling at-sea (depending on the IPHC Regulatory Area). Assuming that full retention of all legal catch is retained in regulation, removing the MinSL will result in improved data on total catch through the existing port sampling program.

Introduction of a MaxSL was evaluated based on fishery and survey data over a range of potential maximum sizes. A 60 inch (152 cm) MaxSL was found to result in a very small reduction net fishery yield (rounding to 100% of the 2020 adopted mortality limits). Any MaxSL is projected to result in a new source of discard mortality, almost entirely comprised of female Pacific halibut, but in this example that mortality would be offset through increased yield due to a higher fraction of males in the retained catch and average size closer to the peak yields under current size-at-age. A MaxSL is also projected to result in an increase in older/larger female Pacific halibut in the stock, and therefore available to the recreational fishery. This increase would continue over time, depending on the level of fishing intensity resulting from commission mortality limits, as well as future size-at-age and recruitment levels. A 60" (152 cm) MaxSL is projected to reduce fishery efficiency by approximately 3%, due to the additional handling of large female halibut that would have to be discarded. This handling would also lead to a reduction in data quality as these discards would not be sampled for biological information. The reduction in average fish size in the landings is projected to result in no aggregate change in fishery value. As for the MinSL, the effects of a MaxSL would not be uniformly distributed among IPHC Regulatory Areas; Area 2C would likely see the greatest changes in both the fishery and stock, at least in the short-term, based on recent fishery landings.

Other considerations

A relatively large difference was observed between the fishery and FISS catches of large (primarily female) Pacific halibut. Although the fishery is known to capture a larger proportion of females across all ages (Stewart and Webster 2020), landings of fish larger than 55 inches were consistently estimated to be a greater fraction of the total in the FISS data. There are several potential reasons for this. Commercial fishery effort may be focused on fishing grounds with higher average catch rates, which must comprise smaller fish, as there are far more numerous in the population and may be behaviorally segregated from the largest fish investigated here. This represents potential avoidance of large fish, consistent with the slightly lower price (Appendix D). In addition, some large fish may be either lost from the gear during retrieval, or currently not retained by the directed commercial fishery during normal fishing operations. Finally, the difference may be simply an artifact of the calculation method; the survey catch percentages for large fish are based on individual predicted weights from the historical length-weight relationship (due to only 1 partial year of measured weights being available), and the length-weight relationship is known to over-predict the individual weights of the largest Pacific halibut.

This analysis did not examine trade-offs in yield between the commercial and recreational sectors as would likely occur due to existing domestic catch agreements. However, the results do account for the existing TCEY distribution. This means that estimated potential yield would be available without making major changes to the current distribution of the TCEY among IPHC Regulatory Areas. Removing the current MinSL or introduction of a MaxSL is also likely to affect the contribution of Pacific halibut resource to the economy through the recreational sector. This could be a potential avenue for an economic analysis that is currently under development by the IPHC.

The IPHC landed and sold U32 Pacific halibut that were sacrificed for scientific data collection as part of the 2020 FISS design (see **IPHC-2021-AM097-06**). These fish, although very limited in number, provide the first direct information on the price for U32 Pacific halibut for comparison with the critical price ratios found in this analysis. However, it is unclear whether a broader market response would differ if, as projected under the removal of the current MinSL, 13-22% of the coastwide landings comprised U32 fish. Further, it may take several years before a robust market for U32 fish develops and the relative price of U32 vs. other size categories stabilizes. Moreover, interpretation of these prices may be confounded by highly disrupted market conditions in 2020 (due to COVID-19). As of early 2020, news reports of small (3-8 pound; 1.4-3.6 kg) frozen Pacific halibut from the Russian fishery ("Fish Factor", Laine Welch, March 23, 2020) suggested U32 fish are already present in the global marketplace. Discovering the relative price for U32 Pacific halibut from IPHC Convention waters represents a clear adaptive management component of removing the MinSL.

This evaluation included consideration of both fishery targeting and avoidance of U32 Pacific halibut if the MinSL were removed. There are factors that could lead to both outcomes under the right circumstances. Targeting could occur if there was a small (or no) price differential for U32 fish, as fishery catch rates (efficiency) could be improved via increased effort on fishing grounds that produce smaller fish. Conversely, under a larger price differential there may be very strong economic reasons to avoid fishing grounds with small fish in order to avoid having to retain those fish under current regulation. This has been observed in recent years in the sablefish (*Anoplopoma fimbria*) fishery occurring in the same waters of Alaska as strong recruitment events have resulted in reduced prices for small fish and changes in fishery behavior (Hanselman et al. 2019). Both targeting and avoidance could be affected by future whale depredation; it is unknown whether this is likely to become a greater or lesser problem in the absence of a MinSL.

The previous evaluation of size limits (Stewart and Hicks 2018) considered the potential of a conservation benefit of the MinSL due to creating a 'reproductive refuge', where fish were allowed to mature before harvest. Although this concept forms the basis for the use of MinSLs in species from crustaceans to reef fish (e.g., Hilborn and Walters 1992), for Pacific halibut, much of the current fishery landings even with the MinSL in place are juvenile (immature) females. Another well recognized aspect of size-limits reflects the shape of the fishery yield curve: the yield available as a function of varying levels of fishing intensity tends to be a flatter relationship through the use of size limits. This means that a larger range of fishing intensity level (or similarly, of errors in intended fishing intensity) tend to produce more similar yields when a size limit is in place. This buffering of management actions (and errors) was noted in the previous size-limit analysis (Stewart and Hicks 2018). In the extreme, for a species where at least one spawning is ensured through the use of a MinSL (e.g., many crustaceans), there is much less importance of annual quotas or fishing intensity, and in some cases a MinSL may successfully provide the sole source of management. Similarly, a slot limit (a combination of both a MinSL and MaxSL) may provide both a management buffer and reproductive outputs, especially in the presence of very large maternal effects (Ahrens et al. 2020). Due to the wide range of ages represented by a single size of Pacific halibut, as well as the relatively late maturity (approximately 50% between ages 11 and 12), Pacific halibut management does not provide a ready analog for these simpler cases.

There are a variety of policy and procedural implications for a change to the current MinSL or introduction of a MaxSL. This analysis does not address the timeline or logistic aspects of such a change, as these would be primarily domestic management issues. However, with regard to data collection, the IPHC may need to request that domestic at-sea observer programs (either electronic or traditional) begin to identify the reason for discarding in the future so that adequate delineation of sub-legal, legal-regulatory (quota attainment), and supra-legal discards can occur.

Effects on size-at-age

Despite a long history of investigation, the mechanisms behind trends in Pacific halibut size-at-age remain poorly understood. Density dependence (Clark and Hare 2002), temperature (Holsman et al. 2018), dietary overlap (Barnes et al. 2018), and fishing (Sullivan 2016) may all be contributing factors. In the presence of a minimum size limit, fishing mortality can affect size-at-age in at least two ways: 1) by reducing the fastest growing fish in each cohort, such that the observed size-at-age is lower than it would be in the absence of fishing (e.g., Martell et al. 2015b; Taylor and Methot Jr 2013), and 2) cumulative effects over cohorts of removing the fastest growing genetic components of the stock (e.g., Conover and Munch 2002). This reconstructed historical time-series does not seem consistent with either of these, as size-at-age is understood to have increased from the 1930s through the 1970s, a period of high levels of exploitation combined with a (26") MinSL. However, removing the current MinSL would likely reduce the selective removal of faster growing individuals. Some selectivity for faster growing Pacific halibut would remain even in the absence of a MinSL: hook sizes used by the commercial fishery also select for larger fish (and therefore faster growing fish as younger ages). Although conceptually this aspect of the decision to retain or remove the current MinSL could be considered to be adaptive management, in practice it could be decades before trends in size-at-age were clearly identified and those may be confounded with changes in the stock and ecosystem.

Importance of spatial differences

The detailed results of this evaluation illustrate the spatial variability in effects of removing the MinSL or implementing a MaxSL. This analysis is structured around the current demographic patterns (observed recent distributions of U32 and O60 Pacific halibut), and also the recent distribution of the TCEY. Management decisions to appreciably change the TCEY distribution will have both immediate and delayed effects on both the fishery and stock. Specifically, the net effect of removing the MinSL will depend on the proportion of the TCEY assigned to Areas of higher and lower encounter rates of U32 Pacific halibut. This analysis assumed no changes to the current distribution.

The effects of either removing the MinSL or introducing a MaxSL will not only vary by Biological Region and IPHC Regulatory Area, but will also vary at finer scales. Based on analyses of fine-scale spatial and temporal persistence in size-at-age patterns, broad changes observed over time and IPHC Regulatory Areas mask even more complex patterns among fishing grounds (B. Ritchie, MS Thesis in preparation, Alaska Pacific University). This means that the effects on individual fishermen will differ based on where they choose to fish their quota within the larger Regulatory Areas. Therefore, there is the potential for changes in the selection of fishing grounds to create targeting or avoidance that introduce additional uncertainty in this analysis.

The stock distribution also represents both an important input, and to some degree an output of any decision regarding size limits. Ontogenetic movement patterns observed for Pacific halibut suggest higher relative movement at younger ages/smaller size, but continued movement throughout their life-span, with a clear net movement toward eastern IPHC Regulatory Areas (Webster et al. 2013). This means that large changes in the distribution of the TCEY and/or the size structure of the mortality are likely to have an effect on long-term stock distribution. Evaluation of this feedback requires a spatially-structured simulation model and accounting for all aspects of the management system (see management procedure discussion below).

Spawning biomass and recruitment

The IPHC's Interim Management procedure relies on a reference SPR, this means that regardless of allocation, selectivity and current age structure of the stock, the long-term reproductive output of the stock is maintained at a constant level. The age-structure of the spawning biomass has been found to be important for some marine species, particularly long-lived rockfishes (e.g., Berkeley et al. 2004), through 'maternal effects' or increasing survival/fitness of offspring produced by older females. Some species also show evidence of an increasing relationship between size and fecundity, indicating that eggs produced per unit of body mass may be greater for larger females (Dick 2009). However, for Pacific halibut, there are currently no data that indicate either maternal effects or increasing fecundity with size or age. Both maturity and fecundity are part of the ongoing IPHC research program (Planas 2020).

As part of a broader review of stock-recruitment modelling in the Pacific halibut stock assessment, models have been explored that allow for maternal effects, in order to determine whether they are more consistent with the historical time-series. Although this is not an experimental evaluation with high statistical power, no support was found in the historical age composition and other information available (IPHC-2020-SRB016-07). Therefore, it is unlikely that implementing a MaxSL would increase projected recruitment to the Pacific halibut stock.

Public perception

Globally, in recent decades there has been decrease in discarding of non-target species and sizes (bycatch) in many fisheries (Zeller et al. 2017). In some regions this change has been driven by regulation based 'full' retention, including the highly publicized ban on discarding of all quota species in the North Sea in 2014 causing changes in the way many affected fisheries are conducted (e.g. Catchpole et al. 2017). For Pacific halibut, the last decade has seen increasing interest in quantifying the effects of discard mortality both within the directed commercial fishery and in non-directed commercial fisheries. A similar trend has been notable among previous size-limit analyses, ranging from little emphasis on discarding as a decision point in early evaluations, to a major focus on the magnitude and distribution of discards in 2018. There would seem to be some benefit for the directed fishery in public perception, and beyond simple yield calculations, in eliminating all discard mortality by removing the MinSL and requiring the retention of all catch.

Size limits within a comprehensive management procedure

This evaluation provides tactical decision-making information for consideration of removing the current MinSL and/or implementing a MaxSL. The focus is on short-term yield, fishery and stock performance while retaining all other aspects of the IPHC's Interim Management Procedure. It is not intended to provide a comparison of long-term performance of size limits as one part of a comprehensive management procedure. Such a comprehensive analysis is ongoing, via the MSE process. Questions regarding long-term change in spatial distribution and scale of recruitment and spawning biomass require the full 'closed-loop' approach used in the MSE. As such, size limits provide a potential avenue for future MSE analysis depending on prioritization by the Management Strategy Advisory Board.

ADDITIONAL INFORMATION FOR 2021

The IPHC secretariat will prepare a projection of detailed management results for 2021 mortality limits in the absence of the commercial MinSL for presentation at AM097. This information will be provided in early January 2021, in order to include end-of-year 2020 updated mortality estimates, consistent with the mortality projection tool.

RECOMMENDATIONS

That the Commission:

a) **NOTE** paper IPHC-2021-AM097-09 which provides an evaluation of directed commercial fishery size limits in response to the discussion and request from AM096.
b) **AGREE** on whether the minimum size limit should be removed for the 2022 fishing period, noting that a Fishery Regulation proposal would need to be submitted to the Commission for consideration in accordance with the IPHC Rules of Procedure (2020).

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APPENDIX A: CALCULATION OF CHANGE IN FISHERY YIELD

This evaluation is focused on the short-term effects of removing the MinSL and/or adding a MaxSL. Therefore, the approach taken to make yield calculations is based on current conditions and is intended to guide IPHC management in 2021-2022, pending the development and implementation of a comprehensive management procedure through the MSE process.

In order to estimate the change in yield associated with removing the MinSL (as well as the related calculations of the percent of that yield comprising U32 Pacific halibut and the critical price ratio; see Appendix B), the following procedure was applied using the 2019 stock assessment ensemble:

1) Begin with the directed fishery landings equating to the mortality limits adopted for 2020. This level of yield and projected fishing intensity ($F_{42\%}$) provides the baseline for comparisons.
2) Inflate the estimated discard mortality (U32) to reflect a removal of the MinSL, such that all fish captured by the directed commercial Pacific halibut fishery are retained. The magnitude of this source of mortality increases substantially from those fish discarded dead, due to the 16% discard mortality rate (catch = discard mortality/0.16).
3) Because the total mortality is now greater, the directed fishery O32 landings must be scaled downward to achieve the same level of fishing intensity for 2020. However, U32 Pacific halibut are now included in the landed fishery yield.
4) After iteratively finding the scale of the new set of removals that matches the target fishing intensity, the fishery yield by IPHC Regulatory Area, Biological Region, and Coastwide can be compared with the adopted mortality limits for 2020.
5) Because the response of the fishery to removal of the MinSL is unknown, several alternative levels of targeting (10, 20 and 30% more U32 catch) and avoidance (10, 20 and 30% less U32 catch) were also compared with regard to yield and catch characteristics.

A similar, but slightly more complicated approach was required to evaluate the MaxSL:

1) Add another commercial fleet to the assessment models to represent the capture of large (O60) Pacific halibut.
2) Add another fleet to represent the directed fishery ages without the O60 fish included.
3) Add 2017-2018 age composition data (with the appropriate sizes of fish added/removed) to inform the selectivity curve of new fleets.
4) Iteratively fit the assessment model to these data to generate selectivity curves consistent with a change in both the landings and new source of discard mortality under a MaxSL, then fix the selectivity parameters at those estimates allowing the models to be projected to 2020 without any change in the time-series.
5) Use the observed percentages of large Pacific halibut in the landed catch to assign a fraction of the projected catch for 2020 to the new large fish discard fleet. Discount that catch by 84% to account for release survival.
6) Reduce the existing fishery mortality by the amount transferred to the discard fleet and transfer remaining mortality for the fishery to the new fleet where selectivity does not represent O60s.
7) Iterate to find the new fishery yield and discard associated with the MaxSL that satisfies the SPR from the 2020 projection.
8) Compare with the adopted mortality limits for 2020.

APPENDIX B: CALCULATION OF CRITICAL PRICE RATIO

The value of the current fishery can be approximated by:

$$value_{SL} = L_{O32,SL} x P_{O32}$$

Where *L* denotes the landings of legal-size (*O32*) Pacific halibut in the presence of the current size limit (*SL*), and *P* denotes the price.

In the absence of a size-limit (*NSL*) a similar approximation using the same notation is:

$$value_{NSL} = L_{O32,NSL} x P_{O32} + L_{U32,NSL} x P_{U32}$$

Where the additional term reflects the contribution of sublegal (*U32*) Pacific halibut to the overall fishery value. In order to find the point at which the fishery value would be equal with and without the size limit, these two equations can be set equal and re-arranged, yielding a 'critical price ratio':

$$\frac{P_{U32}}{P_{O32}} = \frac{L_{O32,SL} - L_{O32,NSL}}{L_{U32,NSL}}$$

This formulation in convenient for comparisons because it does not require that the price for either O32 or U32 Pacific halibut is known in order to determine if the fishery is likely to gain or lose overall value. Only the relative landings must be known. Further, given important differences in the relative proportions of O32 and U32 in potential fishery landings by IPHC Regulatory Area and Biological Regions, this critical price ratio can be estimated at each scale to provide more information on the likely spatial distribution of effects on the fishery.

An important simplifying assumption in this approach is that the price for O32 Pacific halibut will remain the same regardless of the presence or absence of the MinSL. Theoretically, we might expect an increase in the O32 price in the absence of the MinSL as the supply would be lower and therefore demand may be higher. This would lead to the reported critical price ratio to be conservative relative to the likely outcome: fishery value may actually be higher than predicted, and the critical ratio of U32 to O32 price lower than calculated using this method.

APPENDIX C: SUMMARY OF U32 FISS CATCHES BY SIZE, 2017-2019

The most comprehensive source of size- and sex-delineated information for U32 Pacific halibut comes from the annual catches by the FISS. In order to evaluate the distribution of U32 Pacific halibut by number and biomass, the most recent three years of FISS catches (2017-2019) were summarized in 1-inch (~2.5 cm) increments. Results are provided in the form of alternative potential MinSLs by individual IPHC Regulatory in Figures C.1 to C.8. Across all IPHC Regulatory Areas, the catch of Pacific halibut discarded at alternative potential size limits less than 32 inches decreases rapidly with fish size. Catches of Pacific halibut less than 26 inches (66 cm) are small, corresponding a maximum of 19.8% by number and 7.1% of the catch by weight in IPHC Regulatory Area 4A. This suggests that removing the current MinSL entirely would not likely produce a large amount of catch smaller than 26 inches without significant changes in fishing behavior. In most IPHC Regulatory Areas, male Pacific halibut comprise an increasing percentage of the catch at smaller sizes; this change in sex-ratio is included in the yield analyses reported in this document. Also evident in these results is the broad range of encounter rates among IPHC Regulatory Areas from 2C (the lowest) to 3B (the highest).

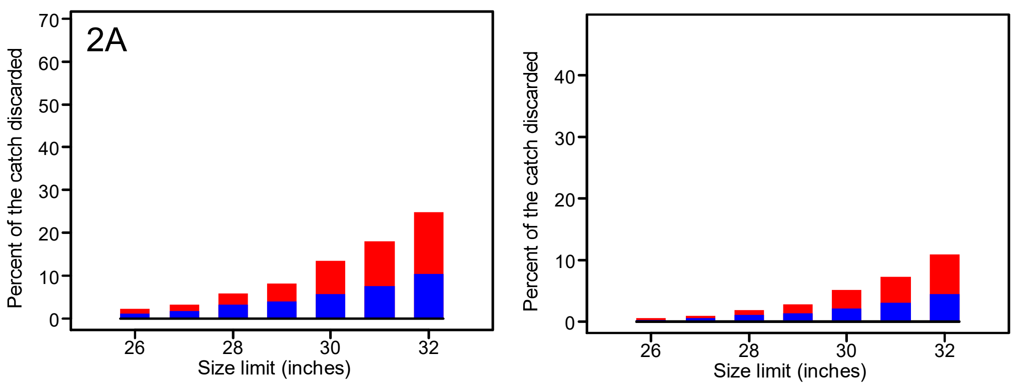

Figure C.1. Percent of the catch discarded (bars) based on alternative potential size limits less than 32 inches for IPHC Regulatory Area 2A. Left panel is based on numbers of fish, right panel is based on estimated weight of the catch. Each bar is divided into the male (blue) and female (red) components of the catch.

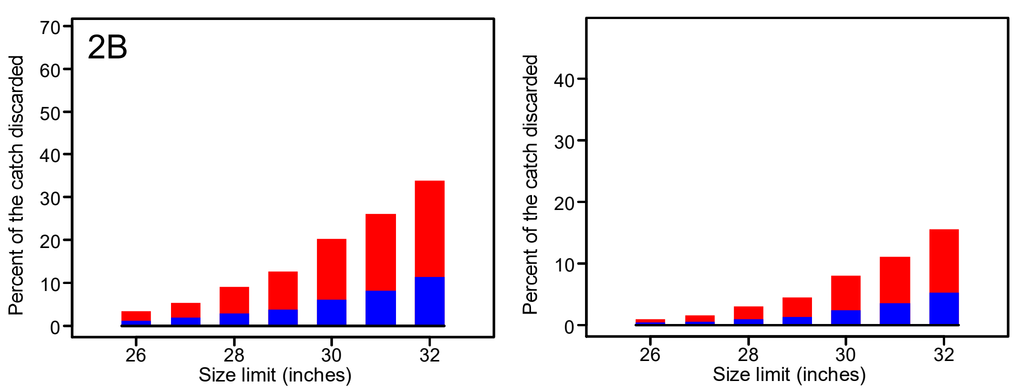

Figure C.2. Percent of the catch discarded (bars) based on alternative potential size limits less than 32 inches for IPHC Regulatory Area 2B. Left panel is based on numbers of fish, right panel is based on estimated weight of the catch. Each bar is divided into the male (blue) and female (red) components of the catch.

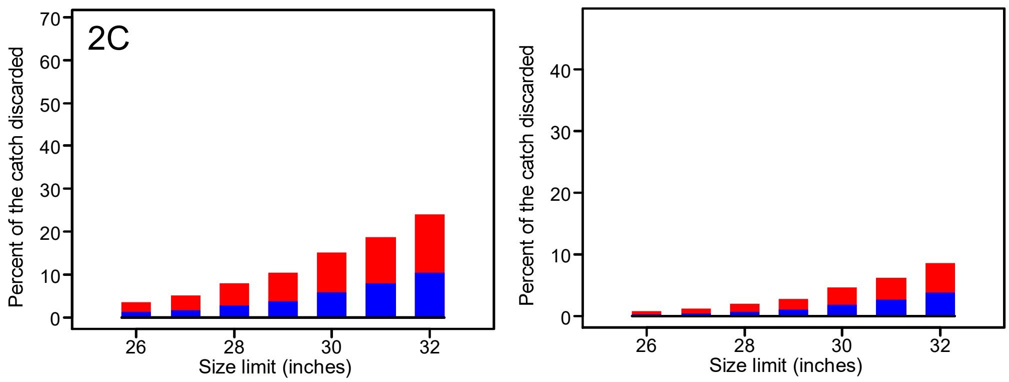

Figure C.3. Percent of the catch discarded (bars) based on alternative potential size limits less than 32 inches for IPHC Regulatory Area 2C. Left panel is based on numbers of fish, right panel is based on estimated weight of the catch. Each bar is divided into the male (blue) and female (red) components of the catch.

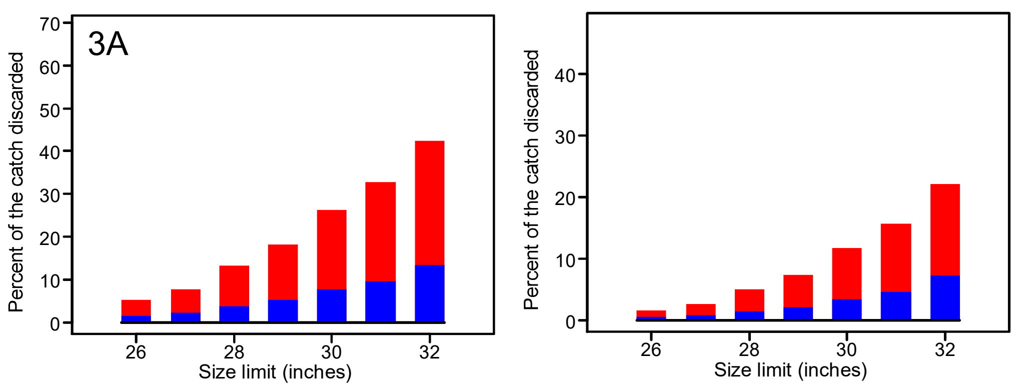

Figure C.4. Percent of the catch discarded (bars) based on alternative potential size limits less than 32 inches for IPHC Regulatory Area 3A. Left panel is based on numbers of fish, right panel is based on estimated weight of the catch. Each bar is divided into the male (blue) and female (red) components of the catch.

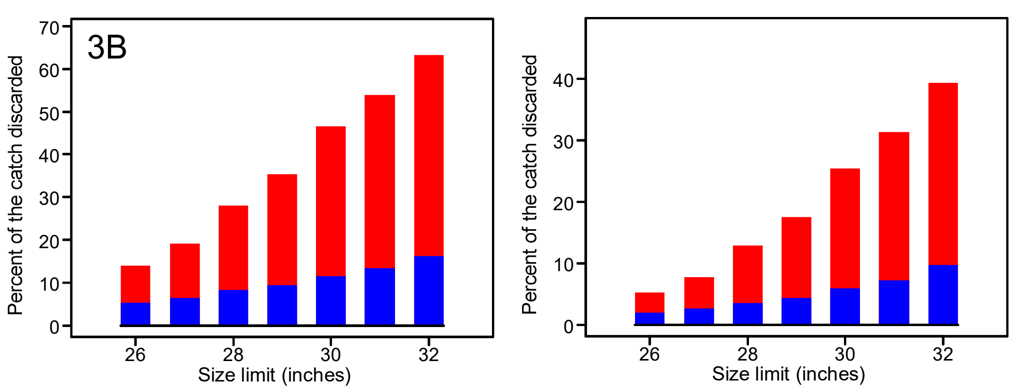

Figure C.5. Percent of the catch discarded (bars) based on alternative potential size limits less than 32 inches for IPHC Regulatory Area 3B. Left panel is based on numbers of fish, right panel is based on estimated weight of the catch. Each bar is divided into the male (blue) and female (red) components of the catch.

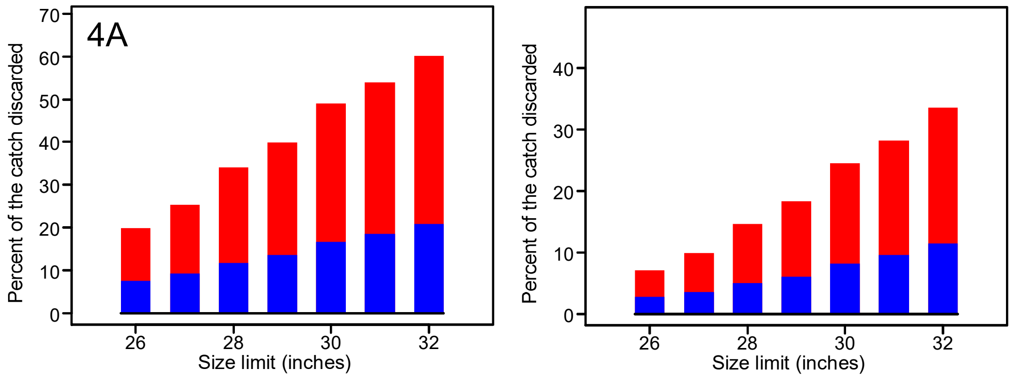

Figure C.6. Percent of the catch discarded (bars) based on alternative potential size limits less than 32 inches for IPHC Regulatory Area 4A. Left panel is based on numbers of fish, right panel is based on estimated weight of the catch. Each bar is divided into the male (blue) and female (red) components of the catch.

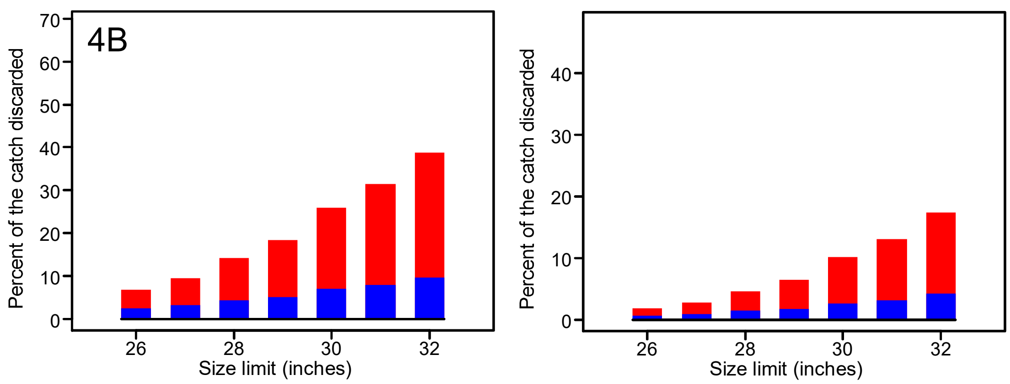

Figure C.7. Percent of the catch discarded (bars) based on alternative potential size limits less than 32 inches for IPHC Regulatory Area 4B. Left panel is based on numbers of fish, right panel is based on estimated weight of the catch. Each bar is divided into the male (blue) and female (red) components of the catch.

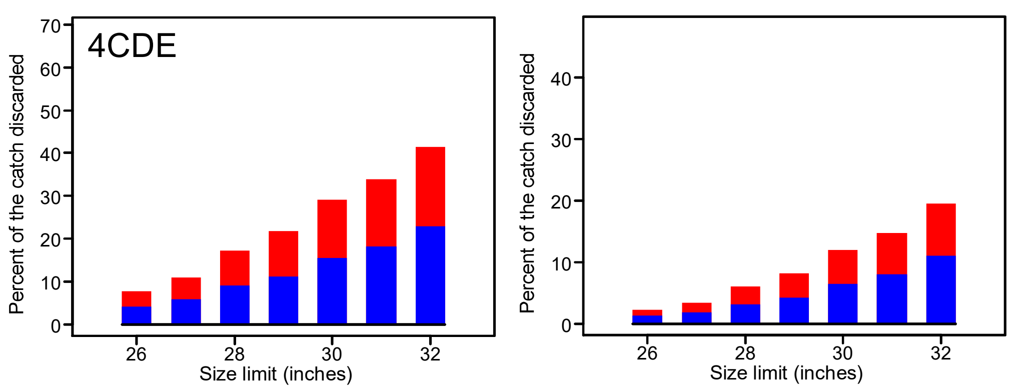

Figure C.8. Percent of the catch discarded (bars) based on alternative potential size limits less than 32 inches for IPHC Regulatory Area 4CDE. Left panel is based on numbers of fish, right panel is based on estimated weight of the catch. Each bar is divided into the male (blue) and female (red) components of the catch.

APPENDIX D: 2019 PACIFIC HALIBUT PRICES IN ALASKA

Recent prices and differences in price among size (weight) categories of the commercial fishery landings differ by year, IPHC Regulatory Area, port and buyer. In order to provide context for the critical price ratio, and the relative importance of different size categories, landings data were summarized from 2019 (Table D.1).

Table D.1: Average reported 2019 landings, revenue and price by aggregated weight category for Pacific halibut landed in Alaska (raw data from the eLandings system).

Aggregated weight category (net lbs)	Reported landings (net lbs)	Revenue ($US)	Price ($US)
<=20	5,397,552	27,350,760	5.07
20-40	4,492,190	24,046,953	5.35
40-60	1,821,392	10,391,435	5.71
60-80	375,098	2,060,299	5.49
80+	209,932	1,135,090	5.41
Unassigned[1]	3,270,674	17,566,759	5.37

[1]Categories reported in recent years have been inconsistent, including various levels of aggregation. The categories assigned here represent those that could be categorized unambiguously; therefore a large fraction of the landings remained unassigned.

APPENDIX E: ADAPTIVE MANAGEMENT CONSIDERATIONS

During the review of the 2018 MinSL evaluation (Stewart and Hicks 2018), the SRB made the following request:

SRB10–Req.02 *(para. 28):*

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

Adaptive management consists of actions taken in order to learn specific information that will subsequently improve future management (Walters 1986). In some cases, actions may be sub-optimal (or even negative) in the short term, but the information that they generate may facilitate improved performance (e.g., yield), and thus a positive result in the long term. An important aspect of adaptive management is that the focus of the action is on gaining information about the system and not on the specific results of that action.

The 2018 MinSL analysis provided an appendix containing detailed projections of likely effects by IPHC Regulatory Area of a reduced (or no) MinSL. During SRB11 (IPHC 2017b), after reviewing the options developed by the Secretariat, the IPHC's Scientific Review Board made an additional recommendation:

SRB11–Req.05 (para. 21):

> *"NOTING the thoughtful and detailed presentation on the potential impacts of changing the minimum size limit presented in Appendix E (Evaluation of adaptive management approaches) of paper IPHC-2017-SRB11-07, the SRB REQUESTED that the IPHC Secretariat, between now and SRB12, seek feedback from the Commissioners, Conference Board, Processors Advisory Board, and the Management Strategy Advisory Board, on a modified version of Appendix E. In particular, a modified version would include (i) a process for starting and possibly ending an experiment, (ii) performance metrics, and (iii) criteria for making conclusions based on the experimental outcomes."*

Discussion of alternative and potentially adaptive approaches for removing or modifying the MinSL included both the Commission and advisory bodies. One proposal allowed for the MinSL to be removed in a single IPHC Regulatory Area on a voluntary basis in order to learn more about the price for U32 Pacific halibut (and therefore potential change in fishery value). There were no IPHC Regulatory Areas that volunteered to remove the MinSL as an adaptive management measure at that time.

INTERNATIONAL PACIFIC HALIBUT COMMISSION

IPHC 5-year Biological and Ecosystem Science Research Plan (2017-21): Update

PREPARED BY: IPHC SECRETARIAT (J. PLANAS, 15 DECEMBER 2020)

PURPOSE

To provide the Commission with a description of progress on the IPHC 5-year Biological and Ecosystem Science Research Plan (2017-21).

BACKGROUND

The main objectives of the Biological and Ecosystem Science Research at the IPHC are to:

1) identify and assess critical knowledge gaps in the biology of the Pacific halibut;
2) understand the influence of environmental conditions; and
3) apply the resulting knowledge to reduce uncertainty in current stock assessment models.

The primary biological research activities at IPHC that follow Commission objectives are identified and described in the IPHC Five-Year Biological and Ecosystem Science Research Plan (2017-21). These activities are summarized in five broad research areas designed to provide inputs into stock assessment and the management strategy evaluation processes (Appendix I), as follows:

1) Migration. Studies are aimed at further understanding reproductive migration and identification of spawning times and locations as well as larval and juvenile dispersal.
2) Reproduction. Studies are aimed at providing information on the sex ratio of the commercial catch and to improve current estimates of maturity.
3) Growth and Physiological Condition. Studies are aimed at describing the role of some of the factors responsible for the observed changes in size-at-age and to provide tools for measuring growth and physiological condition in Pacific halibut.
4) Discard Mortality Rates (DMRs) and Survival. Studies are aimed at providing updated estimates of DMRs in both the longline and the trawl fisheries.
5) Genetics and Genomics. Studies are aimed at describing the genetic structure of the Pacific halibut population and at providing the means to investigate rapid adaptive changes in response to fishery-dependent and fishery-independent influences.

UPDATE ON PROGRESS ON THE MAIN RESEARCH ACTIVITIES

1. Migration.

   Knowledge of Pacific halibut migration throughout all life stages is necessary in order to gain a complete understanding of stock distribution and the factors that influence it.

   1.1. Larval distribution and connectivity between the Gulf of Alaska and Bering Sea.
   Principal Investigator: Lauri Sadorus (M.Sc.)
   Objective: To investigate larval and juvenile connectivity of Pacific halibut within and between the Gulf of Alaska and the Bering Sea.

Knowledge of the dispersal of Pacific halibut larvae and subsequent migration of young juveniles has remained elusive because traditional tagging methods are not effective on these life stages due to the small size of the fish. This larval connectivity project, in cooperation with NOAA EcoFOCI, used two recently developed modeling approaches to estimate dispersal and migration pathways in order to better understand the connectivity of populations both within and between the Gulf of Alaska (GOA) and Bering Sea (BS). A manuscript of the results has been recently published in the journal *Fisheries Oceanography* (Sadorus et al., 2020). In brief, to improve current understanding of larval dispersal pathways and migrations of young fish within and between GOA and BS, investigations were conducted to (1) examine pelagic larval dispersal and connectivity between the two basins using an individual-based biophysical model (IBM), and (2) track movement of fish up to age-6 years using annual age-based distributions and a spatio-temporal modeling approach. IBM results indicate that the Aleutian Islands constrain connectivity between GOA and BS, but that large island passes serve as pathways between these ecosystems. The degree of connectivity between GOA and BS is influenced by spawning location such that up to 50-60% of simulated larvae from the westernmost GOA spawning location arrive in the BS with progressively fewer larvae arriving proportional to distance from spawning grounds further east. There is also a large degree of connectivity between eastern and western GOA and between eastern and western BS. Spatial modeling of 2-6 year old fish shows ontogenetic migration from the inshore settlement areas of eastern BS towards Unimak Pass and GOA by age 4. The pattern of larval dispersal from GOA to BS, and subsequent post-settlement migrations back from BS toward GOA, provides evidence of circular, multiple life-stage, connectivity between these ecosystems, regardless of temperature stanza or year class strength. The results of these studies will improve estimates of productivity by contributing to the generation of potential recruitment covariates and by informing minimum spawning biomass targets by Biological Region. In addition, these results will assist in the biological parameterization and validation of movement estimates in the MSE Operating Model (Appendix I).

1.2. Wire tagging of U32 Pacific halibut.
Principal Investigator: Joan Forsberg (B.Sc.; Fisheries Statistics & Services Branch)
Objective: To investigate the migratory patterns of young 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 NOAA-Fisheries groundfish trawl survey and, beginning in 2016, on the IPHC Fishery-Independent Setline Survey (FISS). In 2019, a total of 821 Pacific halibut were tagged and released during the GOA trawl survey and 885 tags were released during the BS trawl survey. Through 2019, a total of 6,536 tags have been released in the NOAA-Fisheries groundfish trawl survey and, to date, 52 tags have been recovered. No U32 tagging on the NOAA-Fisheries groundfish trawl survey occurred in 2020 due its cancellation as a result of COVID-19. On the IPHC FISS, a total of 3,980 U32 Pacific halibut have been wire tagged are released and 74 of those have been recovered to date. In 2020, 868 U32 fish were wire-tagged and released: 321 fish in Regulatory Area 2B and 547 fish in Regulatory Area 3A. The distance traveled by recaptured fish from the release location was under 10 nm for 35% of the fish and between 11 and 50 nm for 25% of the fish. For example, of the 2,005 fish released in Reg Area 3A between 2015 and 2019, 31 of 32 recovered fish were recovered in the same area of release and within the first three years at liberty.

2. Reproduction.

Efforts at IPHC are currently underway to address two critical issues in stock assessment for estimating the female spawning biomass: the sex ratio of the commercial landings and maturity estimations.

2.1. Sex ratio of the commercial landings.
Principal Investigator: Anna Simeon (M.Sc.)
Objective: To provide information on the sex ratio of the commercial landings.

The sex ratio of the commercial fishery catch represents an extremely important source of uncertainty in the annual stock assessment (Stewart and Hicks, 2020). The IPHC has generated sex information of the entire set of aged commercial fishery samples collected in 2017 and in 2018 (>10,000 fin clips per year) using genetic techniques based on the identification of sex-specific single nucleotide polymorphisms (SNPs) (Drinan et al., 2018) using TaqMan qPCR assays conducted at the IPHC's Biological Laboratory. Therefore, for the first time, direct estimates of the sex-ratio at age for the directed commercial fishery have been available for stock assessment. Genetic analyses of commercial samples from 2017 showed that the proportion of females coastwide was high (82%), ranging from 65% to 92% depending on the biological region. Data from the 2018 commercial samples showed almost identical patterns, with females comprising 80% of the coastwide commercial landings (by number). Given that the sex-ratio data constitutes one of the two most important contributors to estimates of both population trend and scale, the inclusion of this information in the 2019 stock assessment resulted in higher spawning biomass. The IPHC Secretariat has recently completed the processing of genetic samples from the 2019 commercial landings and the results indicate that the percentage of females coastwide in the commercial catch is 78%, showing a continuous decline since 2017. Additional years of sex-ratio information of the commercial catch are likely to further inform selectivity parameters and cumulatively reduce uncertainty in future estimates of stock size, in addition to improving simulation of spawning biomass in the MSE Operating Model (Appendix I).

The IPHC Secretariat is also working towards providing information on sex ratios in years previous to 2017 through the use of genotyping techniques using historical samples of otoliths. The IPHC Secretariat has recently tested whether DNA can be extracted from otoliths and whether the extracted DNA is of sufficient quantity and quality to be used in the genotyping assays currently used with DNA derived from fin clips. The results obtained indicate that DNA can be extracted from otoliths, albeit at low concentration, and that the genotyping assays can correctly identify the sex of the individual fish. Additional studies are underway to determine whether clean archived otoliths can also be used as a historical source of DNA for genotyping.

2.2. Maturity estimations.
Principal Investigator: Josep Planas (Ph.D.)
Objective: To characterize maturity and fecundity in female Pacific halibut.

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, 2020). These results highlight the need for a better understanding of factors influencing reproductive biology and success for 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 in this species. Specific objectives of current studies include: 1) accurate description of oocyte developmental stages and their use to classify female maturity stages; 2) comparison of macroscopic (based on field observations) and microscopic (based on histological assessment) maturity stages and revision of maturity criteria; 3) revision of current estimates of female age-at-maturity; and 4) investigation of fecundity and skip-spawning in females.

The IPHC Secretariat has described for the first time the different oocyte stages that are present in the ovary of female Pacific halibut and how these are used to classify females histologically to specific maturity stages. This information is contained in a manuscript that has been recently published in the *Journal of Fish Biology* (Fish et al., 2020). In brief, 8 different oocyte developmental stages have been described, from early primary growth oocytes until preovulatory oocytes, and their size and morphological characteristics established. Maturity classification was determined by assigning maturity status to the most advanced oocyte developmental stage present in ovarian tissue sections and 7 different microscopic maturity stages were established. Analysis of oocyte size frequency distribution among the seven different maturity stages provided evidence for the group-synchronous pattern of oocyte development and for the determinate fecundity reproductive strategy in female Pacific halibut. The results of this study will allow us to establish a comparison of the microscopic/histological and macroscopic/field classification criteria that are currently used to assign the maturity status of females that is used in stock assessment. The results of this study set the stage for and in-depth study on temporal changes in maturity, as assessed by microscopic observations of ovarian samples collected throughout an entire annual reproductive cycle, that is currently underway. Furthermore, the IPHC Secretariat is also establishing a comparison of the microscopic (e.g. histological) and macroscopic (e.g. visual) maturity classification criteria to determine whether field classification criteria that are currently used to assign the maturity status of females that is used in stock assessment needs to be revised in light of the improved knowledge on ovarian development.

In addition, the IPHC Secretariat is conducting temporal and spatial analyses of female maturity schedules through the collection of ovarian samples in FISS. For the temporal analysis of maturity, ovarian samples have been collected in the Portlock region (central Gulf of Alaska) during the same period (June-July) for 30 females (>90 cm length) for four consecutive years: 2017, 2018, 2019 and 2020. These ovarian samples have been processed for histology and microscopic maturity staging will be conducted to compare the maturity status over that time period. Furthermore, for the spatial analysis of maturity, ovarian samples from 30 females (>90 cm length) have been collected in the FISS in 5 different regions in the Gulf of Alaska in order to obtain preliminary information on potential spatial differences in maturity.

The results of these studies will be important for scaling biomass and reference point estimates and to improve simulation of spawning biomass in the MSE Operating Model (Appendix I).

3. Growth.
   Principal Investigator: Josep Planas (Ph.D.)
   Objective: To investigate somatic growth variation as a driver for changes in size-at-age.

   Recent stock assessments conducted by the IPHC Secretariat have indicated that the Pacific halibut stock experienced a continuous coastwide decline from the late 1990s until approximately 2012 largely due to a decrease in size-at-age (SAA) (Stewart and Hicks, 2020). Current low values of SAA combined with low recruitment of cohorts spawned at the time of the initial decrease in SAA in the 1990s have contributed to a decrease in exploitable Pacific halibut biomass. Although the decrease in SAA has been hypothesized as being attributed to several potential causes, including environmental effects such as temperature or food availability, as well as ecological or fishery effects, our knowledge on the actual factors that influence SAA of Pacific halibut is still scarce. The IPHC Secretariat has conducted studies aimed at elucidating the drivers of somatic growth leading to the decline in SAA by investigating the physiological mechanisms that contribute to growth changes in the Pacific halibut. The two main objectives of these studies are: 1) the identification and validation of physiological markers for somatic growth; and 2) the use of growth markers for evaluating growth patterns in the Pacific halibut population and the effects of environmental factors on somatic growth. In order to pursue these objectives, the IPHC Secretariat has investigate on the effects of temperature variation on growth performance, as well as on the effects of density, hierarchical dominance and handling stress on growth in juvenile Pacific halibut in captivity. These studies have been funded by a grant from the North Pacific Research Board to the IPHC (NPRB 1704; 2017-2020) (Appendix II).

   The results on the effects of temperature on growth physiological indicators are being prepared for publication in a peer-reviewed journal (Planas et al., in preparation). In brief, juvenile Pacific halibut were subjected to temperature-induced growth manipulations, whereby somatic growth was suppressed by low temperature acclimation and stimulated by temperature-induced compensatory growth. Physiological signatures of growth suppression and growth stimulation were identified by a comparative transcriptomics and proteomics approach that identified genes and proteins, respectively, which experienced expression changes in response to the two growth manipulations. The identified genes and proteins could potentially represent useful markers for growth in skeletal muscle. Currently, assays are being developed to test the validity of the identified molecular markers for growth on skeletal muscle samples from age-matched adult Pacific halibut of different sizes.

In addition to temperature-induced growth manipulations, the IPHC Secretariat is conducting similar studies to identify physiological growth markers that respond to density and stress-induced growth manipulations. On one hand, changes in SAA in Pacific halibut have been hypothesized, among other potential causes, to be the result of changes in population dynamics of the Pacific halibut stock due to a density effect, whereby high population densities would negatively affect growth. On the other hand, we hypothesize that stress responses associated with capture and release of discarded Pacific halibut may affect feeding and growth in the wild, therefore, addressing potential growth consequences related to capture and handling stress. Investigations related to the effects of density and stress exposure are currently underway.

The results of these studies will inform scale stock productivity and reference point estimates, in addition to contributing to improve simulation of variability and allow for scenarios investigating climate change (Appendix I).

4. Discard Mortality Rates (DMRs) 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. 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 for 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 stock assessment, changes in the estimates of incidental mortality will influence the output of the stock assessment and, consequently, the catch levels of the directed fishery. For this reason, the IPHC Secretariat is conducting investigations on the effects of capture and release on survival and on providing experimentally-derived estimates of DMRs in the directed longline and guided recreational Pacific halibut fisheries that will improve trends in unobserved mortality in stock assessment and that will be important for fishery parametrization (Appendix I):

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.
Principal Investigator: Claude Dykstra (B.Sc.)
Objective: To provide estimates of discard mortality and best-handling practices in the Pacific halibut directed fishery.

In order to better estimate post-release survival of Pacific halibut caught incidentally in the directed longline fishery, the IPHC Secretariat is conducting investigations to understand the relationship between fish handling practices and fish physical and physiological condition and survival post-capture as assessed by electronic archival tagging. Currently, the IPHC assigns a 3.5% DMR to Pacific halibut released from longline gear with only minor injuries and a 16% DMR to the total estimated volume of U32 discards generated by the target fishery. The former was experimentally derived between 1958 and 1961, and the latter is a result of tagging studies in which the baseline DMR was used as a parameter in tag-recovery models that were used to estimate DMRs for fish returned to the water in relatively poorer condition than “minor”. As such, if the 3.5% is mis-specified, the subsequent rates that rest upon that value will be inaccurate, as will be our estimates of total discard mortality within the fishery. The baseline rate was generated from at-sea captive holding studies that reported that observed mortality patterns were, at least in part, due to fluctuating environmental conditions from which the fish could not escape, and for which they attempted to compensate analytically. Ambiguity therefore exists regarding the degree to which the baseline rate is accurate, necessitating additional studies in order to resolve this issue. For this reason, the IPHC Secretariat, with partial funding by a grant from the Saltonstall-Kennedy Grant Program NOAA (NA17NMF4270240; 2017-2020) (Appendix II), conducted studies to evaluate the effects of hook release techniques on injury levels, their association with the physiological condition of captured Pacific halibut and, importantly, generated experimentally-derived estimates of DMR in the directed longline fishery.

As part of this study, injury profiles and release viabilities for different release techniques (careful shake, gangion cutting, and hook stripping) have been developed. The results obtained indicate that injury patterns were similar for careful shake and gangion cutting, with most injuries being a small puncture to the cheek, and greater than 70% of the released fish were classified to be in excellent viability. The hook stripper produced more severe physical injuries with significantly greater numbers of fish classified as moderate or poor in viability condition upon release.

Blood glucose, lactate, and cortisol levels from all fish released have been determined using specific assays in the Biological Laboratory. Results are suggestive of a trend towards lower glucose and higher lactate blood levels in fish classified as dead in terms of the release condition. Cortisol levels do not show a significant trend across the release condition categories. Results on glucose, lactate, and cortisol plasma levels in fish according to physical injury code show a fair amount of variation within groups. The relationship of blood glucose, lactate, and cortisol levels to other measured parameters in discarded fish (fat levels, condition index, time out of water, temperature exposure, etc.) are under ongoing investigation.

Electronic monitoring (EM) systems were proven to be effective at accurately capturing the release method applied to each animal. Footage is now being reviewed to determine the ability of EM systems to provide length estimates of captured fish from the existing footage, and additional in season work on a FISS vessel is proposed.

4.2. Discard mortality rates of Pacific halibut in the charter recreational fishery.
Principal Investigator: Claude Dykstra (B.Sc.)
Objective: To provide estimates of discard mortality and best-handling practices in the Pacific halibut guided recreational fishery.

The IPHC has begun a research project to better characterize the nature of charter recreational fisheries with the ultimate goal of better understanding discard practices relative to that which is employed in the directed longline fishery. This project has received funding from the National Fish and Wildlife Foundation (Appendix II). As an initial step in this project, information from the charter fleet on types of gear and fish handling practices used was collected through stakeholder meetings and on dock interviews with charter captains and operators. Results show that the guided recreational fleet predominantly uses circle hooks (75-100%), followed by jigs. Predominant hook release methods included reversing the hook (54%), or twisting the hook out with a gaff (40%), and the fish were generally handled by supporting both the head and tail (65%), while other common techniques included handling by the operculum (10%) or by the tail alone (10%). These results will inform the design of the experimental test fishing that will take place in Spring/Summer of 2021 and in which injury levels, fish condition and stress parameters will be evaluated to identify best practices intended to minimize discard mortality in this fishery and to provide direct estimates of discard survival.

5. Genetics and genomics. The IPHC Secretariat is exploring avenues for incorporating genetic approaches for a better understanding of population structure and distribution and is also building genomic resources to assist in genetics and molecular studies on Pacific halibut.

5.1. Genetics.
Principal Investigator: Andy Jasonowicz (M.Sc.)
Objective: To investigate the genetic structure of the Pacific halibut population and to conduct genetic analyses to inform on Pacific halibut movement and distribution in the eastern North Pacific Ocean. Two specific objectives are being pursued as follows:

5.1.1. Investigate the genetic structure of the Pacific halibut population in the North-eastern Pacific Ocean. Understanding population structure is imperative for sound management and conservation of natural resources (Hauser, 2008). Pacific halibut in Canadian and USA waters are managed by the International Pacific Halibut Commission (IPHC) as a single coastwide unit stock since 2006. The rationale behind this management approach is based on our current knowledge of the highly migratory nature of Pacific halibut as assessed by tagging studies (Webster et al., 2013) and of past analyses of genetic population structure that failed to demonstrate significant differentiation in the North-eastern Pacific Ocean population of Pacific halibut by allozyme (Grant, 1984) and small-scale microsatellite analyses (Bentzen, 1998; Nielsen *et al.*, 2010). However, more recent studies have reported slight genetic population structure on the basis of genetic analysis conducted with larger sets of microsatellites suggesting that Pacific halibut captured in the Aleutian Islands may be genetically distinct from other areas (Drinan et al., 2016). These findings of subtle genetic structure in the Aleutian Island chain area are attributed to limited movement of adults and exchange of larvae between this area and the rest of the stock due to the presence of oceanographic barriers to larval and adult dispersal (i.e. Amchitka Pass) that could represent barriers to gene flow. Unfortunately, genetic studies suggesting subtle genetic structure (Drinan et al., 2016) were conducted based on a relatively limited set of microsatellite markers and, importantly, using genetic samples collected in the summer (i.e. non-spawning season) that may not be representative of the local spawning population. With the collection of winter (i.e. spawning season) genetic samples in the Aleutian Islands by the IPHC in early 2020, a collection of winter samples from 5 different geographic areas across the North-eastern Pacific Ocean (i.e. British Columbia, Central Gulf of Alaska, Bering Sea, Central and Western Aleutian Islands) is now available to re-examine the genetic structure of the Pacific halibut population. Importantly, novel, high-throughput and high-resolution genomics approaches are now available for use, such as low-coverage whole genome resequencing, in order to describe with unprecedented detail the genetic structure of the Pacific halibut population. The recently sequenced Pacific halibut genome (Section 5.2) will constitute an essential resource for the success of the whole genome resequencing approach. The results from the proposed genomic studies will provide important information on spawning structure and, consequently, on the genetic baselines of source populations. Importantly, the results from these studies will provide management advice regarding the relative justifiability for considering the western Aleutians as a genetically-distinct substock. These research outcomes will represent important avenues for improving estimates of productivity and parametrization of the MSE Operating Model (Appendix I).

5.1.2. Analysis of genetic variability among juvenile Pacific halibut in the Bering Sea and the Gulf of Alaska. The aim of this objective is to evaluate the genetic variability or genetic diversity among juvenile Pacific halibut in a given ocean basin in order to infer information on the potential contribution from fish spawned in different areas to that particular ocean basin. We hypothesize that genetic variability among juvenile Pacific halibut captured in one particular ocean basin (e.g. eastern Bering Sea) may be indicative of mixing of individuals originating in different spawning grounds and, therefore, of movement. By comparing the genetic variability of fish between two ocean basins (i.e. eastern Bering Sea and Gulf of Alaska), we will be able to evaluate the extent of the potential contribution from different sources (e.g. spawning groups) in each of the ocean basins and provide indications of relative movement of fish to these two different ocean basins. The use of genetic samples from juvenile Pacific halibut collected in the National Marine Fisheries Service trawl survey in the eastern Bering Sea and in the Gulf of Alaska, aged directly by otolith reading or indirectly through a length-age key, will allow us to provide information on genetic variability among fish that are at or near their settlement or nursery grounds. These studies will provide the ability to assign individual juvenile Pacific halibut to source populations (as established in 5.1.1) and genetic information on movement and distribution of juvenile Pacific halibut. These research outcomes will improve estimates of productivity and biological parametrization and validation of movement estimates and recruitment distribution in the MSE Operating Model (Appendix I).

5.2. Genomics.

Principal Investigator: Josep Planas (Ph.D.)

Objective: To sequence the Pacific halibut genome as a key resource for genomic studies.

The IPHC Secretariat has recently completed conducting a project aimed at generating a first draft sequence of the Pacific halibut genome, the blueprint for all the genetic characteristics of the species. This project was conducted in collaboration with the French National Institute for Agricultural Research (INRA, Rennes, France). Briefly, the Pacific halibut genome has a size of 586 Mb and contains 24 chromosomes- covering 98.6% of the complete assembly with a N50 scaffold length of 25 Mb at a coverage of 91x. The Pacific halibut genome sequence has been submitted to the National Center for Biological Information (NCBI) with submission number SUB7094550 and with accession number JABBIT000000000. Furthermore, the Pacific halibut genome has been annotated and is available in NCBI as NCBI *Hippoglossus stenolepis* Annotation Release 100. The generated genomic resources will greatly assist current studies on the genetic structure of the Pacific halibut population, on the application of genetic signatures for assigning individuals to spawning populations and for a thorough characterization of regions of the genome or genes responsible for important traits of the species.

RECOMMENDATIONS

That the Commission **NOTE** paper IPHC-2021-AM097-10 which outlines progress on the IPHC 5-year Biological and Ecosystem Science Research Plan.

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APPENDICES

Appendix I: Integration of ongoing biological research activities, stock assessment and management strategy evaluation.

Appendix II: Summary of awarded research grants current in 2020

APPENDIX I

Integration of ongoing biological research activities, stock assessment and management strategy evaluation

Research areas	Research activities	Research outcomes	Relevance for stock assessment	Relevance for MSE	Specific analysis input	SA Rank (Top 3)	MSE Rank (Top 3)
Migration	Larval and juvenile connectivity and early life history studies	Improved understanding of larval and juvenile distribution	Improve estimates of productivity	Improve parametization of the Operating Model	Will be used to generate potential recruitment covariates and to inform minimum spawning biomass targets by Biological Region	3. Biological input	1. Biological parameterization and validation of movement estimates
Reproduction	Histological maturity assessment	Updated maturity schedule	Scale biomass and reference point estimates	Improve simulation of spawning biomass in the Operating Model	Will be included in the stock assessment, replacing the current schedule last updated in 2006	1. Biological input	
	Examination of potential skip spawning	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		
	Fecundity assessment	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		
	Examination of accuracy of current field macroscopic maturity classification	Revised field maturity classification			Revised time-series of historical (and future) maturity for input to the stock assessment		
	Sex ratio of current commercial landings	Sex ratio-at-age	Scale biomass and fishing intensity		Annual sex-ratio at age for the commercial fishery fit by the stock assessment	1. Assessment data collection and processing	
	Historical sex ratios based on archived otolith DNA analyses	Historical sex ratio-at-age			Annual sex-ratio at age for the commercial fishery fit by the stock assessment		
	Recruitment strength and variability	Establishment of temporal and spatial maturity and spawning patterns	Improve stock-recruitment curve for more precise assessment	Improve simulation of recruitment variability and parametization of recruitment distribution in the Operating Model	May be used to provide a weighted spawning biomass calculation and or inform targets for minimum spawning biomass by Biological Region		2. Biological parameterization and validation of recruitment variability and distribution
Growth	Evaluation of somatic growth variation as a driver for changes in size-at-age	Identification and application of markers for growth pattern evaluation	Scale stock productivity and reference point estimates	Improve simulation of variability and allow for scenarios investigating climate change	May inform yield-per-recruit and other spatial evaluations of productivity that support mortality limit-setting		3. Biological parameterization and validation for growth projections
		Environmental influences on growth patterns			May provide covariates for projecting short-term size-at-age. May help to delineate between effects due to fishing and those due to environment, thereby informing appropriate management response		
Mortality and survival assessment	Discard mortality rate estimate: longline fishery	Experimentally-derived DMR	Improve trends in unobserved mortality	Improve estimates of stock productivity	Will improve estimates of discard mortality, reducing potential bias in stock assessment results and management of mortality limits		1. Fishery parameterization
	Discard mortality rate estimate: recreational fishery				Will improve estimates of discard mortality, reducing potential bias in stock assessment results and management of mortality limits		2. Fishery parameterization
	Best handling practices: longline fishery	Guidelines for reducing discard mortality			May reduce discard mortality, thereby increasing available yield for directed fisheries		
	Best handling practices: recreational fishery	Guidelines for reducing discard mortality			May reduce discard mortality, thereby increasing available yield for directed fisheries		
Genetics and genomics	Population structure	Stock structure of IPHC Regulatory Area 4B relative to the rest of the Convention Area	Altered structure of future stock assessments	Improve parametization of the Operating Model	If 4B is found to be functionally isolated, a separate assessment may be constructed for that IPHC Regulatory Area	2. Biological input	1. Biological parameterization and validation of movement estimates.
	Distribution	Assignment of individuals to source populations and assessment of distribution changes			Will be used to define management targets for minimum spawning biomass by Biological Region	3. Biological input	2. Biological parameterization and validation of recruitment distribution

APPENDIX II
Summary of awarded research grants in 2020

Project #	Funding agency	Project title	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 (Award No. NA17NMF4270240)	IPHC	Alaska Pacific University	$286,121	Bycatch estimates	September 2017 – August 2020 (Finalized)
2	**North Pacific Research Board**	Somatic growth processes in the Pacific halibut (*Hippoglossus stenolepis*) and their response to temperature, density and stress manipulation effects (Award No. 1704)	IPHC	AFSC-NOAA-Newport, OR	$131,891	Changes in biomass/size-at-age	September 2017 – February 2020 (Finalized)
3	**National Fish & Wildlife Foundation**	Improving the characterization of discard mortality of Pacific halibut in the recreational fisheries (Award No. 61484)	IPHC	Alaska Pacific University, U of A Fairbanks, charter industry	$98,902	Bycatch estimates	April 2019 – June 2021
Total awarded ($)					**$516,914**		

IPHC Management Strategy Evaluation for Pacific halibut (*Hippoglossus stenolepis*)

PREPARED BY: IPHC SECRETARIAT (A. HICKS, P. CARPI, I. STEWART, & S. BERUKOFF; 18 DECEMBER 2020)

PURPOSE

To provide a description of the International Pacific Halibut Commission (IPHC) Management Strategy Evaluation (MSE) framework and an evaluation of management procedures for coastwide scale and distributing the TCEY to IPHC Regulatory Areas.

SUMMARY

The Management Strategy Evaluation (MSE) at the International Pacific Halibut Commission (IPHC) has completed an evaluation of management procedures (MPs) relative to the coastwide scale of the Pacific halibut stock and fishery and has developed a framework to investigate MPs related to distributing the Total Constant Exploitation Yield (TCEY) to IPHC Regulatory Areas. The MSE framework contains the Operating Model (OM) that simulates the Pacific halibut population and fisheries, and the Management Procedure (MP) with a closed-loop feedback. A four-region operating model was conditioned to match historical data and then simulated forward in time with uncertainty and using eleven MPs, defined at the 15th Session of the IPHC Management Strategy Evaluation Board (MSAB015), to determine distributed mortality limits. There are many trade-offs between objectives and between IPHC Regulatory Areas that must be considered in the evaluation. Biological sustainability objectives were met for all MPs, except that the percentage of spawning biomass in IPHC Regulatory Area 4B was less than 2% in more than 5% of the simulations for all MPs. This particular result may be due to a number of factors, including a misspecification of the population dynamics in that Biological Region. Yield objectives were similar for coastwide performance metrics but varied across IPHC Regulatory Areas depending on the elements of the MPs. MPs were ranked higher with respect to stability objectives when methods to dampen variability, such as constraints on the annual change in the TCEY and averaging of stock distribution estimates, were included in the MP. Two MPs performed the best. One (MP-D) allowed for increases in the fishing intensity to accommodate agreements in 2A and 2B. The other (MP-J) used a moving five year average of stock distribution estimates to distribute the TCEY. All MSE results and visualizations to evaluate the MPs are available on the MSE Explorer online tool[1].

1 INTRODUCTION

The Management Strategy Evaluation (MSE) at the International Pacific Halibut Commission (IPHC) has completed an evaluation of management procedures (MPs) relative to the coastwide scale of the Pacific halibut stock and fishery and has developed a framework to investigate MPs that also include distributing the Total Constant Exploitation Yield (TCEY) to IPHC Regulatory Areas. The TCEY is the mortality limit composed of mortality from all sources except under-26-

[1] The current MSE Explorer tool is updated at http://shiny.westus.cloudapp.azure.com/shiny/sample-apps/MSE-Explorer/ and the results are archived at http://shiny.westus.cloudapp.azure.com/shiny/sample-apps/IPHC-MSE-AM097/

inch (66.0 cm, U26) non-directed commercial discard mortality, and is determined by the Commission at each Annual Meeting for each IPHC Regulatory Area (Figure 1).

The development of this MSE framework aimed to support the scientific, forecast-driven study of the trade-offs between fisheries management scenarios. Crafting this tool required:

- the definition and specification of a multi-area operating model (OM);
- an ability to condition operating model parameters using historical catch and IPHC Fishery-Independent Setline Survey (FISS) data and other observations;
- identification and development of management procedures with closed-loop feedback into the operating model;
- definition and calculation of performance metrics and statistics based on defined objectives to evaluate the efficacy of applied management procedures.

The MSE framework is briefly described below, followed by a description of the management procedures being evaluated that distribute the TCEY to IPHC Regulatory Areas, and then the presentation of simulation results.

2 Framework Elements

The MSE framework includes elements that simulate the Pacific halibut population and fishery (OM) and management procedures (MPs) with a closed-loop feedback (Figure 2). Specifications of some elements are described below, with additional technical details in document IPHC-2020-MSAB016-INF01.

2.1 Multi-area operating model

The generalized operating model is able to model multiple spatial components, which is necessary because mortality limits and some objectives (Appendix I) are defined at the IPHC Regulatory Area level (Figure 1). The OM is flexible, fast, modular, and easily adapted to many different assumptions. It will be a useful tool for many investigations of the Pacific halibut fishery in the future.

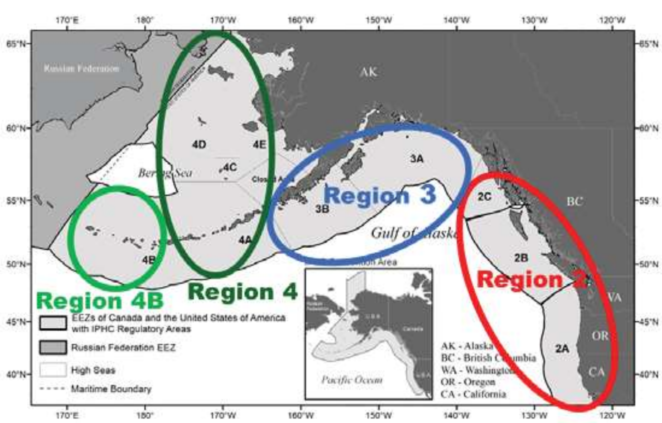

Figure 1: Biological Regions overlaid on IPHC Regulatory Areas. Region 2 comprises 2A, 2B, and 2C, Region 3 comprises 3A and 3B, Region 4 comprises 4A and 4CDE, and Region 4B comprises solely 4B.

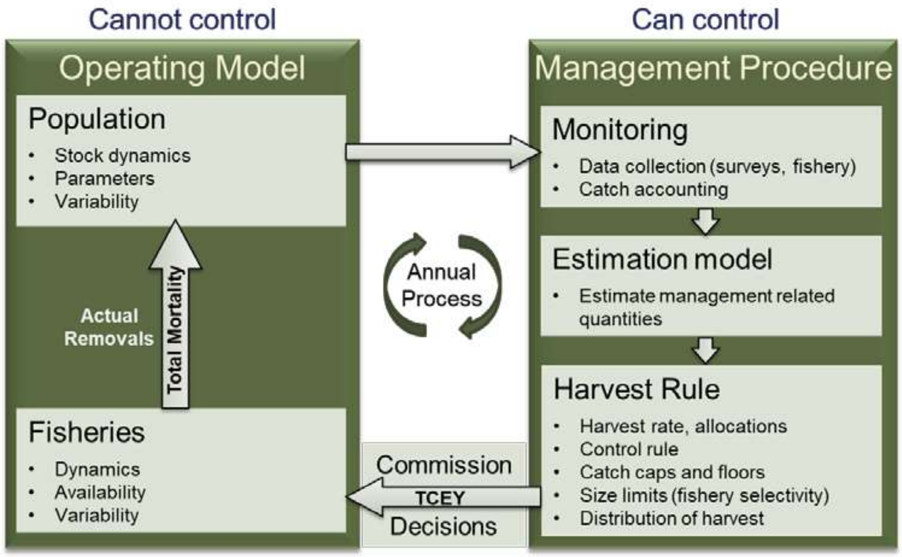

Figure 2. Illustration of the closed-loop simulation framework with the operating model (OM) and the management procedure (MP). This is the annual process on a yearly timescale.

2.1.1 Population and fishery spatial specification

The current understanding of Pacific halibut diversity across the geographic range of its stock indicates that IPHC Regulatory Areas should be only considered as management units and do not represent relevant sub-populations (Seitz et al. 2017). Therefore, four Biological Regions (Figure 1) were defined with boundaries that matched some of the IPHC Regulatory Area boundaries for the following reasons. First, data for stock assessment and other analyses are most often reported at the IPHC Regulatory Area scale and are largely unavailable for sub-Regulatory Area evaluation. Particularly for historical sources, there is little information to partition data to a portion of a Regulatory Area. Second, it is necessary to distribute TCEY to IPHC Regulatory Areas for quota management. If a Biological Region was not defined by boundaries of IPHC Regulatory Areas (i.e. a single IPHC Regulatory Area is in multiple Regions) it would be difficult to create a distribution procedure that accounts for biological stock distribution and distribution of the TCEY to IPHC Regulatory Areas for management purposes. Further, the structure of the current directed fisheries does not delineate fishing zones inside individual IPHC Regulatory Areas, so there would be no way to introduce management at that spatial resolution.

To a certain degree, Pacific halibut within the same Biological Region share common biological traits different from adjacent Biological Regions. These traits include sex ratios, age composition, and size-at-age, and different historical trends in these data may be indicative of biological diversity within the greater Pacific halibut population. Furthermore, tagging studies have indicated that within a year, larger Pacific halibut tend to undertake feeding and spawning migrations within a Biological Region, and movement between Biological Regions typically occurs between years (Seitz et al. 2007; Webster et al. 2013).

Given the goals to divide the Pacific halibut stock into somewhat biologically distinct regions and conserve the distribution of spawning biomass across the entire range of the Pacific halibut stock, Biological Regions are considered by the IPHC Secretariat, and supported by the SRB (paragraph 31 IPHC-2018-SRB012-R), to be the best option for biologically-based areas to meet management needs. They also offer a parsimonious spatial separation for modeling inter-annual population dynamics.

However, as mentioned earlier, mortality limits are set for IPHC Regulatory Areas and thus directed fisheries operate at that spatial scale. Furthermore, since some fishery objectives have been defined at the IPHC Regulatory Area level (Appendix I), the TCEY will need to be distributed to that scale. Even though the population is modelled at the Biological Region scale, fisheries can be modelled at the IPHC Regulatory Area scale by using an areas-as-fleets approach within Biological Regions. This requires modelling each fleet with separate selectivity and harvest rates that operate on the biomass occurring in the entire Biological Region in each year. The distribution of the population within a Biological Region is currently approximated assuming specified proportions of the population in each IPHC Regulatory Area within a Biological Region that are based on historical observations. These proportions are constant over ages and time, and allow for the calculation of statistics specific to IPHC Regulatory Areas. Future improvements to the framework will allow for different options such as modelling proportions based on population attributes and accounting for year-to-year variability.

2.1.1.1 Recruitment

Recruitment at age 0 to the population is determined at the coastwide level and is a function of the coastwide spawning biomass using a Beverton-Holt spawner-recruit relationship with a steepness of 0.75. The recruitment to each Biological Region is simply a proportion of the coastwide recruitment and those proportions (constrained to sum to 1) are time-invariant. Variability is incorporated as described below.

2.1.1.2 Fisheries

Fisheries were defined by IPHC Regulatory Areas (or combinations of areas if fishing mortality in that area was small) and for five general sectors, which are consistent with the definitions in the recent IPHC stock assessment (IPHC-2020-AM096-09 Rev_2):

- **directed commercial** representing the O32 mortality from the directed commercial fisheries including O32 discard mortality;
- **directed commercial discard** representing the U32 discard mortality from the directed commercial fisheries, comprised of Pacific halibut that die on lost or abandoned fishing gear, and Pacific halibut discarded for regulatory compliance reasons;
- **non-directed commercial discard** representing the mortality from incidentally caught Pacific halibut in non-directed commercial fisheries;
- **recreational** representing recreational landings (including landings from commercial leasing) and recreational discard mortality; and
- **subsistence** representing non-commercial, customary, and traditional use of Pacific halibut for direct personal, family, or community consumption or sharing as food, or customary trade.

Thirty-three (33) fisheries were defined as a sector/area combination based on the amount of mortality in the combination, data availability, and MSAB recommendations (Table 1).

The FISS is included as a fishery to output summaries of observations such as indices and observed proportions-at-age in the population available to the FISS at a specific time and in a specific region. Mortality from the FISS is included with the directed commercial fishery mortality, although it could be kept separate. The fishery mimicking the FISS is simply referred to as 'survey' here to avoid confusion with actual FISS observations.

Selectivity determines the age composition of fishery mortality and ensures the removal of appropriate numbers-at-age from the population when mortality occurs in the annual time-step. Selectivity in this OM represents the proportion at each age that is captured and retained (i.e., landed) by the gear. Directed commercial discard mortality is modelled as a separate sector with its own selectivity, and discard mortality for other sectors is included in the total mortality for those sectors. Parameters for selectivity when conditioning models were determined from the estimated parameters from the long Areas-As-Fleets (AAF) model in the recent stock assessment (IPHC-2020-SA-01) including annual deviations in selectivity for the directed fisheries and the survey. These parameters were modified to make the selectivity curves for directed commercial fisheries and the survey asymptotic (i.e., no descending limb) because movement should account for implied availability of a spatially explicit model compared to the coastwide stock assessment. Selectivity could be further modified as necessary to improve fits to data.

2.1.1.3 Weight-at-age

Empirical weight-at-age by region for the population, fisheries, and survey are determined using observations from the FISS and the fisheries, as is done with the stock assessment models (IPHC-2020-SA-02) and as described in detail in Stewart and Martell (2016). Smoothed observations of weight-at-age from NMFS trawl surveys were used to augment weight-at-age for ages 1–6 in the fishery sectors and survey. Population weight-at-age is smoothed across years to reduce observation error. Finally, survey and population weight-at-age prior to 1997 is scaled to fishery data because survey observations are limited if present at all.

2.1.1.4 Movement

Many data sources are available to inform Pacific halibut movement. Decades of tagging studies and observations have shown that important migrations characterize both the juvenile and adult stages and apply across all regulatory areas. The conceptual model of halibut ontogenetic and seasonal migration, including main spawning and nursery grounds, as per the most current knowledge, was presented in IPHC-2019-MSAB014-08 and was used to assist in parameterizing movement rates in the OM.

In 2015, the many sources of information were assembled into a single framework representing the IPHC's best available information regarding movement-at-age among Biological Regions. Key assumptions in constructing this hypothesis included:

- ages 0-1 do not move (most of the young Pacific halibut reported in Hilborn et al. (1995) were aged 2-4),
- movement generally increases from ages 2-4,
- age-2 Pacific halibut cannot move from Region 4 to Region 2 in a single year, and
- relative movement rates of Pacific halibut of age 2-4 to/from Region 4 are similar to those observed for 2-4-year-old Pacific halibut in Region 3, relative to older Pacific halibut.

Based on these assumptions, appreciable emigration is estimated to occur from Region 4, decreasing with age. Pacific halibut age-2 to age-4 move from Region 3 to Region 2 and from Region 4B to Regions 3 and 2, and some movement of older Pacific halibut is estimated to occur from Region 2 back to Region 3 (Figure 3).

The conceptual model and assembled movement rates were used to inform the development of the MSE operating model framework and were used as a starting point to incorporate variability and alternative movement hypotheses in Pacific halibut movement dynamics. Movement in the OM is modelled using a transition matrix as the proportion of individuals that move from one Biological Region to another for each age class in each year.

2.1.1.5 Maturity

Spawning biomass for Pacific halibut is currently calculated from annual weight-at-age and a maturity-at-age ogive that is assumed to be constant over years. There is currently no evidence (IPHC-2020-SA-02) for skip spawning or maternal effects (increased reproductive output or offspring survival for larger/older females) and therefore are not modelled but could be added. Stewart & Hicks (2017) examined the sensitivity of the estimated biomass to a trend in declining spawning potential (caused by a shift in maturity or increased skip spawning) and found that under that condition there was a bias in both scale and trend of recent estimated spawning biomass. The SRB document IPHC-2020-SRB016-07 tested maternal effects on estimates of recruitment and concluded “there appears to be no evidence in the current data that the addition of a simple age-based maternal effects relationship improves the ability of the current stock assessment models to explain the time-series of estimated recruitments.” Ongoing research on maturity and skip spawning will help to inform future implementations of the basis for and variability in the determination of spawning output.

Table 1: The thirty-three fisheries in the OM, the IPHC Regulatory Areas they are composed of, and the 2019 mortality (metric tonnes and millions of net pounds) for each.

Fishery	IPHC Regulatory Areas	2019 Mortality tonnes	2019 Mortality Mlbs
Directed Commercial 2A	2A	404	0.89
Directed Commercial 2B	2B	2,368	5.22
Directed Commercial 2C	2C	1,665	3.67
Directed Commercial 3A	3A	3,701	8.16
Directed Commercial 3B	3B	1,048	2.31
Directed Commercial 4A	4A	658	1.45
Directed Commercial 4B*	4B	454	1.00
Directed Commercial 4CDE	4CDE	748	1.65
Directed Commercial Discards 2A	2A	14	0.03
Directed Commercial Discards 2B	2B	59	0.13
Directed Commercial Discards 2C	2C	27	0.06
Directed Commercial Discards 3A	3A	145	0.32
Directed Commercial Discards 3B	3B	68	0.15
Directed Commercial Discards 4A	4A	41	0.09
Directed Commercial Discards 4B	4B	14	0.03
Directed Commercial Discards 4CDE	4CDE	32	0.07
Non-directed Commercial Discards 2A	2A	59	0.13
Non-directed Commercial Discards 2B	2B	109	0.24
Non-directed Commercial Discards 2C	2C	41	0.09
Non-directed Commercial Discards 3A	3A	748	1.65
Non-directed Commercial Discards 3B	3B	218	0.48
Non-directed Commercial Discards 4A	4A	159	0.35
Non-directed Commercial Discards 4CDE	4CDE	1,588	3.50
Non-directed Commercial Discards 4B	4B	68	0.15
Recreational 2B	2B	390	0.86
Recreational 2C	2C	857	1.89
Recreational 3A	3A	1,674	3.69
Subsistence 2B	2B	186	0.41
Subsistence 2C	2C	168	0.37
Subsistence 3A	3A	86	0.19
Recreational/Subsistence 2A	2A	218	0.48
Recreational/Subsistence 3B	3B	9	0.02
Recreational/Subsistence 4	4A, 4CDE	27	0.06

*The small amount of recreational and subsistence mortality from IPHC Regulatory Area 4B is included in Directed Commercial 4B

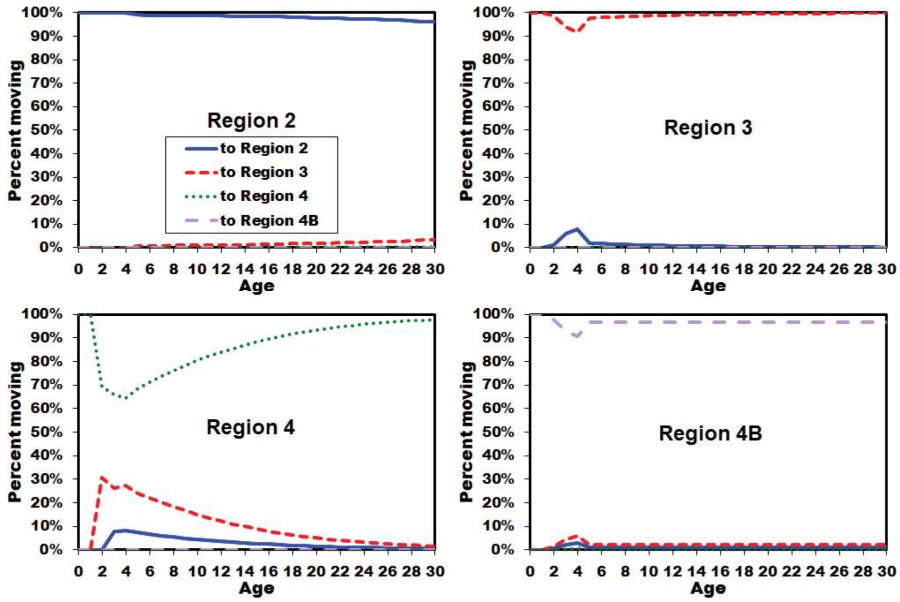

Figure 3: Estimated aggregate annual movement rates by age from Biological Regions (panels) based on currently available data (from IPHC-2019-AM095-08).

2.1.2 Uncertainty and variability in the operating model

Uncertainty and variability are important to consider, as the goal of an MSE is to develop management procedures that are robust to both. The OM should simulate potential states of the population in the future, uncertainties within the management procedure, and variability when implementing the management procedure.

2.1.2.1 Uncertainty in the conditioned OM

The conditioned OM is a representation of the Pacific halibut population and matches observations from the fishery, FISS, and research. Uncertainty can be included in the OM by varying parameters in two different ways. A common method method is to vary parameters (Table 2) between simulated trajectories by randomly generating them from correlated probability distributions that are derived from estimation procedures (e.g. the stock assessment). A second method is to fix specific parameters at different values representing potential states. Trajectories may be simulated using both methods and then integrated appropriately to produce distributions of potential outcomes. At this time, the second method of fixing specific parameters at alternative values is not being used but can easily be implemented in the future.

2.1.2.2 Projected population variability

Variability in the projected population is a result of initializing the population with a range of parameters to recreate a range of historical trajectories and then including additional variability in certain population processes in the projection. The major sources of variability in the projections are shown in Table 3 and some are described in more detail below.

Table 2: Major sources of parameter uncertainty and variability in the conditioned operating model (OM).

Process	Uncertainty
Natural Mortality (*M*)	Uncertainty determined from assessment
Average recruitment (R_0)	Effect of the coastwide environmental regime shift based on the PDO and variability determined from conditioning
Recruitment	Random lognormal deviations. Variability on distribution to Biological Regions determined from conditioning
Movement	Uncertainty estimated when conditioning.

2.1.2.3 Linkage between average coastwide recruitment and environmental conditions

The average recruitment (R_0) is related to the Pacific Decadal Oscillation index[2], expressed as a positive or negative regime (IPHC-2020-SA-02). The regime was simulated in the MSE by generating a 0 or 1 to indicate the regime of each future year, as described in IPHC-2018-MSAB011-08. To encourage regimes between 15 and 30 years in length (assuming a common periodicity, although recent years have suggested less), the environmental index was simulated as a semi-Markov process, where each subsequent year depends on recent years. However, the probability of changing to the opposite regime was a function of the length of the current regime, with a change probability equal to 0.5 at 30 years, and a probability near 1 at 40 or greater years. This default parameterization results in simulated regime lengths most often between 20 and 30 years, with occasional runs between 5 and 20 years or greater than 30 years. This can be modified to test other scenarios.

Table 3. Major sources of projected variability in the operating model (OM).

Process	Variability
Average recruitment (R_0)	Effect of the coastwide environmental regime shift, modelled as an autocorrelated indicator based on properties of the PDO
Recruitment	Random lognormal deviations.
Size-at-age	Annual and cohort deviations in weight-at-age by Biological Region, with approximate historical bounds
Sector mortality	Sector mortality allocation variability on non-directed commercial discard mortality, directed discard mortality, and unguided recreational mortality within an area
Movement (variability)	Change in parameters synchronized with simulated PDO-linked regime shift

2.1.2.4 Projected weight-at-age

Weight-at-age varies over time historically, and the projections capture that variation using a random walk from the previous year. It is important to simulate time-varying weight-at-age because it is an influential contributor to the yield and scale of the Pacific halibut stock. This variability was implemented using the same ideas as in the coastwide MSE (IPHC-2018-MSAB011-08), but was modified to incorporate autocorrelation in a more straightforward manner, and allow for slight departures between regions and fisheries.

[2] https://oceanview.pfeg.noaa.gov/erddap/tabledap/cciea_OC_PDO.htmlTable?time,PDO

The method used to simulate weight-at-age was described in IPHC-2020-SRB016-08 Rev1. Two example projections are shown in Figure 4.

2.2 Conditioned four-region operating model

A multi-region OM was specified with four Biological Regions (2, 3, 4, and 4B; Figure 1), thirty-three (33) fisheries (Table 1), and four (4) surveys. The model was initiated in 1888 and initially parameterized using estimates from the long AAF assessment model.

Parameters for R_0, the proportion of recruitment to each Biological Region, movement from 2 to 3, 3 to 2, and 4 to 3 were estimated by minimizing an objective function based on lognormal likelihoods for spawning biomass predictions and region-specific modelled FISS indices, robustified multivariate normal likelihoods for the proportion of FISS biomass in each region, and observed proportions at age from the FISS. Other movement parameters were fixed to estimates from data (Figure 3) except that movement probabilities from 4 to 2, 2 to 4, 4B to 2, and 2 to 4B were set to zero for all ages. This makes the assumption that a Pacific halibut cannot travel between these areas in an annual time step even though some movement from 4 to 2 at young ages is predicted to occur from past data (Figure 3).

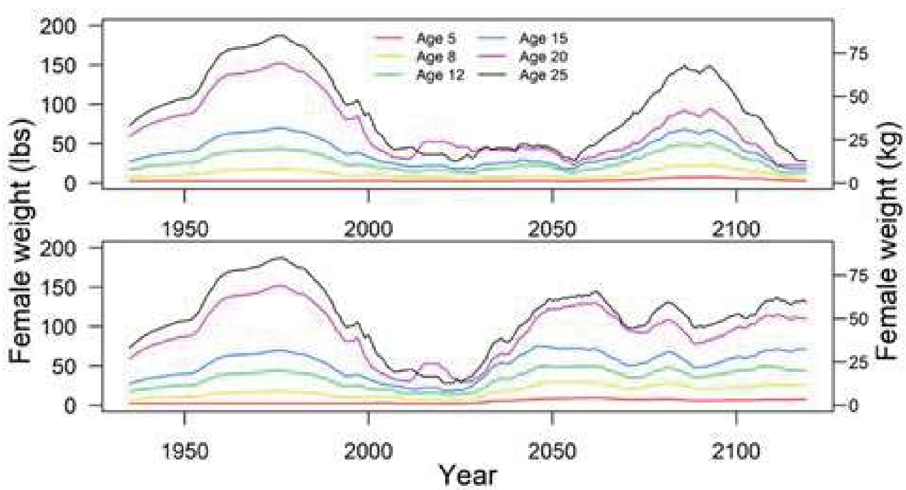

Figure 4: Past observed (shaded area) and two examples of possible one-hundred-year projections of female weight at ages 5, 8, 12, 15, 20, and 25 in Biological Region 3.

The OM was conditioned using five sets of observations: the average estimated spawning biomass from the long AAF and long coastwide stock assessment models (1888–1992), estimated spawning biomass from the stock assessment ensemble including four models (1993–2019), modelled FISS indices of abundance for each Biological Region, FISS proportions-at-age for each Biological Region, and the proportion of “all selected sizes” modelled FISS biomass in each Biological Region (all-sizes stock distribution).

The predicted spawning biomass from the conditioned OM fell mostly within the range of estimated spawning biomass from the four stock assessment models in the ensemble (Figure 5). The multi-region operating model predicted a female spawning biomass at the upper part and slightly above the 90% credible interval from about 1930 to 1960 for the long assessment models due to a large amount of predicted total biomass in Biological Regions 3 and 4. The predicted stock distribution matched closely for most years, although the end of the time-series in Biological Regions 2 and 3 and beginning of the time-series in Biological Regions 4 and 4B showed departures. These departures from the observed stock distribution were consistent for all models examined and suggest that the current structural specifications cannot capture these trends, although preliminary estimates of stock distribution for 2020 are more consistent with the OM (IPHC-2020-IM096-08).

Fits to the modelled FISS index were reasonable for all Biological Regions but showed some patterns in residuals in Biological Region 2 (Figure 6). Few models that were examined were able to fit the time-series in Biological Region 2 much better, and those that did show an improved fit had poor fits to stock distribution.

Estimated and assumed movement probabilities-at-age from one Biological Region to another are shown in Figure 7. Movement from 2 to 3 is estimated to be much greater than the data suggest with higher movement of very young fish and lower movement rates of older fish during high PDO regimes. The generally higher movement of older fish from 2 to 3 may be to counter-balance the high movement rates of young fish from 3 to 2. The OM has movement rates near 5% for movement of older fish from 3 to 2. Younger fish tend to move at higher rates from 4 to 3 with little movement once they are age 8 and older. The OM assumes that this is a closed population with no movement in or out of the four Biological Regions, which may explain some of the differences observed from the movement rates based on observations.

The final OM shown here is a reasonable representation of the Pacific halibut population but has some shortcomings. For example, the lack of fit to the 2019 stock distribution in Biological Regions 2 and 3 (Figure 5) and the high predictions of young fish in Biological Region 2 in 2019 (Figure 6). The lack of fit to the proportions-at-age in 2019 are balanced by better fits in previous years (not shown). There are many changes to the model and conditioning process that could be made to potentially improve these fits. For example, movement may be sex-specific, but tagging data are lacking this information.

Overall, the conditioned multi-region model represents the general trends of the Pacific halibut population and is a useful model to simulate the population forward in time and test management strategies.

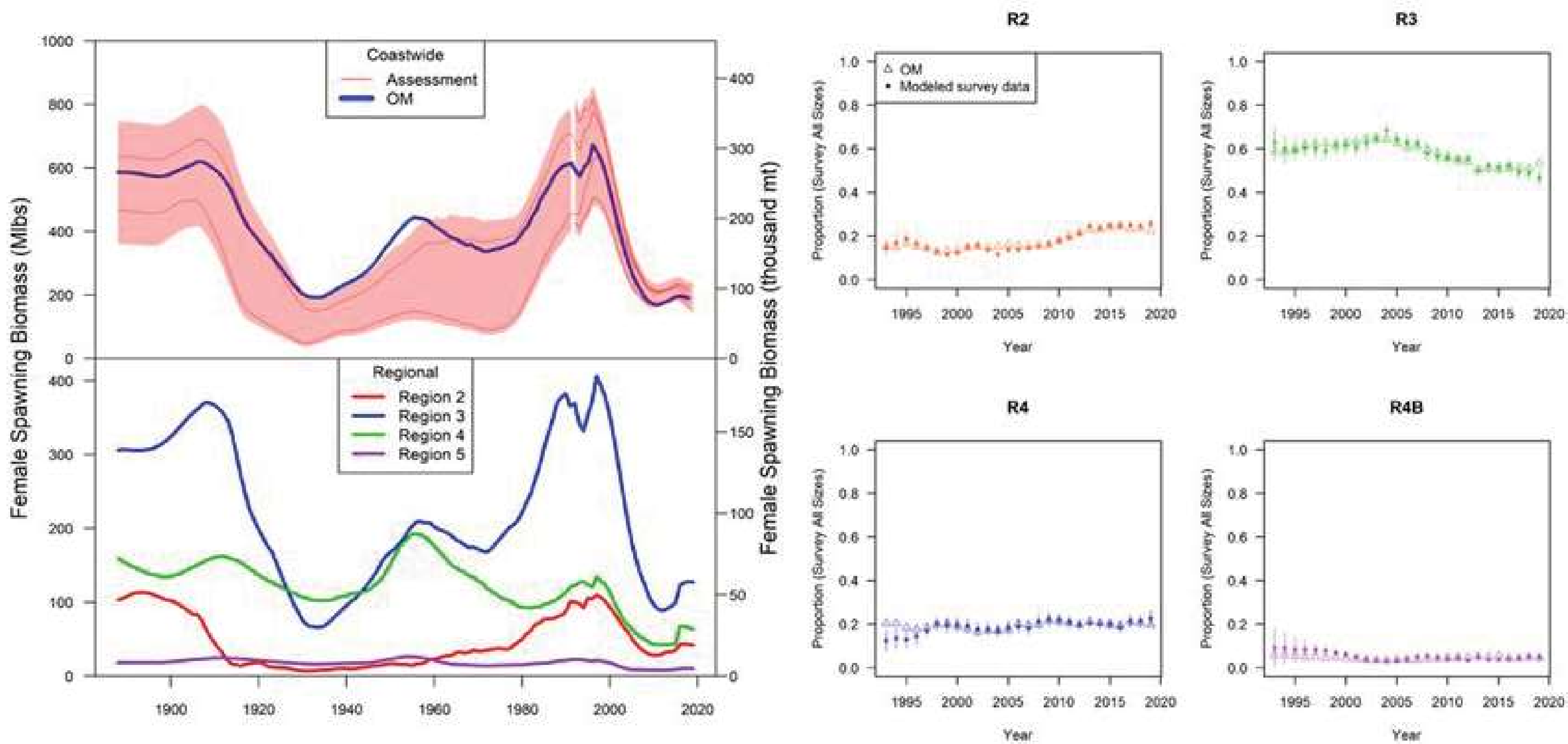

Figure 5: Predicted coastwide spawning biomass (top left) where the blue line is the predicted spawning biomass from the OM, the red lines are the predicted spawning biomass from each model in the stock assessment ensemble, and the red shaded area is the 90% credible interval from the ensemble stock assessment. Total biomass by Biological Region in millions of pounds (bottom left) where Region 4B is denoted by “Region 5”. Predicted annual proportions of biomass in each Biological Region (right plots) from the conditioned OM (unfilled symbols) compared to the modelled FISS results (filled circles) with 95% credible intervals.

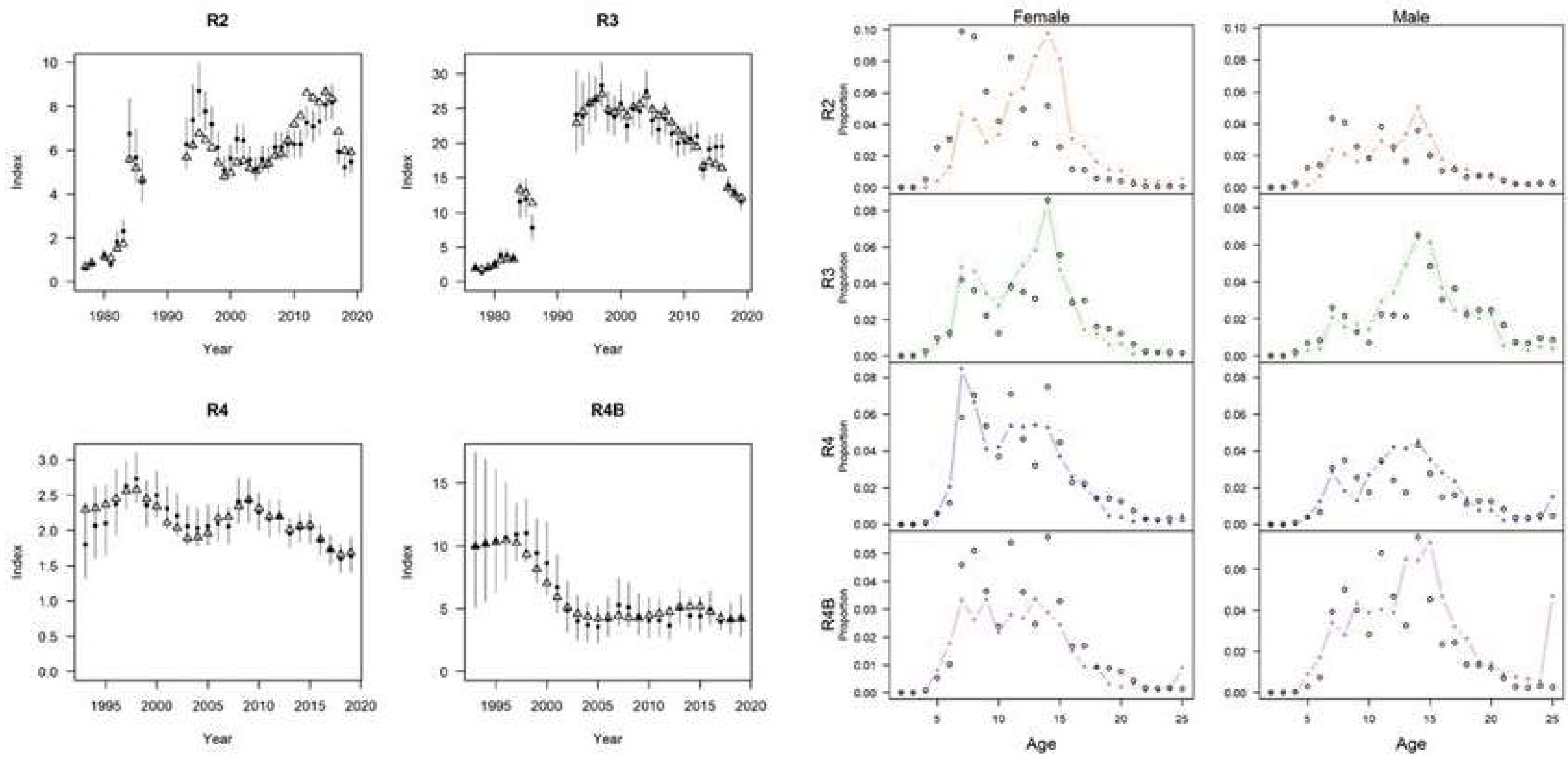

Figure 6: Fits to modelled FISS NPUE index (four panels on the left) where filled circles are modelled FISS NPUE with 95% credible intervals and the open triangles are predictions from the conditioned OM. Fits to proportions-at-age by sex and Biological Region from the year 2019 (eight panels on the right) with filled circles connected by lines showing the proportions-at-age determined from FISS data and the open circles showing predictions from the conditioned OM.

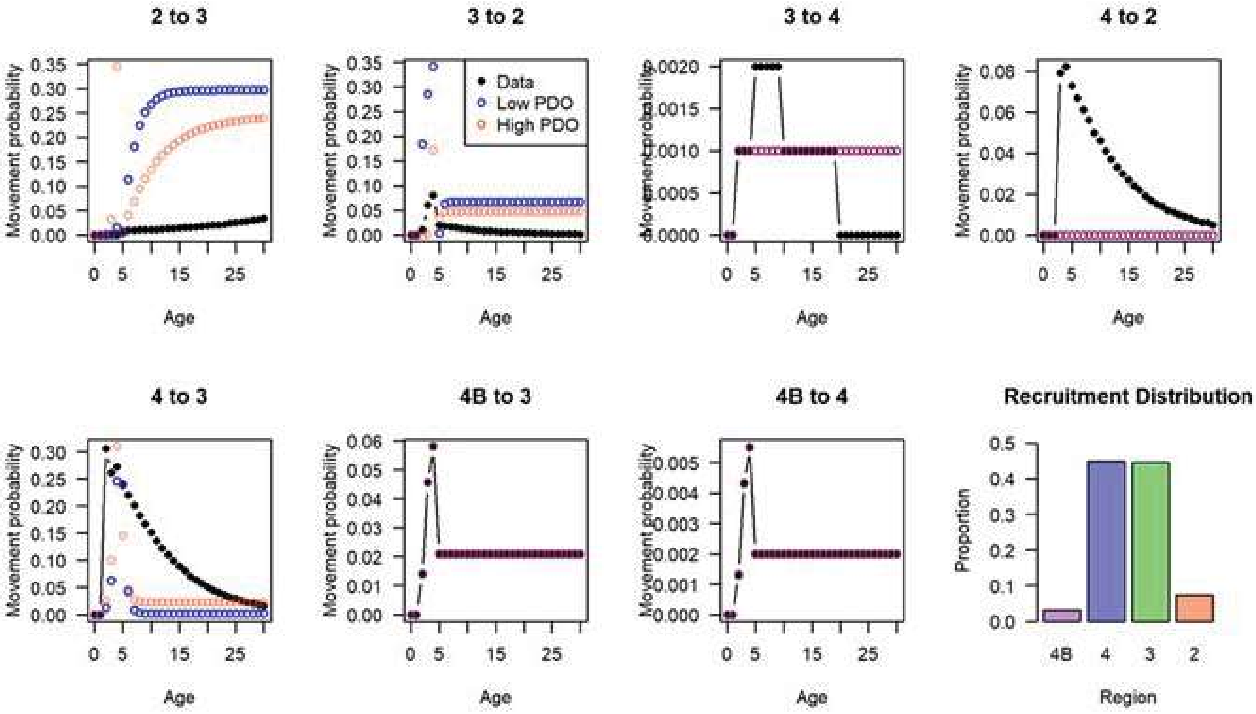

Figure 7: Probabilities of movement-at-age from the data and assumptions (as in Figure 3) and the conditioned OM (blue and red circles for low and high PDO regimes, respectively). The proportion of recruitment distributed to each Biological Region is shown in the lower right.

2.2.1 Uncertainty in the four-region operating model

Uncertainty in population trajectories was captured by adding variability to the parameters of the operating model as specified in Table 2 with correlations between these parameters taken into account. Different hypotheses of specific parameterizations (e.g. movement or steepness) may be investigated through sensitivities and robustness tests.

Simulated trajectories of the OM with parameter variability show a wider range of female spawning biomass than the 90% credible interval from the ensemble stock assessment (Figure 8). Prior to 1993, the trajectories are mostly within and above the upper portion of the ensemble assessment 90% credible interval, but from 1993 to 2019 the trajectories encompass and extend below and above the credible interval. Therefore, the OM is a reasonable representation of the Pacific halibut population in recent decades and is modelled with variability that will allow for the robust testing of MPs.

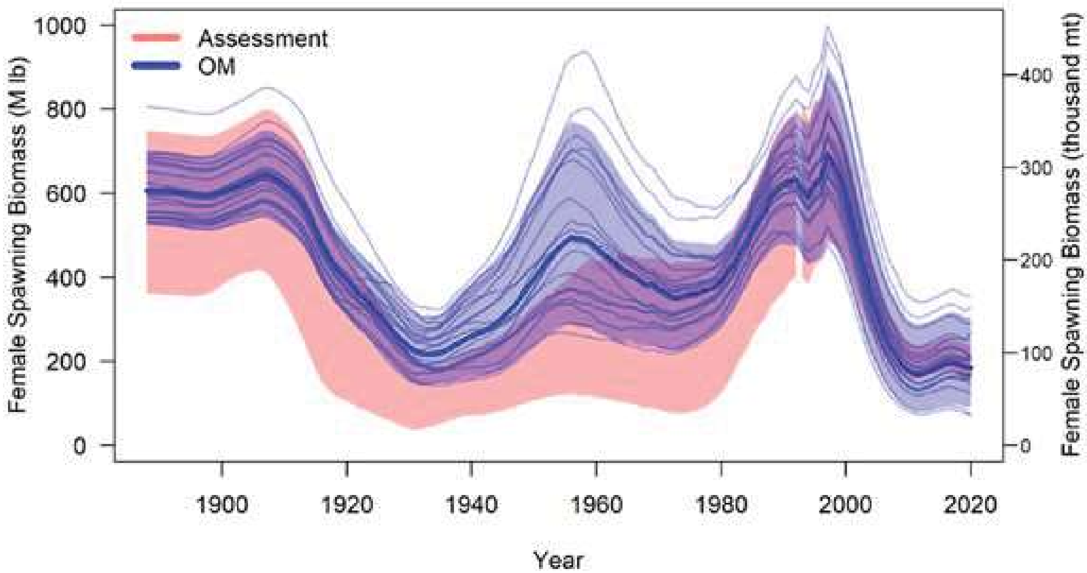

Figure 8: The 90% credible interval from six hundred trajectories of the OM with parameter variability included (blue shaded area), shown against the 90% credible interval of the ensemble stock assessment (two models before 1993 and four models for 1993–2019, red shaded area). An example twenty trajectories are shown (thin blue lines) along with the median of all 600 trajectories (thick blue line).

The stock distribution with variability does not show a large departure from the observed stock distribution (Figure 9). The variability is consistent with the observations except at the beginning of the time-series in Biological Region 4 and in 2019 for Biological Regions 2 and 3. The beginning of the time-series in Biological Region 4 was estimated with few data. The recent year may have seen a shift in movement that is not explained by the OM, although preliminary estimates of stock distribution for 2020 are more consistent with the OM (IPHC-2020-IM096-08).

Projections with the OM, incorporating parameter variability (Table 2) and projection variability (Table 3), produced a wide range of trajectories. Figure 10 shows the median of six-hundred simulations to 2119 without mortality due to fishing along with the interval between the 5th and 95th percentiles. Individual trajectories show that a single trajectory is highly variable and may cover a wide range of that interval in this one-hundred-year projection period.

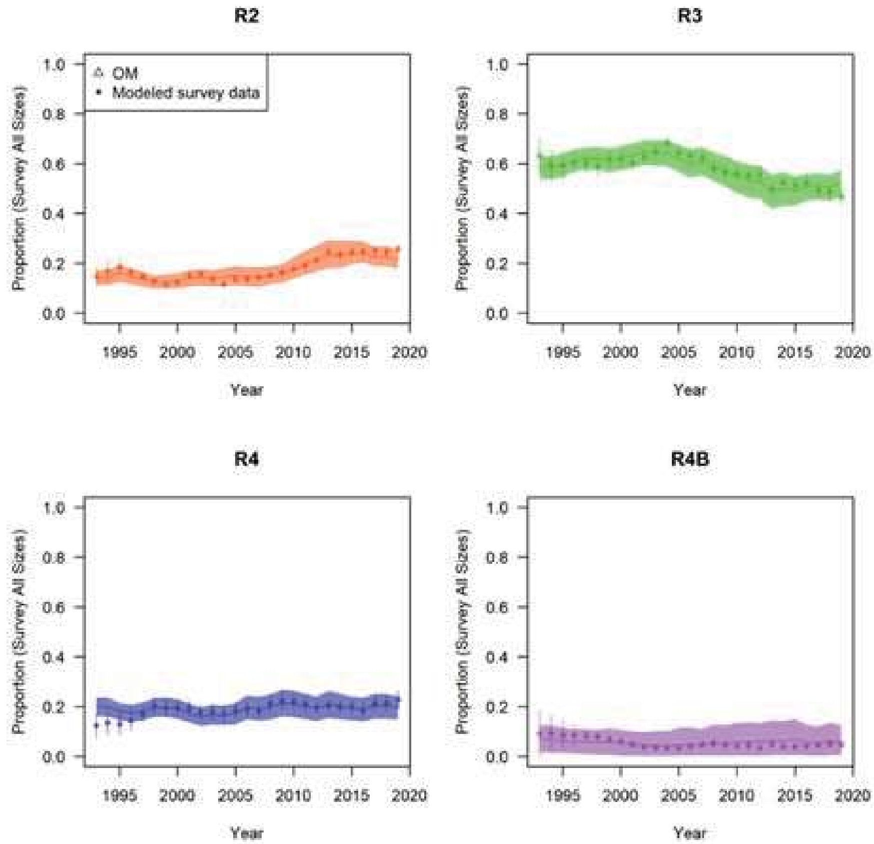

Figure 9: Stock distribution determined from FISS observations (points) and from the OM with variability (shaded areas).

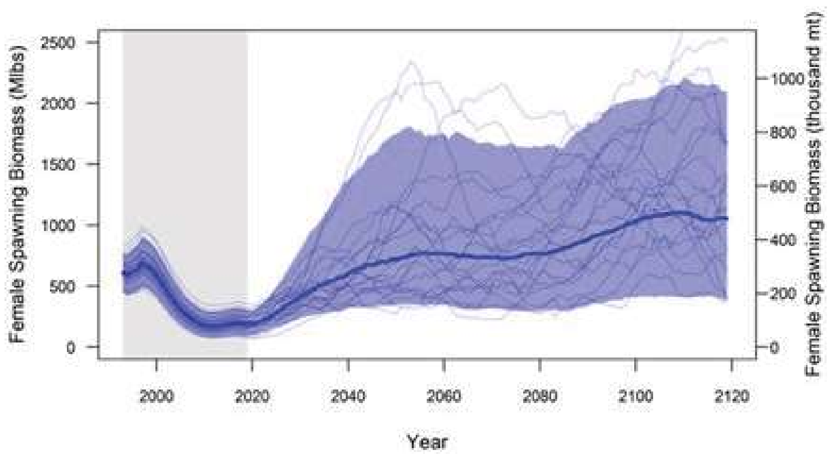

Figure 10: Six hundred 100-year simulations without fishing mortality. The dark blue line is the median and the blue shaded area shows the interval between the 5th and 95th percentiles. The thin blue lines denote the first 20 individual trajectories.

2.3 Management Procedures for coastwide scale and distribution of the TCEY

The management procedure consists of three elements (Figure 2): monitoring, estimation, and the harvest rule. Monitoring (data generation) specifies the data collected from the stock that are used by the estimation model (estimation) and the harvest rule to determine the total mortality, the distribution of the TCEY to IPHC Regulatory Areas, and subsequent allocation to sectors.

2.3.1 Monitoring (data generation)

The MSE framework generates data by simulating the sampling process and can incorporate variability, bias, and any other properties that are desired. Fishery data are generated as needed by the estimation model (e.g., age compositions and CPUE). Data are generated from the survey in the OM (NPUE, WPUE, age compositions, and stock distribution) that are used by the estimation model and management procedures.

2.3.2 Estimation model

The Estimation Model (EM) is analogous to the stock assessment and introduces estimation error in the simulations. Three approaches to introduce and investigate estimation error were included in the MSE framework. Results from all three methods are available on the MSE Explorer.

2.3.2.1 No estimation error

The estimates and predictions needed for the harvest rule are taken directly from the operating model and do not include estimation error. This provides an indication of the best possible outcome given the natural variability in the population, although it is unrealistic because population quantities are never known without error, and therefore not presented here.

2.3.2.2 Simulate estimation error

This approach simulated the error in estimates and predictions needed for the harvest rule using random number generation from probability distributions, as was done in the coastwide MSE. The OM determines the stock status and the TM consistent with the input fishing intensity (i.e. F_{SPR}). Correlated deviates randomly generated with a bivariate normal distribution, including an autocorrelation of 0.4 with previous deviates, were applied to the stock status and TM. Details can be found in Section 4.2.2. of IPHC-2018-SRB012-08. This method is useful to provide a reasonable approximation of the assessment process while speeding up the simulation process and allowing investigation of specific levels of bias and variability.

2.3.2.3 Model estimation error

This method uses a model similar to the stock assessment (i.e. stock synthesis), but simplified, with generated data to determine the estimates and predictions needed for the harvest rule. The assessment models that this EM were based on are complex and developed for short-term forecasts using currently available data. Increasing the number of years of data in the models, possibly not simulated with the exact processes that the assessment was tuned to, can cause the models to perform less than optimal. However, the use of an EM based on the assessment models provides a more accurate representation of the assessment process and of the bias associated with it. This method is currently in development and will be available for future iterations of the MSE. Some results using only one of the four assessment models used in the ensemble are available for preliminary comparison to the other methods, although are not presented here.

2.3.3 Harvest Rule

The Harvest Rule contains additional procedures when determining the mortality limits, such as the application of a control rule and distribution of the limits to IPHC Regulatory Areas. The harvest rule for distributing the TCEY begins with the coastwide TCEY determined from the stock assessment and fishing intensity defined by the reference SPR (with application of the control rule). Figure 11 is an illustration of the current interim harvest strategy policy at IPHC, which includes the harvest rule as part of the management procedure. The TCEY may be distributed to Biological Regions first and then to IPHC Regulatory Areas, or directly to IPHC Regulatory Areas. Relative adjustments can be applied in each step of the distribution process. Typically, the distribution procedure does not appreciably alter the coastwide fishing intensity (although a slight change may occur when applying distribution methods that differ greatly due to different selectivity patterns accessing the population). However, there is interest in management procedures that are only limited to being less than a maximum fishing intensity (i.e., above a minimum SPR) that would account for modifications in the TM during the distribution procedures.

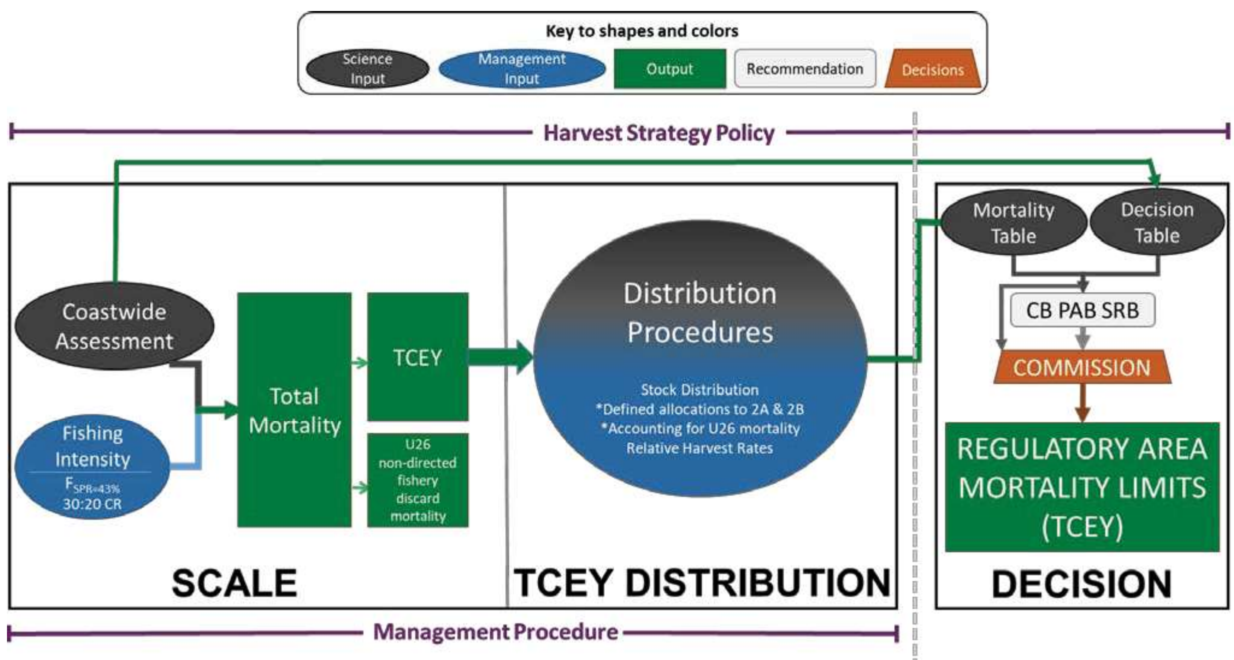

Figure 11: Illustration of the Commission interim IPHC harvest strategy policy (reflecting paragraph ID002 in IPHC CIRCULAR 2020-007) showing the coastwide scale and TCEY distribution components that comprise the management procedure. Items with an asterisk are three-year interim agreements to 2022. The decision component is the Commission decision-making procedure, which considers inputs from many sources.

The Coastwide TCEY is calculated from the TM by removing the U26 portion of the non-directed discard mortality, which is approximated in the MSE framework by a fixed length-at-age key determined from historical observations applied to non-directed discard mortality observed the previous year.

The outputs of the management procedure are TCEY limits for each IPHC Regulatory Area, which then need to be allocated to the different sectors specific to the IPHC Regulatory Area. See Table 1 for a complete list of the fishing sectors by IPHC Regulatory Area. There are two parts to the simulation procedure: the allocation of the upcoming mortality limits by sector, and the calculation of the realized mortality by sector. The allocation of mortality limits is necessary because some sector's mortality limits are determined from the limits for other sectors. In the current framework, the calculation of the realized mortality differs from the calculation of the mortality limits for the non-directed discard, directed discard, subsistence, and unguided recreational mortalities (i.e., implementation error). Mortality limits and realized mortality are equal for the various recreational and directed commercial sectors (i.e. no implementation error for these sectors).

The simulation procedure begins by subtracting the non-directed commercial O26 discard mortality by IPHC Regulatory Area from the corresponding IPHC Regulatory Area TCEY, and the remainder is then allocated to directed fishery sectors. Each IPHC Regulatory Area has a unique catch-sharing plan (CSP) or allocation procedure, and these CSPs were mimicked as closely as possible in the MSE framework. When the TCEY for an IPHC Regulatory Area is very low, the CSP may no longer be applicable and alternative decisions may be necessary. It is unknown what the allocation procedure may be at very low TCEYs (far below levels actually observed in the historical time-series), so working with MSAB members, a simple assumption was to assume that the sum of the directed non-FCEY components would not exceed the TCEY without non-directed commercial O26 discard mortality, and the FCEY components would be set to zero.

Overall, the estimated values from the data generation and estimation model/estimation error steps are used in the application of the harvest rule to determine mortality limits by IPHC Regulatory Area. The simulated application of the harvest rule will therefore include errors in stock status as well as the size of the population, both of which are propagated into management quantities.

2.3.4 Management procedures for evaluation

The MSAB has defined coastwide and distribution elements of management procedures that are important for future evaluation, including the following listed in paragraph 42 of IPHC-2020-MSAB015-R.

IPHC-2020-MSAB015-R, para. 42*.The MSAB* ***AGREED*** *that the following elements of interest for defining constraints on changes in the TCEY, and distribution procedures be considered for the Program of Work in 2020:*

a) *constraints on the change in the TCEY can be applied annually or over multiple years at the coastwide or IPHC Regulatory Area level. Constraints on the change in TCEY currently considered include a maximum annual change in the TCEY of 15%, a slow-up fast down approach, multi-year mortality limits, and multi-year averages on abundance indices;*

b) *indices of abundance in Biological Regions or IPHC Regulatory Area (e.g. O32 or All sizes from modelled survey results);*

c) *a minimum TCEY for an IPHC Regulatory Area;*

d) *defined shares by Biological Region, Management Zone, or IPHC Regulatory Area;*

e) *maximum coastwide fishing intensity (e.g. SPR equal to 36% or 40%) not to be exceeded when distributing the TCEY;*

f) *relative harvest rates between Biological Regions or IPHC Regulatory Areas.*

At MSAB014 and MSAB015, elements specifying candidate management procedures were defined for simulation and subsequent evaluation (Table 4 and Table II.1 in Appendix II, reproduced from IPHC-2020-MSAB015-R).

3 CLOSED-LOOP SIMULATION RESULTS

For brevity, only the simulated estimation error results are reported to compare across SPR values, and some figures and tables only present results using an SPR of 43%. Simulations with alternative estimation error methods and additional SPR values are available on the interactive MSE Explorer website. Pertinent results related to primary objectives are discussed below.

Figure 12 shows coastwide performance metrics linked to the primary coastwide objectives. The relative spawning biomass (RSB) is similar across all management procedures, but varies with SPR. All MPs are within the 10% tolerance for RSB dropping below 20% SPR (Table 5), and the median RSB resulting from an SPR of 40% is slightly less than 36%. Table 5 shows that the probability of being below 36% is slightly less for MP-A compared to all other MPs. The AAV was higher for MP-A as well, especially at lower SPR values, because MP-A was the only MP without an annual constraint of 15% on the TCEY. For the same reason, the probability that the annual change (AC) was greater than 15% was greater than zero for MP-A and zero for all other MPs, except MP-D which allowed the coastwide TCEY to accommodate agreements in 2A and 2B. Short-term median TCEY was between 30 and 50 Mlbs (13,600 and 22,700 t) for all MPs and SPR values, with larger values for lower SPR values (higher fishing intensity) and slight variations between MPs. The difference in the short-term median TCEY was less than 2.5 Mlbs (1,100 t) between MPs for an SPR of 43% (Table 5).

Table 4: A comparison of management procedures (MPs) showing the elements included in defined MPs. See Appendix II and Appendix III for additional details of the MPs.

Element	MP-A	MP-B	MP-C	MP-D	MP-E	MP-F	MP-G	MP-H	MP-I	MP-J	MP-K
Maximum coastwide TCEY change of 15%											
Maximum Fishing Intensity buffer (SPR=36%)											
O32 stock distribution											
O32 stock distribution (5-year moving average)											
All sizes stock distribution											
Fixed shares updated in 5th year from O32 stock distribution											
Relative harvest rates of 1.0 for 2-3A, and 0.75 for 3B-4											
Relative harvest rates of 1.0 for 2-3, 4A, 4CDE, and 0.75 for 4B											
Relative harvest rates by Region: R2=1, R3=1, R4=0.75, R4B=0.75											
1.65 Mlbs fixed TCEY in 2A											
Formula percentage for 2B											
National Shares (2B=20%)											

Short-term performance metrics for the TCEY in each IPHC Regulatory Area are shown in Figure 13 as well as Table 6, Table 7, and Table 8. These are the median-minimum and median-average TCEY over a ten-year period and the median-minimum and median-average percentage of TCEY in each IPHC Regulatory Area over a ten-year period (short-term). MPs F–K show decreased TCEY in 2A and MPs E and G–K show decreased TCEY in 2B along with increased TCEY in all other IPHC Regulatory Areas because the current agreements from 2A and 2B, or national shares for 2B, are not included in those MPs. The TCEY increases in 3B, 4A, and 4B with the increased relative harvest rate included in MP-H and MP-K, while it decreases in other IPHC Regulatory Areas. MP-J, which uses a 5-year average of stock distribution, shows similar TCEY values as MP-G, but with lower AAV for most IPHC Regulatory Areas (Table 8). Stability related performance metric differences are evident at the IPHC Regulatory Area level with MP-J, even though its stability was not much different than that of MP-G at the coastwide level (e.g., median AAV). Additional performance metrics presented in the MSE Explorer may assist in the evaluation of the MPs.

Overall, the eleven MPs differ slightly at the coastwide level but showed some important differences at the IPHC Regulatory Area level. Trade-offs between IPHC Regulatory Areas are an important consideration when evaluating the MSE results. Ranking the performance metrics across management procedures and then averaging groups of ranks (e.g., over IPHC Regulatory Areas) can assist in identifying MPs that perform best overall.

The Biological Sustainability objectives have a tolerance defined making it possible to determine if each objective is met by a management procedure. All management procedures met the Biological Sustainability objectives, except for the objective to maintain a minimum percentage of female spawning biomass above 2% in IPHC Regulatory Area 4B with a tolerance of 0.05 (Table 9). This distribution of the projected percentage of spawning biomass in Biological Region 4B has a probability of 0.19 to be less than 2% with no fishing mortality (Figure 14). This probability is slightly less with fishing mortality (Table 9) because the spawning biomass is less variable with fishing. The fact that this objective is not met without fishing or with any of the management procedures suggests two things: 1) the objective should be revisited and/or 2) the operating model is possibly mischaracterizing the population in Biological Region 4B, and thus the proportion of the population in this Biological Region.

The operating model was conditioned to the observed stock distribution and the predicted range of historical stock distribution from the operating model for Biological Region 4B is wider than the confidence intervals for the observed stock distribution (Figure 8 in IPHC-2020-MSAB016-08). Biological Region 4B is a unique region in the IPHC convention area, possibly with an effectively separate stock (genetic research is ongoing to better understand the connectivity of 4B with the rest of the stock), and the operating model may not be completely capturing the stock dynamics in that area. Additionally, with mostly out-migration from 4B and little recruitment distributed to that area, large increases in spawning biomass in the other Biological Regions may result in Biological Region 4B containing a small percentage of the spawning biomass even though the absolute spawning biomass is at a high level. Regardless, the spawning biomass simulated in the OM persists in that Biological Region. In addition to revisiting the assumptions in the OM, it may be prudent to revisit the regional spawning biomass objective.

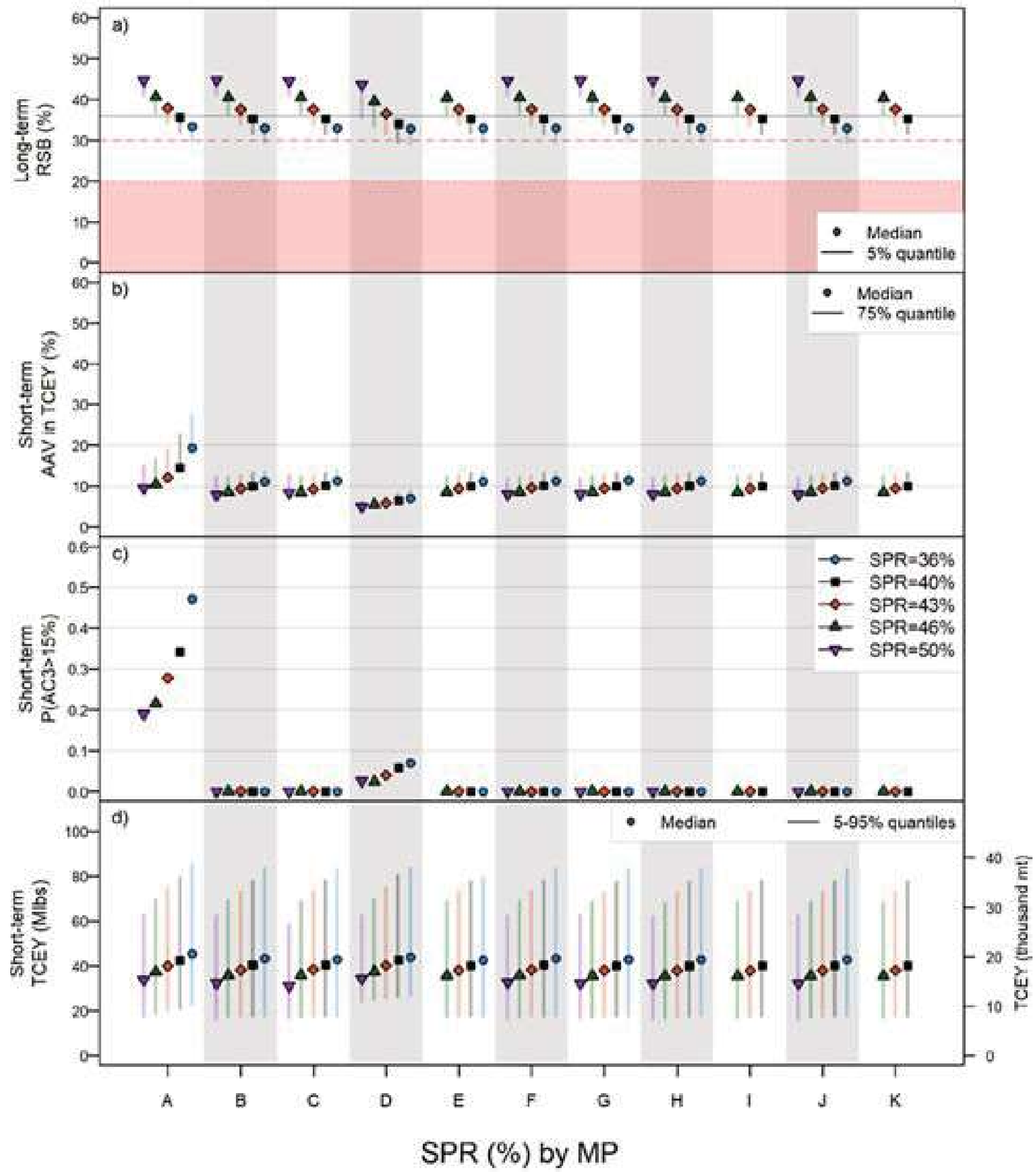

Figure 12: Coastwide performance metrics for MPs A through K using simulated estimation error with SPR values of 40%, 43%, and 46% for all and 36% and 50% for some. The relative spawning biomass and the limit (20%), trigger (30%) and target (36%) are shown in a). The AAV for TCEY is shown in b). The probability that the annual change exceeds 15% in 3 or more years is shown in c). The median TCEY along with 5th and 95th quantiles are shown in d).

Table 5: Coastwide long-term performance metrics for the biological sustainability objective and P(all RSB<36%) and short-term performance metrics for the remaining fishery sustainability objectives for MPs A through K for an SPR value of 43% using simulated estimation error.

Input SPR/TM	**43**	**43**	**43**	**43**	**43**	**43**	**43**	**43**	**43**	**43**	**43**
Management Procedure	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**
Number of Simulations	500	500	500	500	500	500	500	500	500	500	500
Biological Sustainability											
P(any RSB_y<20%)	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fishery Sustainability											
P(all RSB<36%)	0.25	0.28	0.28	0.44	0.28	0.28	0.28	0.29	0.29	0.28	0.28
Median average TCEY (Mlbs)	39.92	38.17	38.32	40.22	38.01	38.18	37.89	37.87	37.86	37.90	37.95
P(any3 change TCEY > 15%)	0.44	0	0	0.10	0	0	0	0	0	0	0
Median AAV TCEY	12.1%	9.4%	9.3%	5.9%	9.4%	9.5%	9.5%	9.4%	9.4%	9.5%	9.4%

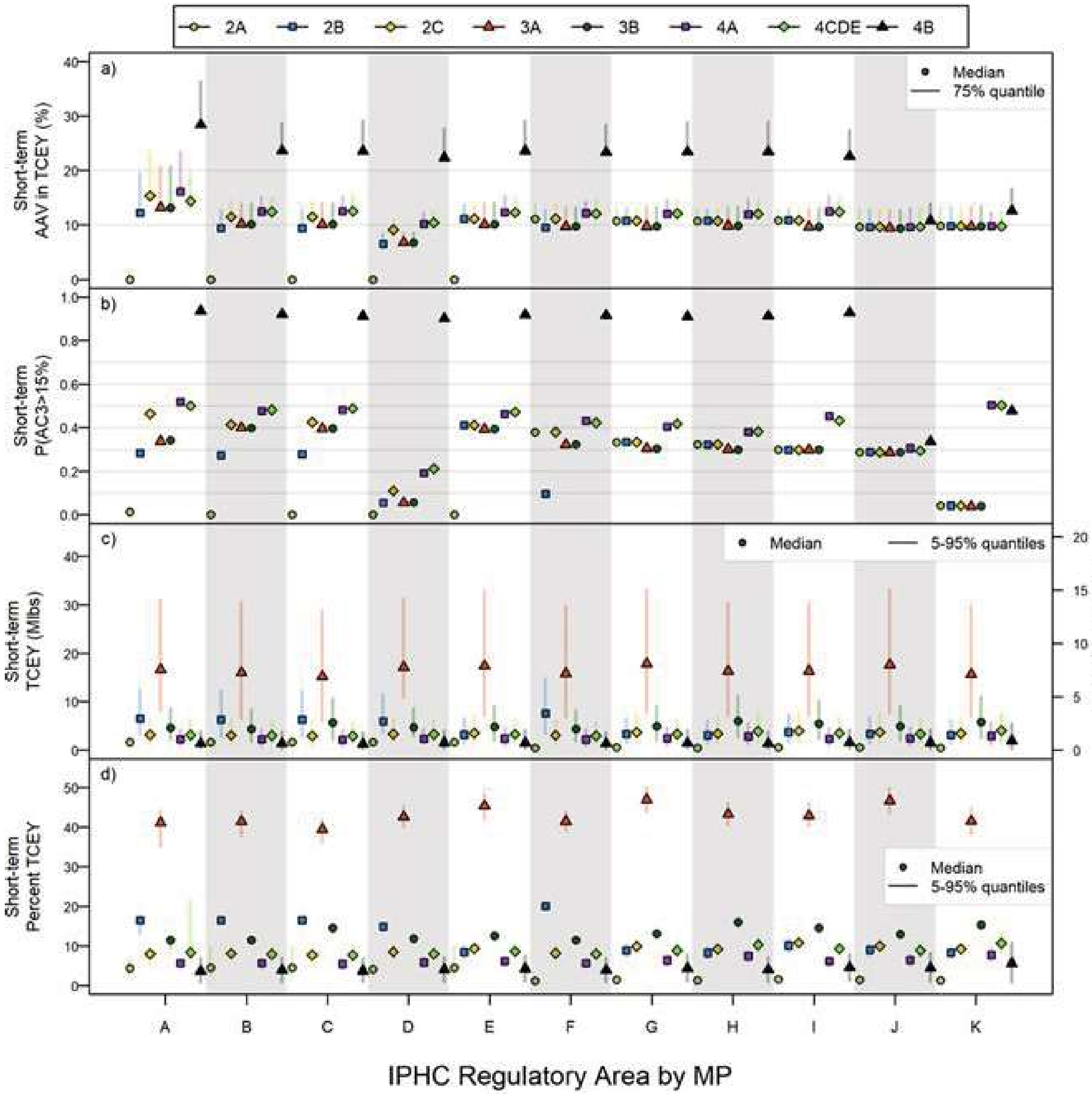

Figure 13: Performance metrics by IPHC Regulatory Areas for MPs A through K using simulated estimation error with an SPR value of 43%. The AAV for TCEY is shown in a). The probability that the annual change exceeds 15% in 3 or more years is shown in b). The median TCEY with 5th and 95th quantiles is shown in c). The median percentage of the TCEY in each IPHC Regulatory Area is shown in d).

Table 6: Long-term spawning biomass performance metrics by Biological Region and TCEY (Mlbs) short-term performance metrics by IPHC Regulatory Areas for MPs A through K with an SPR value of 43% using simulated estimation error.

Input SPR/TM	**43%**	**43%**	**43%**	**43%**	**43%**	**43%**	**43%**	**43%**	**43%**	**43%**	**43%**
Distribution Procedure	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**
Number of Simulations	500	500	500	500	500	500	500	500	500	500	500
Biological Sustainability											
P(%$SB_{R=2}$ < 5%)	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
P(%$SB_{R=3}$ < 33%)	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
P(%$SB_{R=4}$ < 10%)	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
P(%$SB_{R=4B}$ < 2%)	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.15	0.16	0.16	0.18
Fishery Sustainability											
Median Minimum TCEY 2A	1.65	1.65	1.65	1.65	1.65	0.33	0.39	0.36	0.44	0.40	0.38
Median Minimum TCEY 2B	3.76	4.79	4.75	4.76	2.34	5.78	2.48	2.28	2.84	2.52	2.37
Median Minimum TCEY 2C	1.79	2.27	2.18	2.65	2.61	2.30	2.76	2.53	3.03	2.80	2.64
Median Minimum TCEY 3A	9.06	11.67	11.16	13.57	12.81	11.81	13.34	12.19	12.18	13.20	11.50
Median Minimum TCEY 3B	2.51	3.24	4.13	3.76	3.55	3.28	3.70	4.51	4.10	3.66	4.25
Median Minimum TCEY 4A	1.23	1.62	1.56	1.81	1.76	1.62	1.82	2.11	1.72	1.86	2.25
Median Minimum TCEY 4CDE	1.74	2.21	2.12	2.48	2.41	2.22	2.49	2.88	2.56	2.53	3.08
Median Minimum TCEY 4B	0.65	0.90	0.85	1.04	0.97	0.89	1.00	0.92	1.02	1.20	1.42
Median average TCEY 2A	1.65	1.65	1.65	1.65	1.65	0.44	0.53	0.49	0.58	0.53	0.49
Median average TCEY 2B	6.55	6.32	6.31	5.94	3.18	7.64	3.33	3.08	3.73	3.34	3.09
Median average TCEY 2C	3.19	3.08	2.94	3.35	3.54	3.08	3.71	3.43	3.98	3.71	3.44
Median average TCEY 3A	16.68	15.99	15.24	17.15	17.42	15.84	17.83	16.34	16.39	17.67	15.71
Median average TCEY 3B	4.63	4.43	5.64	4.76	4.83	4.40	4.95	6.04	5.52	4.90	5.81
Median average TCEY 4A	2.30	2.22	2.15	2.37	2.41	2.21	2.46	2.86	2.37	2.47	2.96
Median average TCEY 4CDE	3.15	3.04	2.94	3.25	3.30	3.02	3.37	3.92	3.52	3.38	4.05
Median average TCEY 4B	1.41	1.36	1.31	1.55	1.48	1.37	1.52	1.41	1.59	1.57	1.93

Table 7: Percentage of TCEY (Mlbs) short-term performance metrics by IPHC Regulatory Areas for MPs A through K with an SPR value of 43% using simulated estimation error.

Input SPR/TM	**43%**	**43%**	**43%**	**43%**	**43%**	**43%**	**43%**	**43%**	**43%**	**43%**	**43%**
Distribution Procedure	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**
Number of Simulations	500	500	500	500	500	500	500	500	500	500	500
Fishery Sustainability											
Median Minimum % TCEY 2A	2.9%	3.4%	3.4%	3.3%	3.4%	1.0%	1.3%	1.2%	1.4%	1.4%	1.3%
Median Minimum % TCEY 2B	16.1%	16.2%	16.1%	14.5%	7.6%	20.0%	8.0%	7.5%	9.1%	8.5%	7.9%
Median Minimum % TCEY 2C	6.9%	7.2%	6.9%	7.5%	8.5%	7.2%	8.9%	8.3%	9.7%	9.5%	8.8%
Median Minimum % TCEY 3A	37.9%	39.2%	37.4%	40.4%	42.8%	39.4%	44.4%	40.8%	40.4%	45.1%	39.8%
Median Minimum % TCEY 3B	10.5%	10.9%	13.8%	11.2%	11.9%	10.9%	12.3%	15.1%	13.6%	12.5%	14.7%
Median Minimum % TCEY 4A	4.9%	5.0%	4.8%	5.1%	5.4%	5.0%	5.6%	6.5%	5.4%	6.0%	6.9%
Median Minimum % TCEY 4CDE	6.9%	6.9%	6.7%	7.0%	7.5%	6.9%	7.7%	8.9%	8.1%	8.3%	9.5%
Median Minimum % TCEY 4B	2.5%	2.8%	2.7%	3.0%	3.1%	2.8%	3.2%	2.9%	3.2%	3.9%	4.5%
Median average % TCEY 2A	4.4%	4.5%	4.5%	4.2%	4.5%	1.2%	1.4%	1.3%	1.6%	1.4%	1.3%
Median average % TCEY 2B	16.4%	16.5%	16.4%	14.8%	8.4%	20.0%	8.9%	8.3%	10.1%	9.0%	8.3%
Median average % TCEY 2C	8.0%	8.1%	7.8%	8.5%	9.4%	8.2%	9.9%	9.2%	10.8%	10.0%	9.2%
Median average % TCEY 3A	41.2%	41.4%	39.4%	42.6%	45.4%	41.5%	46.9%	43.2%	42.9%	46.7%	41.5%
Median average % TCEY 3B	11.4%	11.5%	14.6%	11.8%	12.6%	11.5%	13.0%	16.0%	14.5%	12.9%	15.4%
Median average % TCEY 4A	5.6%	5.7%	5.5%	5.9%	6.2%	5.7%	6.4%	7.5%	6.2%	6.4%	7.7%
Median average % TCEY 4CDE	8.3%	8.0%	7.7%	8.0%	8.6%	8.0%	8.9%	10.3%	9.3%	8.9%	10.7%
Median average % TCEY 4B	3.7%	3.9%	3.8%	4.1%	4.3%	3.9%	4.4%	4.1%	4.6%	4.5%	5.6%

Table 8: Short-term fishery stability performance metrics by IPHC Regulatory Areas for MPs A through K with an SPR value of 43% using simulated estimation error.

Input SPR/TM	**43%**	**43%**	**43%**	**43%**	**43%**	**43%**	**43%**	**43%**	**43%**	**43%**	**43%**
Distribution Procedure	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**
Number of Simulations	500	500	500	500	500	500	500	500	500	500	500
Fishery Sustainability											
P(any3 change TCEY 2A > 15%)	0.01	0.00*	0.00*	0.00*	0.00*	0.38	0.33	0.32	0.30	0.29	0.04
P(any3 change TCEY 2B > 15%)	0.28	0.27	0.28	0.06	0.41	0.10	0.33	0.32	0.30	0.29	0.04
P(any3 change TCEY 2C > 15%)	0.46	0.41	0.42	0.11	0.41	0.38	0.33	0.32	0.30	0.29	0.04
P(any3 change TCEY 3A > 15%)	0.34	0.40	0.40	0.06	0.39	0.32	0.31	0.30	0.30	0.29	0.04
P(any3 change TCEY 3B > 15%)	0.34	0.40	0.40	0.06	0.39	0.32	0.30	0.30	0.30	0.29	0.04
P(any3 change TCEY 4A > 15%)	0.52	0.48	0.48	0.19	0.46	0.43	0.40	0.38	0.45	0.31	0.50
P(any3 change TCEY 4CDE > 15%)	0.50	0.48	0.49	0.21	0.47	0.42	0.42	0.38	0.43	0.29	0.50
P(any3 change TCEY 4B > 15%)	0.94	0.92	0.91	0.90	0.92	0.92	0.91	0.91	0.93	0.34	0.48
Median AAV TCEY 2A	0.0%	0.0%	0.0%	0.0%	0.0%	11.2%	10.8%	10.7%	10.8%	9.6%	9.8%
Median AAV TCEY 2B	12.2%	9.4%	9.4%	6.5%	11.1%	9.5%	10.8%	10.8%	10.8%	9.6%	9.8%
Median AAV TCEY 2C	15.3%	11.5%	11.5%	9.1%	11.1%	11.2%	10.8%	10.8%	10.8%	9.6%	9.8%
Median AAV TCEY 3A	13.2%	10.2%	10.1%	6.8%	10.1%	9.7%	9.8%	9.9%	9.7%	9.4%	9.7%
Median AAV TCEY 3B	13.2%	10.2%	10.1%	6.8%	10.1%	9.7%	9.8%	9.9%	9.7%	9.4%	9.7%
Median AAV TCEY 4A	16.1%	12.5%	12.5%	10.2%	12.3%	12.2%	12.1%	12.0%	12.5%	9.6%	9.8%
Median AAV TCEY 4CDE	14.4%	12.4%	12.5%	10.4%	12.3%	12.1%	12.1%	12.0%	12.4%	9.6%	9.8%
Median AAV TCEY 4B	28.4%	23.7%	23.6%	22.4%	23.6%	23.4%	23.5%	23.5%	22.6%	10.8%	12.6%

*These probabilities are zero because by definition the TCEY is fixed at 1.65 Mlbs in IPHC Regulatory Area 2A for these MPs.

Table 9: Long-term performance metrics for biological sustainability objectives for MPs A through K with an SPR value of 43% using simulated estimation error. Red shading indicates that the currently defined objective is not met, and green shading indicates that the objective is met. Values in the cells are the calculated probabilities.

Objective	Performance Metric	A	B	C	D	E	F	G	H	I	J	K
Maintain a coastwide female SB above a biomass limit reference point 95% of the time	$P(SB < SB_{Lim})$	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maintain a minimum proportion of female SB	$P(\%SB_{R=2} < 5\%)$	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maintain a minimum proportion of female SB	$P(\%SB_{R=3} < 33\%)$	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maintain a minimum proportion of female SB	$P(\%SB_{R=4} < 10\%)$	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maintain a minimum proportion of female SB	$P(\%SB_{R=4B} < 2\%)$	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.15	0.16	0.16	0.18

Table 10: Long-term performance metrics for fishery objective 2.1 for MPs A through K with an SPR value of 43% using simulated estimation error. The ranks are determined by how close the long-term probability is to 0.5 after rounding to two decimal places. Blue shading represents the ranking with light coloring indicating the objective is better met compared to other management procedures.

Objective	Performance Metric	A	B	C	D	E	F	G	H	I	J	K
Maintain the coastwide female SB above a target at least 50% of the time	$P(SB < SB_{36\%})$	11	4	4	1	4	4	4	2	2	4	4

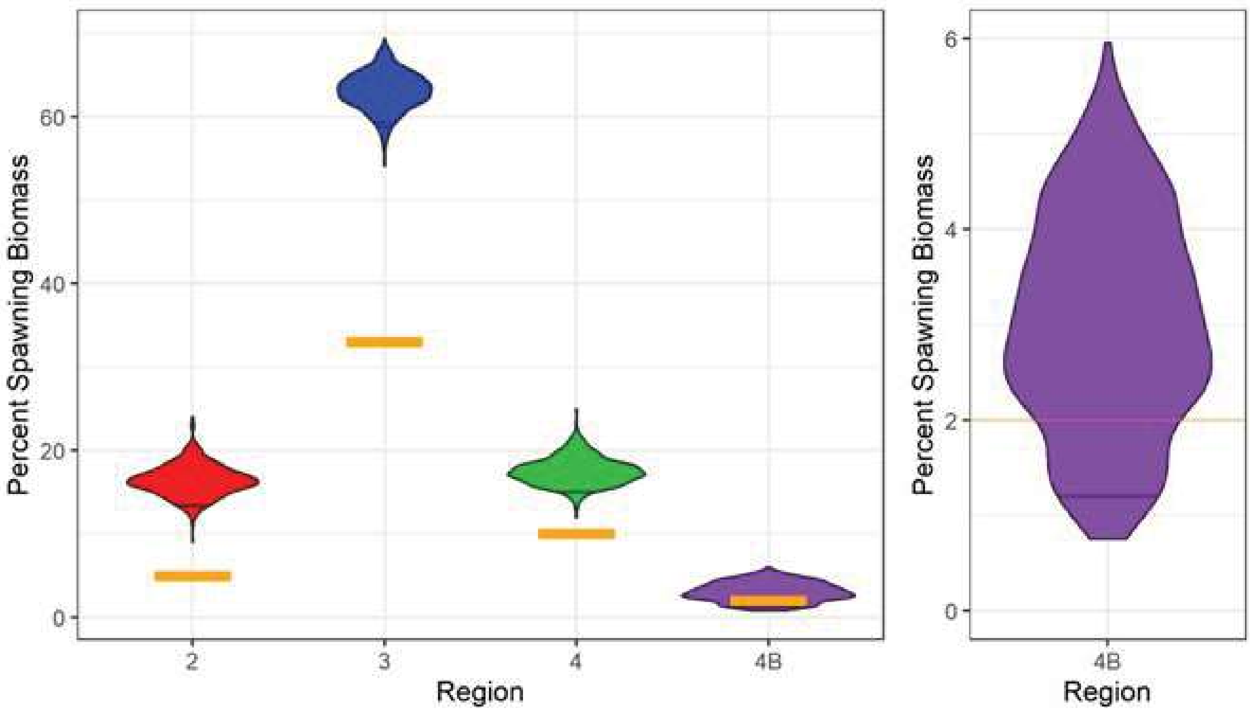

Figure 14: Distribution of the percentage of spawning biomass in each Biological Region after 60 years of projections with no fishing mortality. The right panel is zoomed in on Biological Region 4B. A horizontal line shows the 5% quantile in each plot. Primary objectives are to maintain the female spawning biomass above 5%, 33%, 10%, and 2% for Biological Regions 2, 3, 4, and 4B, respectively. These limits are shown in orange horizontal lines.

The ranking of short-term performance metrics for the Fishery Sustainability objectives are shown in Table 10, Table 11, Table 12, and Table 13. Higher ranks generally occurred for MPs D, I, J, and K, although not necessarily for IPHC Regulatory Areas 2A and 2B when compared to MPs where agreements for those areas are in place. The general objectives were averaged over IPHC Regulatory Areas to produce a summary of ranks as shown in Table 14. This summary shows that MPs D and J generally have higher ranks for stability and yield objectives specific to IPHC Regulatory Areas, although better stability at the IPHC Regulatory Area level does not imply stability at the coastwide level. Further summarizing the ranks to general objectives are shown in Table 15, with better averaged performance for MPs D, I, J, and K, in general.

Table 11: Short-term performance metrics for fishery stability objectives for MPs A through K with an SPR value of 43% using simulated estimation error. Blue shading represents the ranking with light coloring indicating the objective is better met compared to other management procedures. Ranks were determined after rounding probabilities (i.e. $P(AC_3>15\%)$) to two decimals and percentages (i.e. AAV) to one decimal.

Objective	Performance Metric	A	B	C	D	E	F	G	H	I	J	K
Limit TCEY AC	$P(AC_3 > 15\%)$	11	1	1	10	1	1	1	1	1	1	1
Limit TCEY AAV	Median AAV TCEY	11	3	2	1	3	8	8	3	3	8	3
Limit AC in Reg Areas TCEY	$P(AC_3$ 2A > 15%)	5	1	1	1	1	11	10	9	8	7	6
	$P(AC_3$ 2B > 15%)	5	4	5	2	11	3	10	9	8	7	1
	$P(AC_3$ 2C > 15%)	11	8	10	2	8	7	6	5	4	3	1
	$P(AC_3$ 3A > 15%)	8	10	10	2	9	7	6	4	4	3	1
	$P(AC_3$ 3B > 15%)	8	10	10	2	9	7	4	4	4	3	1
	$P(AC_3$ 4A > 15%)	11	8	8	1	7	5	4	3	6	2	10
	$P(AC_3$ 4CDE > 15%)	10	8	9	1	7	4	4	3	6	2	10
	$P(AC_3$ 4B > 15%)	11	7	4	3	7	7	4	4	10	1	2
Limit AAV in Reg Areas TCEY	Median AAV 2A	1	1	1	1	1	11	9	8	9	6	7
	Median AAV 2B	11	2	2	1	10	4	7	7	7	5	6
	Median AAV 2C	11	9	9	1	7	8	4	4	4	2	3
	Median AAV 3A	11	10	8	1	8	3	6	7	3	2	3
	Median AAV 3B	11	10	8	1	8	3	6	7	3	2	3
	Median AAV 4A	11	8	8	3	7	6	5	4	8	1	2
	Median AAV 4CDE	11	8	10	3	7	5	5	4	8	1	2
	Median AAV 4B	11	10	8	3	8	5	6	6	4	1	2

Table 12: Short-term performance metrics for fishery yield objectives related to the TCEY for MPs A through K with an SPR value of 43% using simulated estimation error. Blue shading represents the ranking with light coloring indicating the objective is better met compared to other management procedures. Ranks were determined after rounding to the nearest one million pounds.

Objective	Performance Metric	A	B	C	D	E	F	G	H	I	J	K
Optimize TCEY	Median TCEY	1	3	3	1	3	3	3	3	3	3	3
Maintain minimum TCEY by Reg Areas	Median Min 2A	1	1	1	1	1	6	6	6	6	6	6
	Median Min 2B	5	2	2	2	8	1	8	8	6	6	8
	Median Min 2C	8	8	8	1	1	8	1	1	1	1	1
	Median Min 3A	11	5	10	1	2	5	2	5	5	2	5
	Median Min 3B	9	9	2	2	2	9	2	1	2	2	2
	Median Min 4A	11	1	1	1	1	1	1	1	1	1	1
	Median Min 4CDE	5	5	5	5	5	5	5	1	1	1	1
	Median Min 4B	1	1	1	1	1	1	1	1	1	1	1
Optimize Reg Areas TCEY	Median TCEY 2A	1	1	1	1	1	9	6	9	6	6	9
	Median TCEY 2B	2	3	3	3	7	1	7	7	6	7	7
	Median TCEY 2C	5	5	5	5	1	5	1	5	1	1	5
	Median TCEY 3A	3	6	11	3	3	6	1	6	6	1	6
	Median TCEY 3B	5	10	1	5	5	10	5	1	1	5	1
	Median TCEY 4A	3	3	3	3	3	3	3	1	3	3	1
	Median TCEY 4CDE	4	4	4	4	4	4	4	1	1	4	1
	Median TCEY 4B	6	6	6	1	6	6	1	6	1	1	1

Table 13: Short-term performance metrics for fishery yield objectives related to the percentage of TCEY in each IPHC Regulatory Area for MPs A through K with an SPR value of 43% using simulated estimation error. Blue shading represents the ranking with light coloring indicating the objective is better met compared to other management procedures. Ranks were determined after rounding to two decimals.

Objective	Performance Metric	A	B	C	D	E	F	G	H	I	J	K
Maintain minimum % TCEY by Reg Areas	Median Min % 2A	5	1	1	4	1	11	8	10	6	6	8
	Median Min % 2B	3	2	3	5	10	1	8	11	6	7	9
	Median Min % 2C	10	8	10	7	5	8	3	6	1	2	4
	Median Min % 3A	10	9	11	5	3	8	2	4	5	1	7
	Median Min % 3B	11	9	3	8	7	9	6	1	4	5	2
	Median Min % 4A	10	8	11	7	5	8	4	2	5	3	1
	Median Min % 4CDE	8	8	11	7	6	8	5	2	4	3	1
	Median Min % 4B	11	8	10	6	5	8	3	7	3	2	1
Optimize TCEY percentage among Reg Areas	Median % TCEY 2A	4	1	1	5	1	11	7	9	6	7	9
	Median % TCEY 2B	3	2	3	5	9	1	8	10	6	7	10
	Median % TCEY 2C	10	9	11	7	4	8	3	5	1	2	5
	Median % TCEY 3A	10	9	11	6	3	7	1	4	5	2	7
	Median % TCEY 3B	11	9	3	8	7	9	5	1	4	6	2
	Median % TCEY 4A	10	8	11	7	5	8	3	2	5	3	1
	Median % TCEY 4CDE	7	8	11	8	6	8	4	2	3	4	1
	Median % TCEY 4B	11	8	10	6	5	8	4	6	2	3	1

Table 14: Ranks for the target biomass, fishery yield, and stability short-term performance metrics for MPs A–K with an SPR value of 43% averaged with equal weighting over IPHC Regulatory Areas for those that are reported by IPHC Regulatory Areas (Tables 13–15). Blue shading represents the ranking with light coloring indicating the objective is better met compared to other management procedures.

Objective	Performance Metric	A	B	C	D	E	F	G	H	I	J	K
Maintain the coastwide female SB above a target	$P(SB < SB_{36\%})$	11	4	4	1	4	4	4	2	2	4	4
Limit AC in coastwide TCEY	$P(AC_3 > 15\%)$	11	1	1	10	1	1	1	1	1	1	1
Limit AAV in coastwide TCEY	Median AAV TCEY	11	3	2	1	3	8	8	3	3	8	3
Optimize average coastwide TCEY	Median TCEY	9.75	7.25	6.75	1.75	7	5.62	6	5.88	5.75	2.5	3.5
Limit AC in Reg Areas TCEY	$P(AC_3 > 15\%)$ Reg Areas	8.62	7	7.12	1.75	7.38	6.38	6	5.12	6.25	3.5	4
Limit AAV in Reg Areas TCEY	Median AAV TCEY Reg Areas	1	3	3	1	3	3	3	3	3	3	3
Optimize Reg Areas TCEY	Median TCEY Reg Areas	8.5	6.62	7.5	6.12	5.25	7.62	4.88	5.38	4.25	3.62	4.12
Optimize TCEY % among Reg Areas	Median % TCEY Reg Areas	6.38	4	3.75	1.75	2.62	4.5	3.25	3	2.88	2.5	3.12
Maintain minimum TCEY by Reg Areas	Median Min(TCEY) Reg Areas	3.62	4.75	4.25	3.12	3.75	5.5	3.5	4.5	3.12	3.5	3.88
Maintain minimum % TCEY by Reg Areas	Median Min(% TCEY) Reg Areas	8.25	6.75	7.62	6.5	5	7.5	4.38	4.88	4	4.25	4.5

SB: Spawning Biomass
AC: Annual Change
AAV: Average Annual Variability
Regulatory Areas: IPHC Regulatory Areas
TCEY: Total mortality minus under 26” (U26) non-directed commercial discard mortality

Table 15: Ranks for the target biomass, fishery yield, and stability short-term performance metrics for MPs A–K with an SPR value of 43% averaged with equal weighting over IPHC Regulatory Areas for those that are reported by IPHC Regulatory Areas (Tables 13–15) and equally over objectives within each general category. Blue shading represents the ranking with light coloring indicating the objective is better met compared to other management procedures.

Objective	Performance Metric	A	B	C	D	E	F	G	H	I	J	K
2.1 Maintain the coastwide female SB above a target	$P(SB < SB_{Targ})$	11	4	4	1	4	4	4	2	2	4	4
2.2 Limit catch variability	Limit annual change	10.09	4.56	4.22	3.62	4.59	5.25	5.25	3.75	4	3.75	2.88
2.3 Provide directed fishing yield	Optimize TCEY and maintain minimum TCEY in Regulatory Areas	5.55	5.02	5.22	3.7	3.92	5.62	3.8	4.15	3.45	3.37	3.72

3.1 A closer look at the best performing management procedures

The best performing management procedures, based on the rankings of management procedures when using an SPR value of 43% (Table 11 to Table 15), were MP-D and MP-J. These management procedures generally had better stability ranks for IPHC Regulatory Areas and comparable fishery yield ranks when compared to other management procedures. MP-K performed well according to these performance metrics, but there is a potential for a large change in the TCEY every fifth year to be large, which warrants further evaluation.

MP-D and MP-J are different in two ways. MP-D accommodates the agreements for IPHC Regulatory Areas 2A and 2B by allowing for the fishing intensity to be exceeded (i.e. lowering the SPR to 36% if necessary). Both MPs use O32 stock distribution to distribute the TCEY to IPHC Regulatory Areas, but MP-J uses a moving five-year average of the O32 stock distribution whereas MP-D uses the estimates from the previous year.

We define three ways to report SPR. First, the procedural SPR is the SPR defined by the harvest rule, such as 43%. The applied SPR is the SPR that is actually used to determine mortality limits and differs from the procedural SPR because it may be modified by the control rule (e.g. when the stock status is less than 30%) or by the adjustment in MP-D. The determination of stock status depends on the estimation model, which is dependent on the data, thus the applied SPR is a product of the entire management procedure and subject to uncertainty (see Figure 2). Likewise, the determination of the maximum fishing intensity to accommodate the agreements in MP-D depends on the estimated parameters and stock size from the estimation model, thus is also subject to uncertainty. Thirdly, the realized SPR additionally accounts for the implementation of the fishery and changes in the population (i.e. the operating model processes). For example, the total mortality realized from the fisheries may not equal the mortality limit determined from the applied SPR, thus the realized SPR will differ. Overall, the procedural, applied, and realized SPRs will differ from each other due to the control rule, estimation error, and implementation variability.

Adjusting the fishing intensity to accommodate agreements within IPHC Regulatory Areas results in a variable applied SPR value that has large chance of exceeding the procedural SPR. The average realized SPR for the long-term is plotted in Figure 15 for MP-D and MP-J for different procedural SPR values. The two distribution procedures (D and J) show similar median average realized SPR values at lower fishing intensities, which are nearly the same as the procedural SPR because the simulated estimation error is unbiased and stock status is not often estimated to be less than 30% (where the control rule reduces fishing intensity). At higher fishing intensities, like an SPR of 40%, the median average realized SPR is more (i.e. lower fishing intensity) than the procedural SPR because it is affected by the control rule. This occurs because the stock status is more often estimated to be lower than 30%, thus the control rule increases the SPR (i.e. lowers the fishing intensity) from the procedural SPR. However, the control rule does not lower the procedural SPR. This asymmetry results in a skewed distribution of realized SPR, especially with higher fishing intensities that result in lower stock status.

Allowing the procedural SPR to be modified in MP-D, the realized SPR is greater more often than in MP-J because the accommodation of agreements may reduce the applied SPR (increase fishing intensity) and act opposite of the control rule. The average realized SPR does not reach the minimum SPR of 36% because 1) the asymmetry of the control rule, higher fishing intensities have a greater chance of meeting the agreements in 2A and 2B, 2) this is a realized SPR subject to estimation error, and 3) it is an average of a ten-year period.

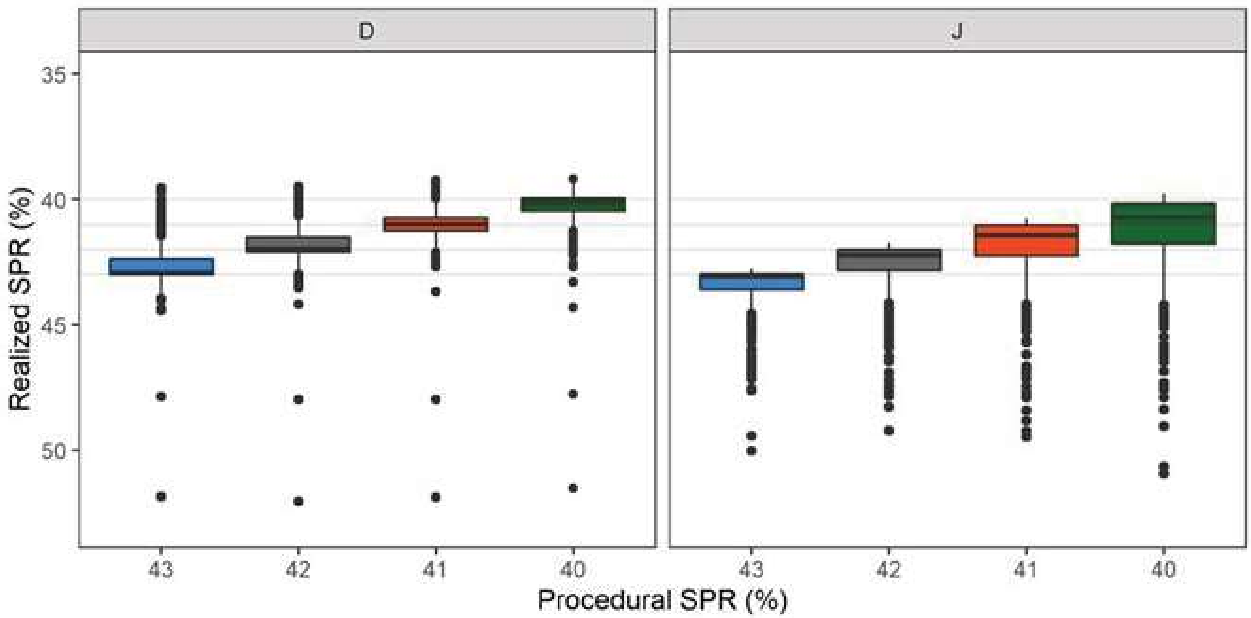

Figure 15: The average realized SPR over the long-term period for combinations of SPR values from 40-43% with MP-D and MP-J. The box outlines the 25th and 75th percentiles and the median is plotted as a horizontal line). Horizontal grid lines are shown for 40%, 41%, 42%, and 43% for reference. Sixteen simulations resulted in average SPR values for MP-D that were less than 20%, which are not plotted. Note that both axes are reversed to indicate increasing fishing intensity with decreasing SPR values.

Coastwide performance metrics differ between MP-D and MP-J in important ways (Figure 16). The long-term average RSB is slightly less in MP-D for the same SPR, and the probability of the stock status being lower than 20% is higher, although less than 5% (Table 5). The AAV is less for MP-D. The probability of the annual change being greater than 15% in three or more years is near 5% for MP-D, and is zero for MP-J (as defined by the constraint). Therefore, the annual change in TCEY is never more than 15% in MP-J but is on average higher in MP-J (likely near 15% most of the time). The median TCEY is slightly greater for MP-D, for a given SPR, and is at lower values more often for MP-J.

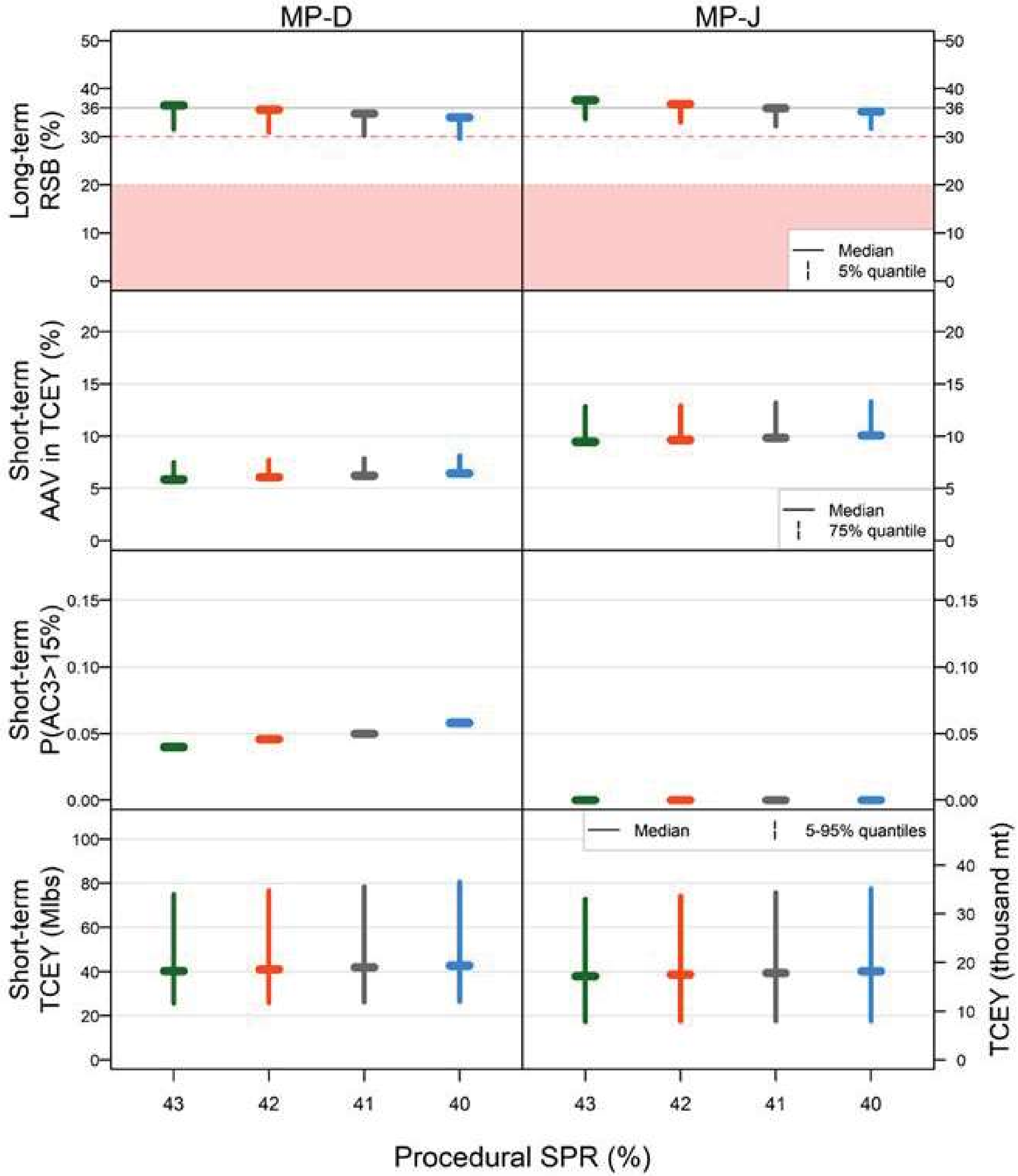

Figure 16: Coastwide performance metrics for SPR values ranging from 40 to 43% using MP-D and MP-J. The median value is shown as a horizontal line and quantiles are shown with vertical lines. Light gray horizontal lines are drawn for reference.

It is useful to compare MP-D and MP-J at distinct procedural SPR values that make them more similar. For MP-D, a procedural SPR near 42% would maintain the stock equally above and below the target RSB of 36%, while for MP-J, a procedural SPR near 41% would satisfy that objective. The stability metrics are still different between the two procedures at these SPR values, with MP-D having a lower AAV but a higher probability of exceeding a 15% annual change in the TCEY. The median TCEYs for the two procedures are more similar, but MP-D shows TCEYs less than 20 Mlbs (~9,100 mt) much less often. They both have a similar chance of experiencing high TCEYs near 80 Mlbs (~36,300 mt). Overall, at the coastwide level, both MPs meet the coastwide biological sustainability objectives, but MP-D has a slightly higher risk of experiencing low stock status because the fishing intensity may increase to accommodate the agreements, which results in a slightly higher TCEY. The change in the annual TCEY has different patterns between the two MPs because the accommodation of the agreements in MP-D is not subject to the constraint and the maximum fishing intensity is not affected by the control rule, in this implementation. Furthermore, other performance metrics show that a change in the TCEY that is greater than 15% is more often an increase (about eleven times more often).

The results are not as straight-forward when examining the short-term fishery sustainability performance metrics for IPHC Regulatory Areas (Figure 17). The stability performance metrics converge to similar values across all IPHC Regulatory Areas with MP-J. IPHC Regulatory Areas 2A and 2B lose stability because MP-J does not have the agreements for those areas and IPHC Regulatory Area 4B gains a considerable amount of stability with MP-J due to the averaging of the estimated stock distribution. The AAV is similar for other IPHC Regulatory Areas, but the probability that the TCEY changes by more than 15% in three or more years increases for all IPHC Regulatory Areas except 4B. The long-term results for stability metrics show improved stability with MP-J for more IPHC Regulatory Areas, especially 4A, 4B, and 4CDE (Figure 18).

The TCEY tends to be lower in IPHC Regulatory Areas 2A and 2B in MP-J, as expected without the agreement, and increases in all other IPHC Regulatory Areas. The increased TCEY that results from the agreements for the two IPHC Regulatory Areas in MP-D is spread across the remaining six areas in MP-J, although 2C and 3A have the largest increases. Long-term results show a similar pattern as short-term results.

These two MPs highlight the trade-offs present in distributing the TCEY to IPHC Regulatory Areas. Allocating TCEY to 2A and 2B, even when allowing for an increase in the fishing intensity, improves the stability for most areas in the short-term but has a different effect in the long-term (Figure 18). IPHC Regulatory Areas 4A, 4B, and 4CDE show the most improvement in stability in MP-J with little change in the median TCEY, while IPHC Regulatory Areas 2C and 3A show the largest increases in median TCEY in MP-J with little improvement to stability. These long-term insights are not related to the current primary objectives but highlight the difference in short-term and long-term affects.

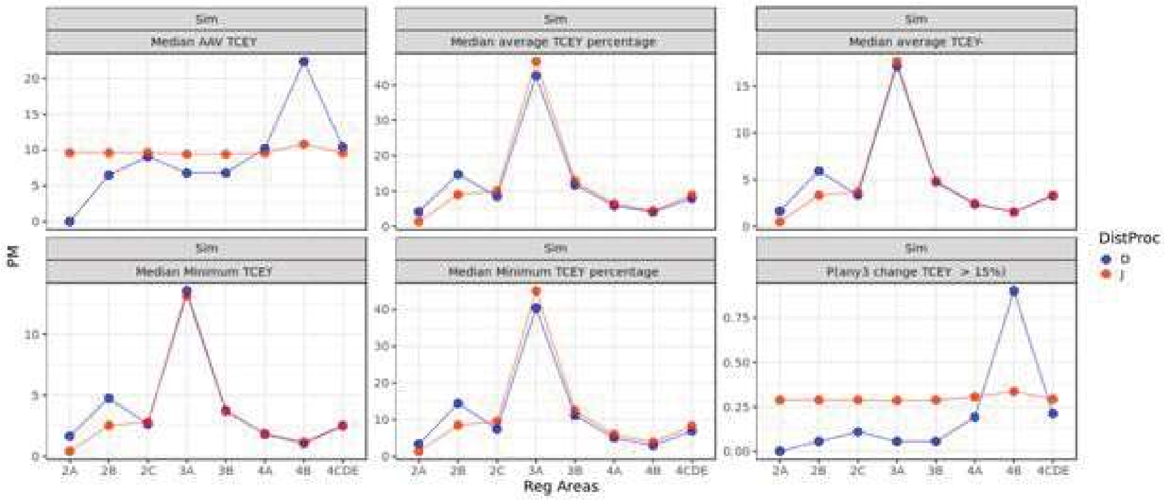

Figure 17: Short-term fishery sustainability performance metrics for IPHC Regulatory Areas using an SPR of 43% with MP-D (blue) and MP-J (red).

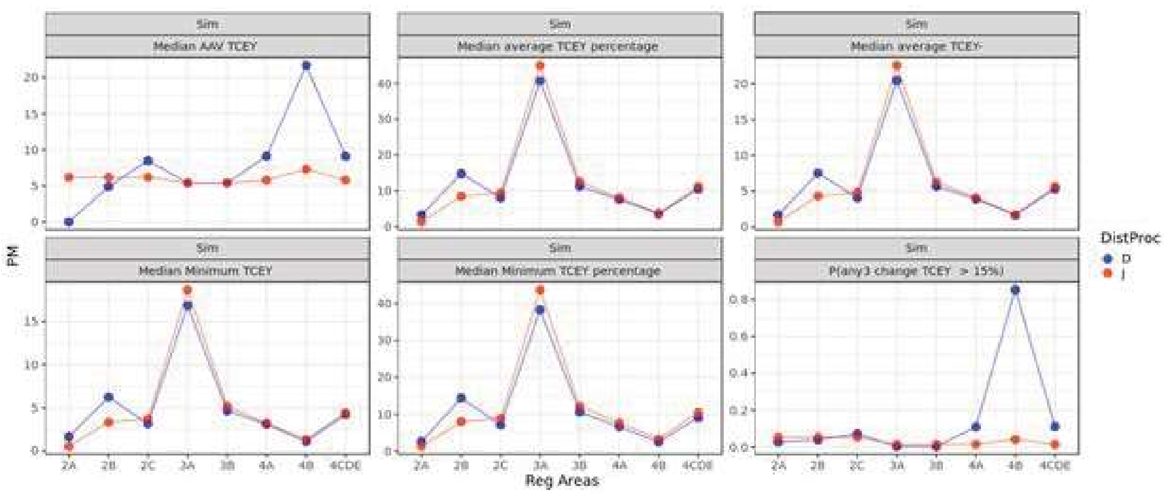

Figure 18: Long-term fishery sustainability performance metrics for IPHC Regulatory Areas using an SPR of 43% with MP-D (blue) and MP-J (red).

Overall, MP-D has a higher risk to the stock because the fishing intensity is allowed to increase without being affected by a control rule, although the performance metrics do not show a risk level beyond the tolerance defined in the primary objectives. The control rule helps to avoid low stock sizes and is very affective at maintaining the stock status above the limit reference point of 20%. A potential improvement to the concept of a maximum fishing intensity in MP-D would be to define a control rule on the minimum SPR as well such that increases in fishing intensity are suppressed when the stock size is low. Some potential methods are to 1) not accommodate the agreements when the stock status is below the trigger, 2) accommodate the agreements but not increase the fishing intensity when the stock status is below zero, or 3) increase the minimum

SPR (i.e. reduce the maximum fishing intensity) when the stock status is less than the trigger as is done with the procedural SPR. Furthermore, elements of MP-D and MP-J can be combined such as averaging the estimated stock distribution or incorporating agreements for one IPHC Regulatory Area (e.g., paragraph 53 of IPHC-2020-MSAB016-R). These modified management procedures are not available for evaluation at this time.

4 IPHC SECRETARIAT PROGRAM OF WORK

Accomplishments to date include the following:

1. Familiarization with the MSE process.
2. Defining conservation and fishery goals.
3. Defining objectives and performance metrics for those goals.
4. Developing coast-wide (single-area) and spatial (multiple-area) operating models.
5. Identifying management procedures for the coastwide fishing intensity and distributing the TCEY to IPHC Regulatory Areas.
6. Presentation of results investigating coastwide fishing intensity.
7. Development of an MSE framework to investigate coastwide scale and distribution components of the harvest strategy.

Management Strategy Evaluation is a process that develops iteratively over many years. It is also a process that needs monitoring and adjustments to make sure that management procedures are performing adequately. The MSE for Pacific halibut fisheries will continue with refinements to any adopted MP, new objectives being defined, more complex models being built with improved understanding of the Pacific halibut population, and the development of new management procedures in the future.

4.1 MSE tasks

Seven (7) categories have been defined in the past MSE program of work for the IPHC Secretariat and delivered. In addition, a recent external review which was completed in September 2020 (IPHC-2020-IM096-17).

Task 1: Review, update, and further define goals and objectives

Task 2: Develop performance metrics to evaluate objectives

Task 3: Identify realistic management procedures of interest to evaluate

Task 4: Design and code a closed-loop simulation framework

Task 5: Further the development of operating models

Task 6: Run closed-loop simulations and evaluate results

Task 7: Develop tools that will engage stakeholders and facilitate communication

The full MSE results incorporating coastwide scale and distribution components of the management procedure (Figure 11) are detailed in this document. There were three main tasks to accomplish in 2020: 1) identify management procedures incorporating coastwide and distribution components to simulate, 2) condition a multi-area operating model and prepare a framework for closed-loop simulations, and 3) present results in various ways in order to evaluate the management procedures. These three main tasks are described below and Table 16 identifies the tasks that were undertaken at each MSAB and SRB meeting in 2020.

Table 16: Tasks for 2020 and 2021.

15th Session of the IPHC MSAB - May 2020	**Progress**
Review Goals and Objectives (Distribution & Scale)	Completed
Review simulation framework	Completed
Review multi-area model	Completed
Review preliminary results	
Identify MPs (Distribution & Scale)	Completed
16th Session of the IPHC SRB - June 2020	
Review simulation framework	Completed
Review multi-region operating model	Completed
Review preliminary results	
3rd Ad-hoc meeting of the MSAB – August 2020	
Examine preliminary results	Completed
17th Session of the IPHC SRB - September 2020	
Review multi-region operating model	Completed
Review penultimate results	Completed
17th Session of the IPHC MSAB - October 2020	
Review final results	Completed
Provide recommendations on MPs for scale and distribution	Completed
97th Session of the IPHC Annual Meeting (AM097)	
Presentation of complete MSE product to the Commission Recommendations on Scale and Distribution MP	

Management procedures that have been developed for many fisheries are reviewed at regular intervals given new observations and data that are collected after adoption (Punt et al 2014; Sharma et al. 2020). For example, tuna Regional Fisheries Management Organizations (RFMOs) have defined exceptional circumstances to determine when an OM should be reconditioned given updated information, and the SRB recommended defining exceptional circumstances for the Pacific halibut MSE.

> **IPHC-2020-SRB017-R, para. 60**: *The SRB RECOMMENDED that Exceptional Circumstances be defined to determine whether monitoring information has potentially departed from their expected distributions generated by the MSE. Declaration of Exceptional Circumstances may warrant re-opening and revising the operating models and testing procedures used to justify a particular management procedure.*

5 Recommendations

That the Commission:

a) **NOTE** paper IPHC-2021-AM097-11 which provides a description of the IPHC MSE framework and simulations of management procedures for distributing the TCEY;

b) **RECOMMEND** a management procedure that best meets Commission objectives and accounts for trade-offs between yield in IPHC Regulatory Areas and yield stability in IPHC Regulatory Areas.

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7 Appendices

Appendix I: Primary objectives defined by the Commission for the MSE

Appendix II: Proposed and Recommended Management Procedures from MSAB015

Appendix III: Description of Management Procedures proposed from MSAB015

APPENDIX I
PRIMARY OBJECTIVES DEFINED BY THE COMMISSION FOR THE MSE

Table I.1: 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	$p_{SB,2} > 5\%$ $p_{SB,3} > 33\%$ $p_{SB,2} > 10\%$ $p_{SB,2} > 2\%$	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 CATCH VARIABILITY	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 II
PROPOSED AND RECOMMENDED MANAGEMENT PROCEDURES FROM MSAB015

Recommended management procedures to be evaluated by the MSAB in 2020 and the priority of investigation. A priority of 1 denotes a focus on producing precise performance metrics. Reproduced from IPHC-2020-MSAB015-R.

Table II.1: Recommended management procedures evaluated by the MSAB in 2020 and the priority of investigation. A priority of 1 denotes a focus on producing precise performance metrics. A priority of 2 denotes potentially fewer simulations are desired, if time was constrained.

MP	Coastwide	Regional	IPHC Regulatory Area	Priority
MP 15-A	SPR 30:20		• O32 stock distribution • Proportional relative harvest rates (1.0 for 2-3A, 0.75 for 3B-4) • 1.65 Mlbs floor in 2A[1] • Formula percentage for 2B[2]	1
MP 15-B	SPR 30:20 MaxChange15%		• O32 stock distribution • Proportional relative harvest rates (1.0 for 2-3A, 0.75 for 3B-4) • 1.65 Mlbs floor in 2A[1] • Formula percentage for 2B[2]	1
MP 15-C	SPR 30:20 MaxChange15%	Biological Regions, O32 stock distribution Rel HRs[3]: R2=1, R3=1, R4=0.75, R4B=0.75	• O32 stock distribution • Relative harvest rates not applied • 1.65 Mlbs floor in 2A[1] • Formula percentage for 2B[2]	2
MP 15-D	SPR 30:20 MaxChange15% Max FI (36%)		First • O32 stock distribution • Relative harvest rates (1.0 for 2-3A, 0.75 for 3B-4) Second within buffer (pro-rated if exceeds buffer) • 1.65 Mlbs floor in 2A[1] • Formula percentage for 2B[2]	2
MP 15-E	SPR 30:20 MaxChange15%		• O32 stock distribution • Proportional relative harvest rates (1.0 for 2-3A, 0.75 for 3B-4) • 1.65 Mlbs floor in 2A[1]	2
MP 15-F	SPR 30:20 MaxChange15%	National Shares: 20% to 2B, 80% to other	• O32 stock distribution to areas other than 2B • Relative harvest rates (1.0 for 2-3A, 0.75 for 3B-4)	1
MP 15-G	SPR 30:20 MaxChange15%		• O32 stock distribution • Relative harvest rates (1.0 for 2-3A, 0.75 for 3B-4)	1

MP	Coastwide	Regional	IPHC Regulatory Area	Priority
MP 15-H	SPR 30:20 MaxChange15%		• O32 stock distribution • Relative harvest rates (1 for 2-3, 4A, 4CDE, 0.75 for 4B)	1
MP 15-I	SPR 30:20 MaxChange15%		• All sizes stock distribution • Relative harvest rates (1.0 for 2-3A, 0.75 for 3B-4)	2
MP 15-J	SPR 30:20 MaxChange15%		• O32 stock distribution (5-year moving average) • Relative harvest rates (1.0 for 2-3A, 0.75 for 3B-4)	1
MP 15-K	SPR 30:20 MaxChange15%		• 5-year shares determined from 5-year O32 stock distribution (vary over time but change only every 5th year)	2

[1] paragraph 97b IPHC-2020-AM096-R

[2] paragraph 97c of IPHC-2020-AM096-R

[3] R2 refers to Biological Region 2 (2A, 2B, 2C); R3 refers to Biological Region 3 (3A, 3B); R4 refers to Biological Region 4 (4A, 4CDE), and R4B refers to Biological Region 4B

APPENDIX III
DESCRIPTION OF MANAGEMENT PROCEDURES PROPOSED FROM MSAB015

The proposed management procedures from the 15th Session of the Management Strategy Advisory Board (MSAB015) are described here. Each management procedure has a coastwide component and a distribution component (Appendix II). The distribution component can distribute directly to IPHC Regulatory Areas or distribute to Biological Regions first.

For all the MPs considered, the coastwide component sees the application of a coastwide SPR and of a 30:20 control rule. The 30:20 harvest control rule adjusts the reference SPR if the estimated stock status falls below the 30% trigger value. Specifically, the fishing intensity is reduced linearly if the stock status falls below 30% of unfished spawning stock biomass to a value of zero at and below an estimated status of 20% of unfished spawning stock biomass.

MP15-A: this MP applies a coastwide SPR and the 30:20 harvest control rule to obtain a coastwide TCEY. The coastwide TCEY is then distributed to IPHC Regulatory Areas using the O32 stock distribution (i.e. biomass of fish over 32 inches) from FISS. A proportional relative harvest rate is applied to IPHC Regulatory Areas such that the relative harvest rate in the western areas (i.e. 3B, 4A, 4CDE, and 4B) is 0.75 and the relative harvest rate in eastern areas (i.e. 2A, 2B, 2C, 3A) is 1.0. Further adjustments are applied to the distributed TCEY, to assign a fixed 1.65 million pounds for IPHC Regulatory Area 2A (when possible) and a percentage allocation for IPHC Regulatory Area 2B calculated from a 30% weight on the current interim management procedure's target TCEY distribution (i.e., O32 stock distribution and relative harvest rates) and 70% weight to 20%.

MP15-B: this MP applies a coastwide SPR and the 30:20 harvest control rule to obtain a coastwide TCEY. A 15% constraint is then applied to not allow the coastwide TCEY to increase or decrease by more than 15% from the previous year's limit. The coastwide TCEY is then distributed to IPHC Regulatory Areas using the O32 stock distribution (i.e. biomass of fish over 32 inches) from the FISS. A proportional relative harvest rate is applied to IPHC Regulatory Areas such that the relative harvest rate in the western areas (i.e. 3B, 4A, 4CDE, and 4B) is 0.75 and the relative harvest rate in eastern areas (i.e. 2A, 2B, 2C, 3A) is 1.0. Further adjustments are applied to the distributed TCEY, to assign a fixed 1.65 million pounds for IPHC Regulatory Area 2A (when possible) and a percentage allocation for IPHC Regulatory Area 2B calculated from a 30% weight on the current interim management procedure's target TCEY distribution (i.e., O32 stock distribution and relative harvest rates) and 70% weight to 20%.

MP15-C: this MP applies a coastwide SPR and the 30:20 harvest control rule to obtain a coastwide TCEY. A 15% constraint is then applied to not allow the coastwide TCEY to increase or decrease by more than 15% from the previous year's limit. The coastwide TCEY is then distributed to Biological Regions using the O32 stock distribution (i.e. biomass of fish over 32 inches) from the FISS. A proportional relative harvest rate is applied to Biological Regions such that the relative harvest rate in Biological Regions 4 and 4B is 0.75 and the relative harvest rate in Biological Regions 2 and 3 is 1.0. The regional TCEY is then distributed to IPHC Regulatory Areas using the O32 stock distribution (i.e. biomass of fish over 32 inches) from the FISS. Further adjustments are applied to the distributed TCEY, to assign a fixed 1.65 million pounds for IPHC Regulatory Area 2A (when possible) and a percentage allocation for IPHC Regulatory Area 2B calculated from a 30% weight on the current interim management procedure's target TCEY distribution (i.e., O32 stock distribution and relative harvest rates) and 70% weight to 20%.

MP15-D this MP applies a coastwide SPR and the 30:20 harvest control rule to obtain a coastwide TCEY. A 15% constraint is then applied to not allow the coastwide TCEY to increase or decrease by more than 15% from the previous year's limit. The coastwide TCEY is then distributed to IPHC Regulatory Areas using the O32 stock distribution (i.e. biomass of fish over 32 inches) from the FISS. A proportional relative harvest rate is applied to IPHC Regulatory Areas such that the relative harvest rate in the western areas (i.e. 3B, 4A, 4CDE, and 4B) is 0.75 and the relative harvest rate in eastern areas (i.e. 2A, 2B, 2C, 3A) is 1.0. Further adjustments are applied to the distributed TCEY, to assign a fixed 1.65 million pounds for IPHC Regulatory Area 2A (when possible) and a percentage allocation for IPHC Regulatory Area 2B calculated from a 30% weight on the current interim management procedure's target TCEY distribution (i.e., O32 stock distribution and relative harvest rates) and 70% weight to 20%. These 2A and 2B adjustments are made by adding to the total coastwide TCEY, rather than reallocating among IPHC Regulatory Areas (as in other MPs). Once this last step is complete, the sum of the distributed TCEY is compared with the TCEY corresponding to a SPR value of 36% (maximum fishing intensity). If the sum of the distributed TCEY is higher than the TCEY corresponding to the maximum fishing intensity, IPHC Regulatory Areas 2A and 2B are adjusted so that the sum of the distributed TCEY is equal to the TCEY corresponding to the maximum fishing intensity. If the sum of the distributed TCEY is lower than the TCEY corresponding to the maximum fishing intensity, no further adjustments are made.

MP15-E: this MP applies a coastwide SPR and the 30:20 harvest control rule to obtain a coastwide TCEY. A 15% constraint is then applied to not allow the coastwide TCEY to increase or decrease by more than 15% from the previous year's limit. The coastwide TCEY is then distributed to IPHC Regulatory Areas using the O32 stock distribution (i.e. biomass of fish over 32 inches) from the FISS. A proportional relative harvest rate is applied to IPHC Regulatory Areas such that the relative harvest rate in the western areas (i.e. 3B, 4A, 4CDE, and 4B) is 0.75 and the relative harvest rate in eastern areas (i.e. 2A, 2B, 2C, 3A) is 1.0. Further adjustments are applied to the distributed TCEY, to assign a fixed 1.65 million pounds for IPHC Regulatory Area 2A (when possible).

MP15-F: this MP applies a coastwide SPR and the 30:20 harvest control rule to obtain a coastwide TCEY. A 15% constraint is then applied to not allow the coastwide TCEY to increase or decrease by more than 15% from the previous year's limit. A National Share of 20% is then applied to IPHC Regulatory Area 2B and the remaining 80% is then distributed to IPHC Regulatory Areas using the O32 stock distribution (i.e. biomass of fish over 32 inches) from the FISS. A proportional relative harvest rate is applied to IPHC Regulatory Areas such that the relative harvest rate in the western areas (i.e. 3B, 4A, 4CDE, and 4B) is 0.75 and the relative harvest rate in eastern areas (i.e. 2A, 2B, 2C, 3A) is 1.0.

MP15-G: this MP applies a coastwide SPR and the 30:20 harvest control rule to obtain a coastwide TCEY. A 15% constraint is then applied to not allow the coastwide TCEY to increase or decrease by more than 15% from the previous year's limit. The coastwide TCEY is then distributed to IPHC Regulatory Areas using the O32 stock distribution (i.e. biomass of fish over 32 inches) from the FISS. A proportional relative harvest rate is applied to IPHC Regulatory Areas such that the relative harvest rate in the western areas (i.e. 3B, 4A, 4CDE, and 4B) is 0.75 and the relative harvest rate in eastern areas (i.e. 2A, 2B, 2C, 3A) is 1.0.

MP15-H: this MP applies a coastwide SPR and the 30:20 harvest control rule to obtain a coastwide TCEY. A 15% constraint is then applied to not allow the coastwide TCEY to increase or decrease by more than 15% from the previous year's limit. The coastwide TCEY is then distributed to IPHC Regulatory Areas using the O32 stock distribution (i.e. biomass of fish over 32 inches) from the FISS. A proportional relative harvest rate is applied to IPHC Regulatory Areas such that the relative harvest rate in IPHC Regulatory Area 4B is 0.75 and the relative harvest rate in all other IPHC Regulatory Areas is 1.0.

MP15-I: this MP applies a coastwide SPR and the 30:20 harvest control rule to obtain a coastwide TCEY. A 15% constraint is then applied to not allow the coastwide TCEY to increase or decrease by more than 15% from the previous year's limit. The coastwide TCEY is then distributed to IPHC Regulatory Areas using the 'all-sizes' stock distribution, which is determined from the biomass of all sizes of Pacific halibut caught in the FISS. A proportional relative harvest rate is applied to IPHC Regulatory Areas such that the relative harvest rate in the western areas (i.e. 3B, 4A, 4CDE, and 4B) is 0.75 and the relative harvest rate in eastern areas (i.e. 2A, 2B, 2C, 3A) is 1.0.

MP15-J: this MP applies a coastwide SPR and the 30:20 harvest control rule to obtain a coastwide TCEY. A 15% constraint is then applied to not allow the coastwide TCEY to increase or decrease by more than 15% from the previous year's limit. The coastwide TCEY is then distributed to IPHC Regulatory Areas using a 5 year moving average of the O32 stock distribution (i.e. biomass of fish over 32 inches) from the FISS. A proportional relative harvest rate is applied to IPHC Regulatory Areas such that the relative harvest rate in the western areas (i.e. 3B, 4A, 4CDE, and 4B) is 0.75 and the relative harvest rate in eastern areas (i.e. 2A, 2B, 2C, 3A) is 1.0.

MP15-K: this MP applies a coastwide SPR and the 30:20 harvest control rule to obtain a coastwide TCEY. A 15% constraint is then applied to not allow the coastwide TCEY to increase or decrease by more than 15% from the previous year's limit. The coastwide TCEY is then distributed to IPHC Regulatory Areas using the previous 5-year average of the O32 stock distribution (i.e. biomass of fish over 32 inches) from the FISS, calculated only every 5th year.

INTERNATIONAL PACIFIC HALIBUT COMMISSION

IPHC Fishery Regulations: Proposals for the 2020-21 process

PREPARED BY: IPHC SECRETARIAT (D. WILSON, L. ERIKSON; 23 DECEMBER 2020; 21 JAN 2021)

PURPOSE

To provide the Commission with the IPHC Fishery Regulation proposals received for consideration by the Commission in the 2020-21 regulatory process, and associated implementation notes.

BACKGROUND

Recalling the IPHC fishery regulation proposal submission and review process instituted in 2017, this paper is intended to provide a preliminary indication of the fishery regulation proposals being submitted to the Commission in the 2020-21 process. Fishery regulation proposals from the Contracting Parties and other stakeholders are typically received later in the process.

> ***Note***: *The date for submission of draft proposals for consideration at the 96th Session of the IPHC Interim Meeting (IM096) was **19 October 2020**, and for the 97th Session of the Annual Meeting (AM097) was **26 December 2020**.*

DISCUSSION

A list of the titles, subjects, and sponsors for IPHC Fishery Regulation proposals to be considered as part of the 2020-21 process is provided at Appendix I, with links to subsequent 'implementation notes' developed by the IPHC Secretariat.

RECOMMENDATION

That the Commission:

1) **NOTE** paper IPHC-2021-AM097-12 Rev_1, which provides the Commission with the IPHC Fishery Regulation proposals received for consideration by the Commission in the 2020-21 regulatory process, and associated implementation notes.

APPENDICES

Appendix I: Titles, subjects, sponsors and implementation notes for IPHC Fishery Regulation proposals for 2020-21.

APPENDIX I

Titles, subjects, and sponsors for IPHC Fishery Regulation proposals for the 2020-21 process

Document number	Title	Brief description if provided (Sector/Area)
IPHC Secretariat		
IPHC-2021-AM097-PropA1	Mortality and Fishery Limits (Sect. 5)	To provide the fishery limits table for the IPHC Fishery Regulations that will be filled in when the Commission adopts TCEYs for the individual IPHC Regulatory Areas.
IPHC-2021-AM097-PropA2	Commercial Fishing Periods (Sect. 9)	To provide recommendations for commercial fishing periods: All IPHC Regulatory Areas for 2021
IPHC-2021-AM097-PropA3	Minor amendments and clarifications.	To improve clarity and consistency in the IPHC Fishery Regulations.
Contracting Parties		
IPHC-2021-AM097-PropB1	Charter Management Measures in IPHC Regulatory Areas 2C and 3A (Sect. 29)	**Proponent**: NOAA-Fisheries To provide charter management measures reflective of fishery limits for the recreational fisheries: 1. IPHC Regulatory Area 2C 2. IPHC Regulatory Area 3A
Stakeholders		
IPHC-2021-AM097-PropC1 Rev_1	Commercial Fishing Periods (Sect. 9)	**Proponent**: Mr Connor, F/V Cape Reliant; Robert Hauknes, F/V Mystic Era To provide for a year-long directed commercial fishery.

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

PREPARED BY: IPHC SECRETARIAT (D. WILSON; 15 DECEMBER 2020)

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)

Recommendation

That the Commission **NOTE** paper IPHC-2021-AM097-13 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) responsibilities, 2) timeline, 3) priorities; and 4) any initial comments of relevance.

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	**N/A:** At this time, the Contracting Parties do not wish to commence the process of updating the IPHC Convention.
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.	N/A	N/A	N/A	**N/A**
	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.	High	Commission	2020-24	**In progress**: 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. Revised ROPs and FRs will be submitted to the annual **Finance and Administration Committee (FAC)** for consideration and potential recommendation to the Commission.
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	**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/).

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	**In progress**: 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	**In progress**: The IPHC Secretariat continues to seek ways to ensure broad stakeholder understanding of our work. For the MSAB and associated MSE work, a webpage is in development to provide a user friendly means to explore and understand the utility of MSE and the simulation results arising. See paper **IPHC-2021-AM097-11** for the latest iteration.
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)**
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	**In progress**: The Commission has 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.

REF#	RECOMMENDATION	PRIORITY	RESPONSIBILITY	TIMELINE	UPDATE/STATUS
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	**In progress**: The IPHC Secretariat has provided a number of examples of phase plots over the past years, with the most recent examples being presented at IM096. See paper **IPHC-2021-AM097-08**.
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.	N/A	N/A	N/A	**N/A**
	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.	High	Contracting Parties	2020-24	**Pending**: Nil work in 2020 to-date.
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	2021-24	**In progress**: To be considered once the initial MSE products are delivered at AM097 in January 2021.
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	2020-21	**In progress**: See paper **IPHC-2021-AM097-11** for the latest iteration.
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	IPHC Secretariat	2020-21	**In progress**: See paper **IPHC-2021-AM097-11** for the latest iteration.

REF#	RECOMMENDATION	PRIORITY	RESPONSIBILITY	TIMELINE	UPDATE/STATUS
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**: Potentially to be incorporated into the Contracting Party National Reports at each Annual Meeting. The Secretariat will work with each Contracting Party.
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**: Potentially to be incorporated into the Contracting Party National Reports at each Annual Meeting.
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; Commission	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.* NOAA-Fisheries continues to deliberate this topic.
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	2020	**In progress**: The IPHC Secretariat has requested this information be provided by domestic agencies via the Contracting Party National Reports to the Commission.

REF#	RECOMMENDATION	PRIORITY	RESPONSIBILITY	TIMELINE	UPDATE/STATUS
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	**In progress**: The IPHC Secretariat has requested this information be provided by domestic agencies via a consolidated Contracting Party National Report to the Commission. This will likely take several years to become an efficient process of reporting.
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.
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 will be presented at FAC097 for recommendation to the Commission. **97th Session of the IPHC Finance and Administration Committee (FAC097)**
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	**In progress**: Monitor progress through the IPHC meeting cycle.
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.

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	**In progress**: The IPHC Secretariat has developed a BCP for the Finance and Administrative Services Branch (financial and administrative BCP) over the past months, and will move to consolidate with other Branches of the organization throughout 2020.
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**: 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**: The Commission agreed to keep the two subsidiary bodies separate moving forward, and for them to be enhanced wherever feasible.

Pacific Halibut Multiregional Economic Impact Assessment (PHMEIA): summary of progress

PREPARED BY: IPHC SECRETARIAT (B. HUTNICZAK; 22 DECEMBER 2020)

PURPOSE

To provide an update on the International Pacific Halibut Commission (IPHC) economic study, including progress on developing the economic impact assessment model, state of the collection of primary economic data from Pacific halibut dependent sectors, and plan for the year ahead, and to reiterate the need for active participation of the IPHC stakeholders in developing the necessary data for analysis.

BACKGROUND

Under the Convention, the IPHC's mandate is *optimum* management of the Pacific halibut resource, which necessarily includes an economic dimension. Fisheries economics is an active field of research around the world in support of fisheries policy and management. Adding the economic expertise to the IPHC Secretariat, the IPHC has become the first regional fishery management organization (RFMO) in the world to do so.

The goal of the IPHC economic study is to provide stakeholders with an accurate and all-sectors-encompassing assessment of the economic impact of the Pacific halibut resource in Canada and the United States of America. The intention of this update is to inform on the project progress and reiterate the need for active participation of the IPHC stakeholders in developing the necessary data for analysis.

The economic effects of changes to harvest levels can be far-reaching. Fisheries management policies that alter catch limits have a direct impact on commercial harvesters, but at the same time, there is a ripple effect through the economy. Industries that supply commercial fishing vessels with inputs, generally referred to as *backward-linked industries*, rely on this demand when making decisions related to their production levels and expenditure patterns. For example, vessels making more fishing trips purchase more fuel and leave more money in a local grocery store that supplies crew members' provisions. More vessel activity means more business to vessel repair and maintenance sector or gear suppliers. An increase in landings also brings more employment opportunities, and, as a result, more income from wages is in circulation. When spending their incomes, local households support local economic activity that is indispensable to coastal communities' prosperity.

Changes in the domestic fisheries output, unless fully substituted by imports, are also associated with production adjustments by industries relying on the supply of fish, such as seafood processors. Similarly to the directly affected sector, any change in production by the *forward-linked industry* has a similar ripple effect on its suppliers. The complete path of landed fish, from the hook to the plate, also includes seafood wholesalers and retailers, and, in the case of highly-prized fish such as Pacific halibut, services. Traditionally, the vast majority of Pacific halibut is consumed at white-tablecloth restaurants. Any adjustment in gross revenue generated by these industries resulting from a change in the supply of directly affected fish is further magnifying the economic impact of management decision altering harvest levels.

Similar effects are attributed to the recreational fishing sector. By running their businesses, charter operators generate demand for fuel, bait fish, boat equipment, and fishing trip provisions. They also create employment opportunities and provide incomes that can be spent locally, supporting various local businesses. What is more, anglers themselves contribute to the economy by creating demand for goods and services related to their fishing trips. A number of sectors support tourism relaying on the Pacific halibut fishing, both guided or unguided. These include lodging, local retailers, or restaurants.

Besides shaping a complex combination of local effects, the industries' interlinked nature is generating cross-regional impacts. Economic benefits from the primary area of the resource extraction are leaked when inputs are imported, when wages earned by non-residents are spent outside the place of employment, or when earnings from quota holdings flow to non-resident beneficial owners. At the same time, the inflow of economic benefits to the local economies from outside is occurring when products are exported or local businesses are bringing tourism cash to the region.

Understanding the multiregional impacts of changes to fisheries sectors is now more important than ever considering how globalized it is becoming. Fish harvested on the other side of the globe can be easily found on the shelf or on the menu in the United States or Canada, competing with domestically produced seafood. The United States and Canada imported seafood worth over USD 28.8 billion (CAD 37.4 billion) in 2018 (Statistics Canada, 2020a; US Census, 2020b). On the production side, the origin of inputs to any sector is increasingly distant, implying a gradual shift of economic activity supported by fisheries and seafood industries abroad. While generally cost-effective, such high exposure to international markets makes seafood accessibility fragile to perturbations, as shown by the covid-19 outbreak (OECD, 2020). Fisheries are also at the forefront of exposure to the accelerating impacts of climate change. A rapid increase of the water temperature of the coast of Alaska, termed *the blob*, is affecting fisheries (Cheung and Frölicher, 2020) and may have a profound impact on Pacific halibut distribution. Thus analyzing the sector in a broader context is crucial.

Update on the model development

Economic impacts are typically estimated with the use of an input-output (IO) model. The traditional IO model is used to investigate how changes in final demand affect economic variables such as output, income and employment or contribution to the region's gross domestic product (GDP). This is known as impact analysis. With an adjustment for the shock type, the model can also demonstrate the magnitude of changes in supply-constrained industries such as total allowable catch (TAC) constrained fisheries. Adopting a multiregional approach, the model accommodates the cross-regional trade. The IO model can also be extended to the so-called social accounting matrix (SAM). Adopting SAM, the calculated effects account for labor commuting patterns and residency of beneficial owners of production factors, and as a result, the flow of earnings between regions.

The Pacific halibut multiregional economic impact assessment (PHMEIA) model is a multiregional SAM model describing economic interdependencies between sectors and regions developed with a specific purpose of assessing the economic contribution of Pacific halibut resource to the economy of the United States and Canada. The adopted methodology is an extension from the multiregional SAM model for Southwest Alaska developed by Seung, Waters, and Taylor (2019) and draws on a few decades' worth of experience in developing IO models with applications to fisheries (for review of relevant literature, please refer to the economic study section on the IPHC website, subsection *Review of economic impact assessment models focused on the fisheries sector*).

The model reflects the interdependencies between eleven major sectors and two Pacific halibut-specific sectors. These include the Pacific halibut fishing sector, as well as the forward-linked Pacific halibut processing sector.[1] The inclusion of the Pacific halibut charter sector is underway. The list of industries considered in the PHMEIA model, as well as the primary commodities they produce, is available in **Table 1**.

The model accounts for interregional spillovers. These represent economic stimulus in the regions other than the one in which the exogenous change is considered. This allows accommodation of increasing economic interdependence of regions and nations. The model considers three primary Pacific halibut producing regions, as well as residual regions to account for cross-boundary effects of fishing in the Pacific Northwest:

- Alaska (AK)
- West Coast (WC – including WA, OR and CA)
- British Columbia (BC)
- Rest of the US (RUS)
- Rest of Canada (ROC)
- Rest of the world (ROW)[2]

By accounting for the economic linkages among these six regions, the study shows the importance of multiregional approaches to measuring economic impacts more accurately. This is particularly important in the context of shared resources and joint management, such as the case of collective management of Pacific halibut by the IPHC. The economic metrics derived from the PHMEIA model range from total economic impact on output along the value chain to impacts on employment and incomes, as well as contribution to the GDP and households' prosperity.

The model adopts a recently published multiregional generalized RAS (MRGRAS) updating technique (Temursho, Oosterhaven and Alejandro, 2019) to develop an up-to-date model that can incorporate partial information on its components while continuing to conform to the predefined balanced structure. This technique can make the multiregional model consistent with aggregated national data[3] and include

[1] As noted by Steinback and Thunberg (2006), there are number of seafood substitutes available to buyers. Thus including impacts beyond processors and wholesalers could be misleading considering that it is unlikely that supply shortage would result in a noticeable change in retail level gross revenues. Data limitations dictate the exclusion of wholesale buyers from the assessment of forward-linked effects.

[2] The ROW region in the model is considered exogenous. This implies that the trade relations with the ROW are not affected by the changes to the Pacific halibut sector considered in this project. While, the full inclusion of ROW component allows for assessment of impact outside Canada and the United States if trade with ROW was to be considered responsive to changes in Pacific halibut sector activity, this is not typically seen in the literature.

[3] For example, data from the National Economic Accounts (NEA). NEA data provide a comprehensive view of national production, consumption, investment, exports and imports, and income and saving. These statistics are best known by summary measures such as gross domestic product (GDP), corporate profits, personal income and spending, and personal saving.

up-to-date estimates from a limited number of focus sectors. For more details on the methodological approach, please refer to the economic study section on the IPHC website (subsection Methodological annex).

The current version of the model is based solely on secondary data sources.[4] As such, the results are conditional on the adopted assumptions for the components for which data were not available. In order to improve the accuracy of the assessment, the IPHC intends to incorporate into the model primary economic data collected directly from members of Pacific halibut dependent sectors (see *Update on the identification of available data sources and primary data collection*), applying the so-called partial-survey method (Miller and Blair 2009, pp. 303). **The subsequent revisions of the model incorporating IPHC-collected data will bring improved estimates on the Pacific halibut sectors' economic impact**.

The model is operational and available for 2014, 2016, and 2018. For more details on the SAM application to the assessment of the impact of the Pacific halibut resource on the economies of Canada and the United States, please refer to the economic study section on the IPHC website (subsection *PHMEIA model*).

[4] I.e. data collected by other parties, not the IPHC.

Table 1. Industries and commodities considered in the PHMEIA model.

	Industry	Primary commodity produced
1	Pacific halibut fishing	Pacific halibut
2	Other fish and shellfish fishing	Other fish and shellfish(1)
3	Agriculture and natural resources (ANR)	Agriculture and natural resources
4	Construction	Construction
5	Utilities	Utilities
6	Pacific halibut processing	Seafood
7	Other fish and shellfish processing	Seafood
8	Food manufacturing (excluding seafood)	Food(2)
9	Manufacturing (excluding food manufacturing)	Manufactured goods (excluding food)
10	Transport	Transport
11	Wholesale	Wholesale
12	Retail	Retail
13	Services (including public administration)	Services (including public administration)
14	Pacific halibut charter sector(2)	Pacific halibut fishing trips

Notes: (1)In the case of Canada case, other fish and shellfish commodity include, besides wild capture production, also aquaculture output produced by aquaculture industry that is a part of the ANR industry. Other fish and shellfish processing industry in the US component, on the other hand, draws more on the ANR commodity that includes aquaculture output. As a result, the misalignment between model components is not concerning as linking these is based on the trade of aggregated seafood commodity. (2)There is a slight misalignment between model components related to the allocation of beverage and tobacco product manufacturing products that, in some cases, are considered non-durable goods and lumped with the food commodity. In the case of the US component, this misalignment is corrected with the use of additional data available from the AMS. No correction is performed for the ROW component, but the global production of beverage and tobacco products is considered of minor importance compared to other food commodities. (2)Inclusion of the Pacific halibut charter sector is underway, the current version of the model accounts only for the economic impact associated with sectors related to commercial Pacific halibut fishing.

Update on the identification of available data sources and primary data collection

The current version of the model is built using a broad set of secondary data sources. These include region-specific commercial fishing outputs in terms of value (DFO, 2020; NOAA, 2020a), wholesale value[5] (AgriService BC, 2018; COAR, 2020), employment and wages[6] (AK DLWD, 2020; Statistics Canada, 2020c), out-of-state employment (Kreiger and Whitney, 2020), seafood trade (NOAA, 2020b; Statistics Canada, 2020a). Additional data are available on recreational harvest and participation in recreational angling (ADFG, 2020; RecFIN, 2020), subsistence and research harvest (IPHC, 2020a). More details on fisheries-related secondary data sources can be found in the economic study section on the IPHC website (subsection *Fisheries-related economic statistics*).

The social accounting matrix, even if built with the purpose of assessing a limited number of sectors (i.e. Pacific halibut dependent industries in this case), also requires input on supply and use by all industries in the economy, as well as supplementary data on household accounts to provide insight into the demographics of the workforce that builds the market for supply and demand of labor and trade

[5] Not available for the US West Coast (confirmed with NOAA NWFSC, personal communication).
[6] Not available for the US West Coast (confirmed with NOAA NWFSC, personal communication).

data to link model components. The following sources serve as a base for the up-to-date estimates (list not exhaustive):

- US Bureau of Economic Analysis (BEA) industry accounts supplemented by BEA Regional Data resources (BEA, 2020) - the USA model component
- United States Census Bureau's Annual Survey of Manufactures (ASM) (US Census 2020a) – complementary statistics on manufacturing establishments
- Provincial-level supply and use tables published by Statistics Canada (Statistics Canada, 2020b) – the Canadian model component
- World Input-Output Tables (Timmer *et al.*, 2015) - base for the rest of the world component
- US Trade provided by the U.S. Census Bureau (US Census, 2020b)
- Canadian International Merchandise Trade Database (Statistics Canada, 2020a)

More accuracy of the results can be achieved by incorporating into the model primary economic data collected directly from members of Pacific halibut dependent sectors. An essential input to the SAM model is data on production structure (i.e. data on the distribution of revenue between profit and expenditure items). Currently, the model uses estimates from species-based NOAA model for Alaska for 2014 (Seung, Waters and Taylor, 2019), as well as Pacific halibut sector estimates for the West Coast provided directly by the authors of the NOAA input-output model for the Pacific Coast fisheries (Leonard and Watson, 2011; Pacific halibut estimates not published). No equivalent detail model is available for British Columbia, although some partial statistics are derived from Edwards and Pinkerton (2020).[7]

A series of surveys to gather information from commercial fishers and processing plant operators has been announced at the AM96. To expand the current model's scope, a survey aimed at charter business owners has been announced at the IM96. The draft survey form has been discussed with a small focus group consisting of charter business owners from all IPHC regions who advised on the questionnaire's clarity and suitability.

New, web-based survey forms are available:

- Here, for Pacific halibut commercial harvesters;
- Here, for Pacific halibut processors;
- Here, for Pacific halibut charter business owners.

IPHC stakeholders are encouraged to fill relevant survey form and contribute to the assessment of the importance of the Pacific halibut resource to the economy of Canada and the United States of America.

Note on data discrepancies

Several discrepancies in crucial economic statistics have been identified. For example, the 2018 Alaska Pacific halibut output value ranges from USD 79.2 mil., as reported by the Alaska Fisheries Information

[7] Edwards and Pinkerton (2020) provide estimates of average operational and fixed cost. These are used to derive value added related to Pacific halibut fishing used in the model.

Network (AKFIN, 2020), to USD 88.1 mil., as reported in the Commercial Operator's Annual Reports (COAR, 2020). Data from fish tickets available through the eLandings (confidential) suggest Pacific halibut output of about USD 78 mil., but there are tickets with missing price data suggesting the need for extrapolation of prices for estimating the total fisheries output value. British Columbia output value ranges from CAD 44.1 mil. reported by the Province of British Columbia (AgriService BC, 2018) to CAD 55.4 mil reported by the Fisheries and Oceans Canada (DFO, 2020). The best effort is made to identify the best data sources for model inputs. Additionally, a table with data comparison between sources will be prepared for verification and/or model input adjustments.

Note on data on Pacific halibut value along the supply chain

The complete path of landed fish, from the hook to the plate, includes, besides harvesters and processors, also seafood wholesalers and retailers, and in the case of highly-prized fish such as Pacific halibut, services when it is served in restaurants. Any change in gross revenue generated by these industries as a result of a change in the supply of directly affected fish is further magnifying the economic impact of management decision altering harvest levels.

Isolating data on Pacific halibut wholesale and retail is challenging as no relevant statistics have been identified. However, it is important to note that there are many seafood substitutes available to buyers. Thus, including economic impacts beyond processors and wholesalers could be misleading when considering that it is unlikely that supply shortage would result in a noticeable change in retail level gross revenues (Steinback and Thunberg, 2006).

Note on primary data collection in the time of the crisis

Recent perturbations in the markets caused by covid-19 serve as an additional argument for considering the broader economic dimension of Pacific halibut's contribution to regional economies. Widespread closure of restaurants, the Pacific halibut's biggest customers, diminished the demand for fish, particularly high-quality fresh fish that fetch higher prices. Lower prices, down in 2020 by up to 30% compared with the previous year (Stremple, 2020), caused a slow first half of the season (Ess 2020). Less harvest activity has repercussions in the economy beyond the harvest sector as it affects also harvest sector suppliers and downstream industries that rely on its output. Outbreaks of covid-19 in fish processing plants (Estus, 2020; Krakow, 2020) also affect economic activity generated regionally by this directly related to the Pacific halibut supply sector. Moreover, seafood processors incur additional costs associated with protective gear, testing, and quarantine accommodations (Ross, 2020; Sapin and Fiorillo, 2020; Welch, 2020).

The pandemic is thought to be a major impediment to successful primary data collection in 2020. The survey's announcement happened shortly before the covid-19 outbreak that shifted the focus of participants to the Pacific halibut fishery. An intensified effort to reach out to commercial vessel operators was made starting July when the IPHC fisheries data specialists (ports) distributed a paper version of the survey. To this date, however, too few responses have been received to make reliable estimates for the sector.

The new edition of the IPHC economic survey has been announced at the IM96. It allows the participants to the Pacific halibut fisheries (commercial and charter sector) to fill the form for 2020, but also retrospectively submit information for 2019. We leave the choice to the survey participants, noting the benefits of filling for both years:

- Data for 2019, covering pre-covid-19 operations, can be considered a baseline suitable for drawing conclusions under normal circumstances and using for predictions.
- Data for 2020, covering an abnormal year of operations, can be used to assess losses incurred by the Pacific halibut sectors, but also sectors' resilience to unfavorable exogenous circumstances. If the project continues and data for 2021 are collected, the project could inform on the response to the crisis and undertake an analysis of the path to recovery.

Note on the inclusion of the recreational sector in the PHMEIA model

There are two components to consider when attempting to assess the full scope of the Pacific halibut resource's economic impact occurring as a result of recreational fishing activities. The first is the contribution to the economy by the charter sector that provides service to anglers. These include services directly related to angling, for example, providing a boat, trip supplies and guides, but also not directly related, for example, hospitality services in case of fly-in lodges that specialize in serving customers interested in Pacific halibut fishing. The economic impact is generated by the sector's demand for inputs from other industries, including manufacturing, professional services (accounting, marketing, etc.) and demand for labor. Assessment of the charter sector economic impact typically requires surveying charter business owners on their revenues and expenditures.

The second component is the contribution of anglers themselves by creating demand for goods and services related to their fishing trips. This includes expenses related to the travel that would otherwise not be incurred (e.g. auto rental, fuel cost, lodging, food, site access fees), as well as money spent on durable goods that are associated with recreational fishing activity, e.g. rods, tackle, outdoor gear, boat purchase, etc. This component applies to both guided and unguided recreational fishing. Assessment of anglers' contribution to the economy typically requires surveying private anglers on their fishing-related expenditures and fishing preferences.

Note on economic impact assessment of subsistence fishing

Previous research suggested that noncommercial or nonmarket oriented fisheries contribution to national GDP is often grossly underestimated, particularly in developing countries (e.g., Zeller, Booth, and Pauly 2006). Subsistence fishing is also important in traditional economies, often built around indigenous communities. Wolfe and Walker (1987) found that there is a significant relationship between the percentage of native population in the community and reliance on wildlife as for a food source in Alaska. However, no comprehensive assessment of the economic contribution of the subsistence fisheries to the Pacific northwest is available. The only identified study, published in 2000 by Wolfe (2000), suggest that the replacement value of the wild food harvests in rural Alaska may be between 131.1 and 218.6 million dollars, but it does not distinguish between different resources and assumes equal replacement expense per lb. Aslaksen et al. (2008) proposed an updated estimate for 2008 based on the same volume, noting that transportation and food prices have risen significantly between 2000 and 2008 and USD 7 a pound is a more realistic replacement value. This gives the total value of USD 306 million, but the approach rely upon the existence of a like-for-like replacement food (in terms of taste and nutritional value), which is arguably difficult to accept in many cases (Haener *et al.*, 2001) and ignores the deep cultural and traditional context of halibut in particular (Wolfe, 2002). A more recent study by Krieg, Holen, and Koster (2009) suggests that some communities may be particularly dependent on wildlife, consuming annually up to 899 lbs per person, but no monetary estimates are derived. Moreover, although previous research points to the presence of sharing and bartering behavior that occurs in many communities (Wolfe, 2002; Szymkowiak and Kasperski, 2020), the economic and cultural values of these networks have yet to be thoroughly explored.

Glance at the preliminary results

This section summarizes the preliminary outcomes of the PHMEIA model. It is important to note that these are based on **the current version of the model incorporating only secondary data sources**. As such, **the results are conditional on the adopted assumptions for the components for which data were not available and are subject to change**.

The current results incorporate the following changes in comparison to the results presented at the IM96:

- Estimates are revised following a new release of data on NEA accounts for the United States (October-November 2020) and Canada (November 2020).
- The estimates fully incorporate described flows of earnings related to Pacific halibut sector.
- The model incorporates revised production structure for the WC Pacific halibut fishing sector (based on NOAA provided estimates) and for the British Columbia sector (incorporating data on fixed and operational cost from the literature).[8]

The preliminary results suggest that Pacific halibut commercial fishing's total estimated impact in 2018 amounts to USD 281 mil. (CAD 364) in GDP, USD 176 mil. (CAD 228 mil.) in labor income (including estimated USD 21.5 mil / CAD 27.9 mil in wages in the Pacific halibut fishing sector), 4,453 in jobs, and USD 179 mil (CAD 232 mil.) in households income and over USD 666 mil. (CAD 863 mil.) in output. This is about 5.1 times the fishery output value of USD 129 mil. (CAD 168 mil.) recorded for 2018 (DFO, 2020; NOAA, 2020a). The estimate is the total economic impact, the sum of the direct, indirect, and induced effects from changes to the Pacific halibut fishing sector, as well as indirect and induced effects associated with forward-linked industries (Pacific halibut processing sector).

The results suggest that the revenue generated by Pacific halibut at 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. Besides supporting production by other industries, the sector also contributes to the GDP of Canada and the United States and has a considerable impact on employment in both countries.

[8] Previous version of the model assumed transferability of production structure between regions and adopted estimates for Alaska to other regions. Revised production structure incorporating region-specific information suggest that the value added accounts for a considerably bigger share of landed value in British Columbia than in Alaska. This is one of the main reasons behind changes in the final estimates.

Understanding such a broad scope of impacts is essential for designing policies with desired effects depending on regulators' priorities.

Moreover, the results suggest that incorporating Pacific halibut specific outflows has a considerable impact on results. **Table 2** shows the estimates of economic impact on households in Alaska from the final model contrasted with estimates from the model that does not account for cross-regional flows of earnings. While 1USD of Pacific halibut output in Alaska could generate USD 0.54 USD for Alaskan households, out-of-state employment[9] and flow related to beneficial ownership of Pacific halibut fishing rights in Alaska (i.e. quota holdings) cause this estimate to drop to USD 0.39.

The study's main contribution is the first consistent estimation of both backward and forward-linked effects of fisheries supply changes in a multiregional setup tracing the transmission of impacts internationally.[10] By linking multiple spatial components, the model offers a better understanding of the impacts of changes in shared stock supply.

The complexity of Pacific halibut supply-side restriction in the form of region-based allocations suggests the need for a tool enabling regulators to assess various combinations of TAC allocations. To address this, the results are complemented by an interactive web-based application allowing users to estimate and visualize joint effects based on custom changes simultaneously applied to all IPHC-managed Pacific halibut producing areas. The preliminary version of the tool is available here.

http://iphcecon.westus2.cloudapp.azure.com:3838/ModelApp_azure/

The current version of the tool accounts only for the commercial sector, inclusion of the recreational component is underway.

Besides providing economic impact estimates for broadly-defined regions, the PHMEIA model results can inform the community impacts of the Pacific halibut resource throughout its range. However, while the quantitative analysis is conducted with respect to components that involve monetary transactions, Pacific halibut's 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. While these elements are not quantified at this time, recognizing such an all-encompassing definition of the Pacific halibut resource contribution, the project 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.

[9] These are preliminary estimates incorporating average out-of-state employment in *Fishing, Hunting and Trapping* sector published by the ADFG (Kreiger and Whitney, 2020). For more accurate results, out-of-state employment in Pacific halibut fishing sector will be estimated from the IPHC economic survey.

[10] While a study analyzing the impact of Pacific salmon fisheries on the economy of both the USA and Canada using the IO approach was identified (Gislason *et al.*, 2017), the models therein are disconnected and do not offer the consistency of an integrated multiregional model.

Table 2 Effect of incorporating Pacific halibut specific outflows - impact on households per 1 USD of Pacific halibut output in Alaska.

	Model with no Pacific halibut specific outflows	Model with Pacific halibut specific outflows
Households in Alaska	0.54	0.39
WC households	0.09	0.16
RUS households	0.31	0.38

Notes: Impacts on households in Canada omitted.

OBJECTIVES

Table 3 summarizes the progress to-date against the IPHC economic study objectives.

Table 3. The study objectives – summary of progress

Objective	Status*
Item 1: Survey of previous studies and existing information	**---**
Item 1.a: Literature review	**COMPLETED**
Item 1.b: Description of ongoing regular data collection programs	**COMPLETED**
Item 1.c: Collection of primary data – commercial sector survey	**IN PROGRESS**
Item 1.d: Collection of primary data – charter sector survey	**IN PROGRESS**
Item 2: Comprehensive qualitative structural description of the current economics of the Pacific halibut resource	**---**
Item 2.a: Description of the economics of the Pacific halibut commercial sector	**COMPLETED**
Item 2.b: Description of the economics of the Pacific halibut recreational sector	**IN PROGRESS**
Item 2.c: Description of the economics of other Pacific halibut sectors (bycatch, subsistence, ceremonial, research, non-directed)	**IN PROGRESS**
Item 3: Quantitative analysis of the economic impact of the directed Pacific halibut fishery	**---**
Item 3.a: Methodology – a model of the economy	**COMPLETED**
Item 3.b: Methodology – inclusion of the commercial sector in the SAM	**IN PROGRESS**
Item 3.c: Methodology – inclusion of the recreational sector in the SAM	**IN PROGRESS**
Item 3.d: Methodology – economic value of the subsistence use	**See note on the collaboration proposal**
Item 4: Account of the geography of the economic impact of the Pacific halibut sectors	**---**
Item 4.a: Visualization of region-specific economic impacts	**IN PROGRESS**
Item 5: Analysis of the community impacts of the Pacific halibut fishery throughout its range, including all user groups	**---**
Item 5.a: Community impacts assessment of the Pacific halibut fishery	**Data-dependent**

Item 6: Summary of the methodology and results of the IPHC study in comparison to other economic data and reports for the Pacific halibut resource, other regional fisheries, and comparable seafood industry sectors	**---**
Item 6.a: Putting methodology into perspective	**IN PROGRESS**
Item 6.b: Putting results into perspective	

* All items marked as COMPLETED are subject to updates based on the direction of the project and evolution of the situation in the Pacific halibut fisheries.

Extensions depending on availability of inputs

Assessment of community impacts

While some of the local communities particularly rely on fishing-related economic activities, extending the proposed SAM model to the community level (or any other spatial scale) requires significant investment in identifying the economic relationships between different sectors or industries (including both seafood and non-seafood industries) within each broader-defined region, this including deriving estimates on intra-regional trade in commodities and flow of earnings. It is an appealing extension of the current model, but not a feasible avenue for the project with its current time frame.

At this time, for increasing spatial resolution of assessed economic impacts, a simplified approach is suggested. The community impacts can be evaluated based on local exposure to the region's Pacific halibut economic impact, using calculated multiplier effects. Key metrics to consider here are created employment opportunities, wages brought to local circulation, and inflow of capital from outside through offering recreational fishing opportunities. It is also essential to consider the changes in quota distribution. In a system based on transferable quotas, small remote fishing communities are more likely to sell their quota, and what follows is a disproportional economic impact on the spatial scale. Loss of fisheries opportunities in small indigenous communities can be an unintended consequence of quota systems (Carothers, Lew, and Sepez 2010; Szymkowiak, Kasperski, and Lew 2019). Residency of Alaskan quota owners, down to the owner’s address, can be searched using CFEC Public Search Application. Canadian quotas (L fishery), which are vessel-based, can be allocated based on vessel owner’s residency, searchable in Canadian Register of Vessels available through Transport Canada’s Vessel Registration Query System.

While the specifics of the methodology for this component of the study are yet to be determined, the results could be delivered at, for example, port-level, considerably increasing the resolution of the assessed economic impacts. More granularity in results would, however, require more detailed data on revenue from landed harvest. Such data are currently available only for Alaska.[11] Request for access to individual trip revenue data for the US West Coast is pending. For British Columbia, the IPHC is

[11] IPHC has access to fish ticket data for Alaska through eLandings portal (https://elandings.alaska.gov/).

planning to adopt a calculation method based on IPHC-collected logbook data and monthly prices for Prince Rupert and Port Hardy from IPHC Fishery-Independent Setline Survey (FISS) sales.[12]

Study of recreational demand

It is important to note that while it is reasonable to assume that changes in harvest limits have a relatively proportional impact on production by commercial fishers (unless these are dramatic and imply fleet restructure), the effects on the recreational sector are not so straightforward.

A separate study estimating changes in saltwater recreational fishing participation as a response to the changing recreational harvest limits is necessary if the stakeholders are interested in policy impact rather than snapshot economic assessment. Such studies typically require surveying recreational fishers.

There is scope for collaboration here with the NOAA Alaska Fisheries Science Center, where there is ongoing work on estimating the marginal value of a Pacific halibut from the charter fishing sector in Alaska.

If the project was to continue beyond two years, the IPHC could consider surveying recreational fishers. The charter owners who participated in the charter survey pilot implied willingness to help with, e.g., distributing a link to the IPHC survey inquiring about their customers' fishing preferences. How to reach private anglers partaking in unguided fishing was not researched at this time.

Suggested extensions beyond the 2-year time frame

Expanding the static SAM model to a computable general equilibrium model

Relaxing the assumption of fixed technical coefficients by specifying these coefficients econometrically as a function of relative prices of inputs is one of the most compelling extensions to the static IO or SAM models. Such models, generally referred to as computable general equilibrium (CGE) models, require however extensive research to develop credible functional relationships between prices and consumption that would guide economic agents' behavior in the model.

The CGE approach is a preferred way forward when expanding the model usability and considering applying it in conjunction with the Pacific halibut management strategy evaluation (IPHC, 2020b). The dynamic model is well suited to analyze the impact of a broad suite of policies or external factors that would affect the stock over time.

[12] It is important to note that adopting this method, bias is expected with respect to smaller operations, aboriginal licenses, and landings outside main ports (ports other than Prince Rupert and Port Hardy).

Improving the granularity of the SAM model

As mentioned earlier, extending the proposed SAM model by disaggregating currently proposed regions into smaller components would require significant investment in identifying the economic relationships between sectors within each broader-defined region.

However, a good understanding of localized effects could be beneficial to policymakers that are often concerned about community impacts. Fisheries policies have a long history of disproportionally hurting smaller communities, often because potential adverse effects were not sufficiently assessed.

RECOMMENDATIONS

That the Commission:

1) **NOTE** paper IPHC-2021-AM097-14 which provides the Commission with an update on the IPHC economic study, including progress on the development of the economic impact assessment model, state of the collection of primary economic data from Pacific halibut dependent sectors and plan for the year ahead;
2) **NOTE** that the accuracy of economic impact assessment of the Pacific halibut resource depends on broader stakeholders' active participation in developing the necessary data for analysis;
3) **NOTE** that the accuracy of the assessment of community impacts depends on cooperation between Contracting Parties and the IPHC on economic data exchange.

ACKNOWLEDGMENTS

The IPHC Fisheries Policy and Economics Branch would like to thank all those who participated to date in the IPHC economic survey and contributed to developing the necessary data for analysis.

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IPHC meetings calendar (2021-23)

PREPARED BY: IPHC SECRETARIAT (15 DECEMBER 2020; 25 JANUARY 2021)

PURPOSE

To provide the Commission with an opportunity to consider the IPHC meetings calendar (2021-23) (Appendix I).

BACKGROUND

Commission: The Commission's annual cycle of meetings is built around the management needs of the Pacific halibut fishery. The IPHC Interim Meeting (IM) follows the completion of the commercial fishing period, and is timed to allow the IPHC Secretariat to incorporate data from that fishing period into the stock assessment and harvest decision support for the coming season. The IPHC Annual Meeting (AM) is scheduled to allow harvest and regulation decisions to be made by the Commission and implemented by the Contracting Parties in time for the opening of the next commercial fishing period.

Subsidiary bodies: The Finance and Administration Committee (FAC), Conference Board (CB) and Processor Advisory Board (PAB) meet adjacent to or during the course of the Annual Meeting. The Scientific Review Board (SRB) and Management Strategy Advisory Board (MSAB) each meet at least twice during the course of the year, in a sequence that supports both their mutual collaboration and the timing of their advice for the Commission. The Research Advisory Board (RAB) meets in February, when its members are best able to convene and consider the IPHC's scientific program of work.

DISCUSSION

Meetings of the Commission and its subsidiary bodies are of interest to the Pacific halibut stakeholder community and the general public, and the publication of their schedule as far in advance as possible enhances meeting preparation and collaboration among stakeholders and Contracting Party agencies.

The IPHC calendar provided in Appendix I includes the dates and locations for meetings in 2021 and 2022 approved by the Commission at its 96th Annual Meeting (AM096).

Dates for IPHC meetings in 2023 are proposed in the calendar for the Commission's consideration.

The IPHC Secretariat is proposing to hold the 98th Session of the IPHC Annual Meeting (AM098) in 2022 at the venue and location originally scheduled for AM097 (Victoria, Canada).

RECOMMENDATIONS

That the Commission:

1) **NOTE** paper IPHC-2021-AM097-15 Rev_1, which provides the Commission with an opportunity to consider the IPHC Meetings Calendar (2021-23).
2) **APPROVE** the IPHC Meetings Calendar (2021-23).

APPENDICES

Appendix I: IPHC Meetings Calendar (2021-23)

APPENDIX I

IPHC Meetings Calendar (2021-23)

	2021			2022			2023		
Meeting	No.	Dates	Location	No.	Dates	Location	No.	Proposed Dates	Location
Annual Meeting (AM)	**97th**	**25-29 Jan**	**Seattle, USA (electronic)**	**98th**	**24-28 Jan**	**Victoria, Canada**	**99th**	**24-28 Jan**	TBD, **USA**
Finance and Administration Committee (FAC)	97th	25 Jan	Seattle, USA (electronic)	98th	24 Jan	Victoria, Canada	99th	24 Jan	TBD, USA
Conference Board (CB)	91st	26-27 Jan	Seattle, USA (electronic)	92nd	25-26 Jan	Victoria, Canada	93rd	25-26 Jan	TBD, USA
Processor Advisory Board (PAB)	26th	26-27 Jan	Seattle, USA (electronic)	27th	25-26 Jan	Victoria, Canada	28th	25-26 Jan	TBD, USA
Research Advisory Board (RAB)	22nd	10 Feb	Electronic	23rd	9 Feb	Seattle, USA	24rd	9 Feb	Seattle, USA
Management Strategy Advisory Board (MSAB)	17th	TBD	Electronic	-	-	-	-	-	-
Scientific Review Board (SRB)	18th	22-24 June	Seattle, USA	20th	21-23 June	Seattle, USA	21st	21-23 June	Seattle, USA
	19th	21-23 Sept	Seattle, USA	21st	20-22 Sept	Seattle, USA	22nd	20-22 Sept	Seattle, USA
Work Meeting (WM)	--	15-16 Sept	Bellingham, USA	--	14-15 Sept	Bellingham, USA	--	14-15 Sept	Bellingham, USA
Interim Meeting (IM)	**97th**	**30 Nov-1 Dec**	**Seattle, USA**	**98th**	**29-30 Nov**	**Seattle, USA**	**99th**	**29-30 Nov**	**Seattle, USA**

IPHC Contracting Party Report: Canada

DATE: 23/DEC/2020

CONTRACTING PARTY: CANADA

AGENCY:

Fisheries and Oceans Canada

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Maureen Finn, Halibut Coordinator, Maureen.Finn@dfo-mpo.gc.ca

Province of British Columbia, Minister of Agriculture

Mike Turner, Senior Manager, Intergovernmental Relations, Fisheries, and Aquaculture, Michael.R.Turner@gov.bc.ca

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FISHERY SECTOR/S

All

IPHC REGULATORY AREA/S

IPHC Regulatory Area 2B (Canada: British Columbia)

DISCUSSION

Each year Fisheries and Oceans Canada provides harvest opportunities to First Nations for food, social and ceremonial (FSC) purposes (or domestic purposes for First Nations with modern treaties), and the commercial and recreational fisheries. First Nations, recreational, and commercial fisheries on the Pacific coast of Canada have long harvested groundfish. Groundfish serve as a source of food, they provide jobs, income, and enjoyment for individuals, businesses, and coastal communities and they play key roles in natural ecosystems.

The B.C. Ministry of Agriculture is responsible for collection and reporting of data and statistics for the agri-food sector. An important part of that mandate is to analyze the impact of various sectors, including fisheries and seafood to the broader provincial economy. B.C. commercially harvests and reports on over 25 wild fisheries including Pacific halibut which is within B.C.'s top most valuable wild fishery commodities.

Indigenous fisheries

In the 1990 Sparrow decision, the Supreme Court of Canada found that where an Indigenous group has an Indigenous right to fish for food, social, and ceremonial (FSC) purposes, it takes priority, after conservation, over other uses of the resource. Fisheries are authorized via a Communal Licence issued by the Department under the Aboriginal Communal Fishing Licences Regulations.

Commercial fisheries

There are seven distinct commercial groundfish sectors: Groundfish trawl, Halibut, Sablefish, Inside Rockfish, Outside Rockfish, Lingcod, and Dogfish fisheries that are managed according to the measures set out in the Integrated Fisheries Management Plan (IFMP). The management of these sector groups is integrated, with all groups subject to 100% at-sea monitoring and 100% dockside monitoring, individual vessel accountability for all catch (both retained and released), individual transferable quotas (ITQ), and reallocation of these quotas between vessels and fisheries to cover catch of non-directed species. There are approximately 308 active commercial groundfish vessels. Information on licensed vessels is available online at the DFO website: http://www.pac.dfo-mpo.gc.ca/fm-gp/licence-permis/index-eng.htm.

The 2020 commercial fishery is described in appendix 1 of this report, "Fisheries and Oceans Canada 2019 IPHC Annual Report," and appendix 3 of this report, "Halibut Compliance and Enforcement."

Recreational fisheries

A recreational fishery may occur where authorized by a valid Tidal Waters Sport Fishing licence, which is required for the recreational harvest of all species of fish. Approximately 300,000 Tidal Waters Sport Fishing licences are sold each year. Tidal Waters Sport Fishing Licences can be purchased online by using the DFO website:
http://www.pac.dfo-mpo.gc.ca/fm-gp/rec/licence-permis/application-eng.html

The 2020 recreational fishery is described in appendix 2 of this report, "2020 Canadian Recreational Fishery Halibut Catch Report," and appendix 3 of this report, "Halibut Compliance and Enforcement."

Recommendations

That the Commission:

1) **NOTE** paper IPHC-2021-AM097-NR01 which provides the Commission with a summary from Fisheries and Oceans Canada of Pacific halibut fisheries in IPHC Regulatory Area 2B.

References

Integrated Fisheries Management Plan for Groundfish, effective February 21, 2020. https://waves-vagues.dfo-mpo.gc.ca/Library/4088529x.pdf

Appendices

Appendix 1: Fisheries and Oceans Canada 2020 Fishery Overview Report
Appendix 2: Fisheries and Oceans Canada 2020 Recreational Fishery Report
Appendix 3: Fisheries and Oceans Canada 2020 Enforcement Report
Appendix 4: Province of British Columbia 2020 Annual Report

APPENDIX 1

Fisheries and Oceans Canada 2020 Fishery Overview Report

PREPARED BY: Fisheries and Oceans Canada (23 Dec 2020)

DATE: 23/Dec/2020

CONTRACTING PARTY: CANADA

AGENCY:

Fisheries and Oceans Canada

CONTACT:

Maureen Finn, Halibut Coordinator, Maureen.Finn@dfo-mpo.gc.ca

FISHERY SECTOR/S:

All

IPHC REGULATORY AREA:

IPHC Regulatory Area 2B (Canada: British Columbia)

Discussion

Catch Limits

Fisheries and Oceans Canada follows an allocation policy that defines access to the Pacific Halibut Canadian Total Allowable Catch (CTAC) for Canadian commercial, recreational, and food, social, and ceremonial (FSC) fisheries. For 2020, the CTAC was 6,410,000 net pounds (fresh, head-off, dressed weight). The CTAC is composed of the catch limit for regulatory area 2B and an allocation for FSC. In addition to the CTAC, a carryover of quota from previous seasons is allocated to some licences.

Priority access is provided to the CTAC for FSC purposes, while commercial and recreational access is divided between the sectors 85% / 15% respectively. The 2020 Commercial and Recreational catch limit for allocation purposes was 6,185,000 net pounds. The net commercial carryover from 2019 to 2020 was 46,623 net pounds. The resulting TAC for commercial and recreational harvest in 2020 was 5,961,086 net pounds.

Commercial and Recreational Fishery Summaries

For allocation purposes, the commercial / recreational total allowable catch (TAC) is equal to the Canadian catch limit, plus "O26" wastage mortality. The TAC is then allocated between the commercial and recreational sectors, and the "O26" wastage mortality is removed from the commercial and recreational TACs (Table 1). The combined commercial and recreational TAC, including carryover adjustments, for 2020 was 5,961,086 net pounds. As of December 20, 2020, the combined commercial and recreational halibut catch (including landed catch and mortality associated with all released fish in the commercial groundfish fisheries) was 5,243,860 net pounds.

Commercial Fishery Summary

The 2020 Canadian commercial Halibut TAC, including the catch limit allocation and carryover, was 5,083,336 net pounds. Halibut may be caught and retained by all commercial hook and line, and trap groundfish fisheries in Canada. This includes category L, K, ZN, and Schedule II licences.

In 2020, the Canadian commercial Halibut catch totalled 4,727,509 net pounds (Table 2). This catch, reported by all hook and line/trap groundfish fisheries in area 2B, includes both landed and released at-sea mortality. Given that non-halibut groundfish fisheries continue throughout the Halibut winter closure, additional released at-sea mortality will continue to be attributed to the 2020 Halibut catch until February 20, 2020, after which released at-sea mortality will be attributed to the 2021 TAC. As such the 2020 commercial catch is current as of December 20, 2020.

Commercial Integrated Management Plan

First introduced as a pilot program in 2006, the Commercial Groundfish Integration Program (CGIP) was made permanent in January 2010 to manage groundfish fisheries, including Pacific Halibut, in British Columbia. The objectives of the CGIP are to improve and maintain groundfish harvest sustainability and management through improved catch monitoring and catch accountability. The CGIP implemented individual vessel accountability for all catch, both retained and released, via individual transferable quotas which may be reallocated between licences and fisheries to cover non-directed catch. In addition these management tools are supported by 100% at-sea monitoring and 100% dockside monitoring for all groundfish vessels.

Notable management changes for the 2020 season include:

- The ongoing rebuilding measures for Yelloweye Rockfish and Bocaccio Rockfish in all commercial groundfish fisheries
- Due to Departmental capacity issues resulting from the COVID-19 pandemic, the 2020 Experimental Recreational Halibut fishery (XRQ fishery) remained closed. Any 2019 licence holders who are subsequently licensed to participate in the 2021 fishery (if/when opened) will have access to their 2019 carryover quota.
- As a result of COVID-19 impacts to the Canadian Halibut fishery, the Canadian (2B) commercial Halibut fishing season was extended by three weeks, to close on December 7th,

2020. This regulatory change was discussed and approved at the 8th Special Session (SS08) of the IPHC held virtually on the 17th of September, 2020.

- A seasonal (Nov 1st, 2020 – April 30th, 2021) extension to the existing pilot bottom trawl closure was implemented at a fishing location in the Queen Charlotte Sound known as the Circle Tow by the groundfish trawl fleet and the 800 Line by the Halibut fleet. This expanded seasonal closure is an interim management measure that is intended to limit harvest of spawning aggregations of Arrowtooth Flounder and Halibut. The year-round pilot bottom trawl closure that was implemented in March 2019 continues to be in effect. This expanded seasonal closure is intended for the short term and will be re-evaluated during the 2021/2022 fishing season. DFO would like to thank all those involved for their cooperation in finalizing this agreement. More information can be found at: https://notices.dfo-mpo.gc.ca/fns-sap/index-eng.cfm?pg=view_notice&DOC_ID=239138&ID=all

The 2021/2022 commercial groundfish fishing season will commence February 21, 2021, at which time the renewed Groundfish Integrated Fisheries Management Plan (IFMP) will be available. All commercial groundfish management measures are detailed in the IFMP, which can be requested once available at: http://www.pac.dfo-mpo.gc.ca/fm-gp/ifmp-eng.html#Groundfish

Recreational Fishery Summary

There are usually two opportunities for recreational halibut fishing in area 2B, the recreational fishery, and the Experimental Recreational Halibut fishery pilot program (XRQ fishery). The 2020 recreational Halibut TAC was 877,750 net pounds. However, the 2020 XRQ fishery was closed, due to COVID related Departmental capacity issues. The estimated 2020 Canadian recreational Halibut catch totalled 516,351 net pounds. The estimation methods of the recreational catch are outlined in *2020 Canadian Recreational Fishery Halibut Catch Report*. Management measures for the 2020 recreational fishery are summarised in the Area 2B Recreational Fishery Halibut Catch Report.

Halibut Experimental Recreational Fishery Program

The Experimental Recreational Halibut fishery pilot program allows individual anglers as well as guides, charters, lodges, marinas and other fishing experience providers to lease Halibut quota and subsequently retain Halibut that is in excess of the regular recreational fisheries daily and possession limits, and maximum size limits. When open, an XRQ licence holder is usually permitted to fish for and retain Halibut from April 1 – December 31, even if the traditional recreational fishery is closed prior to December 31. Participants in the XRQ fishery must complete logbooks and submit them electronically within seven days of retaining a Halibut.

The XRQ fishery has operated as a pilot program since 2011, but was closed for the entirety of the 2020 season due to COVID capacity issues within the Department. A regulatory process is underway to create a category of annual sport fishing licence in s.17 of the *British Columbia Sport Fishing Regulations, 1996*. Public consultations about the regulatory changed were held throughout 2012/2013, and a Regulatory Impact Assessment Statement that summarizes feedback from the public meetings on the experimental licence and regulatory change has been presented to the Minister. A regulatory intent document will be presented for additional public comment prior to the proposed regulatory changes being posted in Canada Gazette 1.

Given the XRQ fishery was closed this year, no quota has been reallocated from commercial groundfish fisheries. The 2021 XRQ fishery (if/when opened) will carry over a maximum 7,299 net pounds of uncaught quota from the 2019 season – should eligible licenses be re-issued.

Additional details about the XRQ program are available online: http://www.pac.dfo-mpo.gc.ca/fm-gp/commercial/ground-fond/index-eng.html

Canadian Aquaculture Research

There were no halibut aquaculture research or production activities in area 2B for 2020.

Food, Social and Ceremonial and Treaty Fishery

The estimated Food, Social, and Ceremonial (FSC) halibut catch in area 2B is 405,000 pounds. Since 2009, new conditions have been applied to commercial Halibut licences and many communal halibut permits, to improve catch reporting of FSC caught fish on commercial trips. Of the total FSC halibut caught in 2020, approximately 42,872 net pounds were caught in conjunction with commercial fishing trips and were subject to all commercial monitoring requirements, including 100% at-sea and 100% dockside monitoring. In addition, First Nations engaging in fishing only for FSC used tools such as catch calendars, some dockside monitoring and phone surveys to estimate their catch. Fisheries and Oceans Canada continues to work with First Nations to improve catch reporting within the FSC fisheries.

In April 2011 the Maa-nulth Final Agreement came into effect. The agreement allocates 26,000 pounds of FSC Halibut (part of the 405,000 pounds described above) plus 0.39% of the total CTAC to the Maa-nulth First Nations for FSC purposes (equivalent to 50,999 pounds in 2020). In 2011 DFO mitigated for the additional treaty allocation through acquisition of 0.47% of the commercial TAC which is set aside for the Maa-nulth First Nation on an annual basis (identified as part of the "net reallocations into/out of the commercial fishery" in Table 1).

RECOMMENDATIONS: NA

REFERENCES: See hyperlinks above

Appendices

Tables

Table 1. Halibut allocations in 2B as of December 20, 2020. All values in net pounds.

Commercial / recreational TAC for allocation		6,185,000
Commercial allocation	x 85%	
O26 wastage	- 130,000	
2019 Underages [A]	+ 104,770	
2019 Overages [B]	- 58,315	
Net carryover	+ 46,455	
Net reallocations into/out of the commercial fishery [C]	+ 12,828	
Commercial TAC		5,083,336

Recreational allocation	x 15 %	
O26 wastage	- 50,000	
Recreational TAC		877,750

2B commercial and recreational TAC	5,961,086
2B commercial and recreational catch [D]	5,243,860

A Underage. Unfished quota equaling 10% or less of a commercial licence's individual transferable quota is carried over into the following year.

B Overage. All catch that exceeds the available quota on an individual commercial licence at the end of a given fishing season is deducted from the individual commercial licence the following season.

C Net reallocations include quota reallocated from the commercial halibut sector to Maa-nulth First Nations Treaty, the Pacific Integrated Commercial Fisheries Initiative (PICFI), and Allocation Transfer Program (ATP), as well as the Halibut Experimental Recreational Fishery pilot program.

D Catch includes all landed fish, as well as the mortality associated with legal-sized released fish in the commercial fishery.

Table 2. Halibut for 2B commercial groundfish fisheries as of December 20, 2020. All values in net pounds.

Commercial TAC	5,083,336
Total Commercial Catch	4,727,509

Table 3. Halibut for 2B recreational and the Halibut Experimental Recreational pilot program (XRQ) fisheries as of December 20, 2020. All values in net pounds.

Recreational TAC	877,750
Recreational catch [E]	516,351

E Landed recreational catch to October 31, 2020.

APPENDIX 2

Fisheries and Oceans Canada 2020Recreational Fishery Report

PREPARED BY: Fisheries and Oceans Canada (20December2020)

DATE: 20/DEC/2020

CONTRACTING PARTY: CANADA

AGENCY:

Fisheries and Oceans Canada

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FISHERY SECTOR/S:

Recreational

IPHC REGULATORY AREA:

IPHC Regulatory Area 2B (Canada: British Columbia)

DISCUSSION

Table of Contents

1. Overview

This report summarizes the 2020 harvest and biological data from the Canadian recreational Halibut fishery in the tidal waters of British Columbia (BC). The recreational total allowable catch for 2020 was 877,750 pounds[1] and the estimated harvest is 516,351 pounds (361,399 pound underage). The estimated harvest by pieces is 36,384 pieces.

The 2020 season opened on March 1 and closed on December 31. Traditional monitoring and reporting programs, such as logbooks, lodge manifests and recreational creel surveys, collected catch, effort and biological data during peak months and areas of the fishery. 2020 recreational catch is approximately 63% of last year – despite a similar recreational TAC and a carryover of the 2019 recreational management measures into the 2020 season. COVID related restrictions on travel and border closures led to many lodges and guided fishing operations shutting down either prior to or during the fishing season. This led to a significant reduction or complete loss of effort and catch from this component of the sector. Estimates of catch in months and areas not monitored by traditional programs were generated from data collected during DFO's internet-based recreational survey (iREC). Initiated in 2012, the iREC survey collects catch and effort information from recreational licence holders on a monthly basis throughout the recreational fishing year[2].

Final estimates are anticipated to be available by the spring of 2021. Estimated harvest in pieces and net weight by regional areas are noted below.

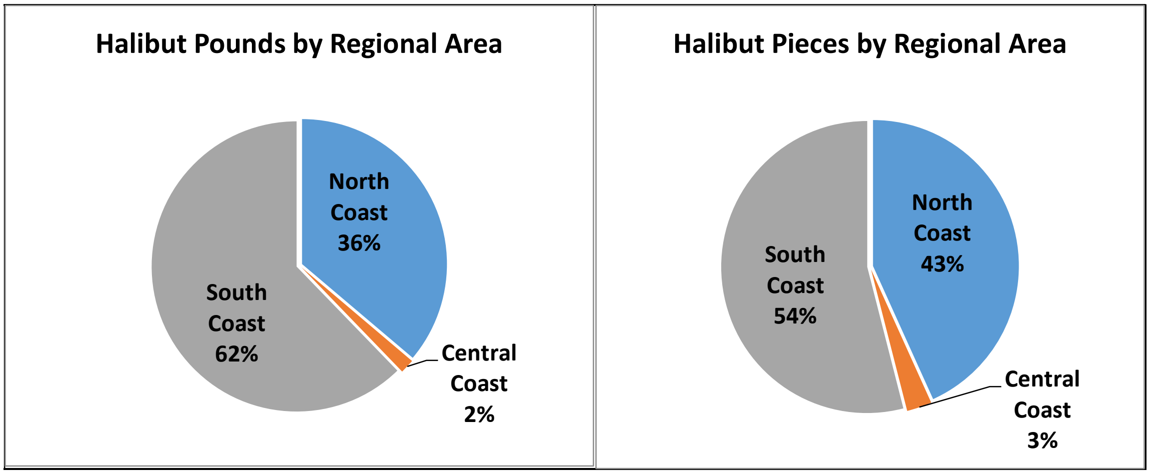
1.1. Harvest

Table 1. Estimated Harvest in Pieces and Pounds by Regional Area

Area	Pieces	Pounds
North Coast	15,731	186,734
Central Coast	1,003	8,179
South Coast	19,650	321,438
Totals	**36,384**	**516,351**

[1] Pounds in this document refer to net weight (head off, dressed) pounds. See Biological Sampling section for the equations used to convert round weight (head on, undressed) and fork length to net weight.
[2] For more information on the Internet Recreational Effort and Catch (iREC) Survey please visit the following internet site; http://www.dfo-mpo.gc.ca/csas-sccs/publications/sar-as/2015/2015_059-eng.html.

Figure 1. Percentage of Halibut harvested by piece and weight by Regional Area



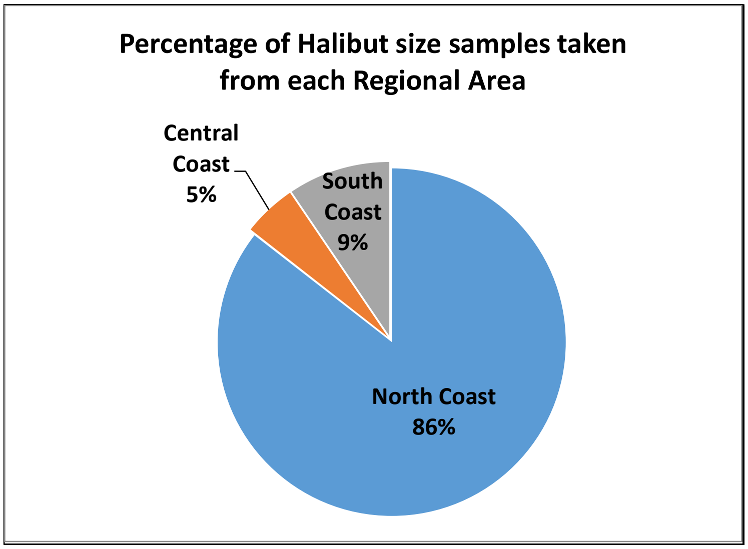
1.2. Biological Samples

A coast wide total of 12,115 halibut were biologically sampled for either length or weight in 2020, representing 33% of the estimated harvest. The number of biological samples collected by regional areas is noted below.

Table 2. Number of Halibut Biologically Sampled by Regional Area

Area	Samples
North Coast	10,365
Central Coast	601
South Coast	1,149
Totals	**12,115**

Figure 2. Percentage of Halibut size samples taken from each regional area.



1.3. Fishery Logistics

Catch monitoring of the recreational fishery in BC is extremely challenging given the large geographic area (numerous remote areas), the diversity of fishing opportunities and the diversity of participants.

Starting in 2015, Tidal Waters Sport Fishing Licences included Conditions of Licence that make catch reporting mandatory. Specifically, the conditions state that "*The licence holder shall provide accurate information regarding their catch and fishing activities upon request of a Creel Surveyor or an on-line surveyor, authorities designated under s.61(5) of the Fisheries Act".* Conditions of Licence also included regulations related to possession limits, size limits and an annual limit.

In response to the IPHC's 2012 request for data collection programs on recreational discards, Fisheries and Oceans Canada reviewed its existing recreational halibut catch and release information and examined options for the estimation of release mortalities. DFO obtains information from anglers on the number of halibut releases through creel surveys, logbooks and internet surveys. In BC, anglers are not required to keep any records of released Halibut. Fishers are not required to record sizes of released Halibut in part because such a practice may increase release mortality and present challenges in terms of angler safety, and provide data of variable quality.. Size limits and angler preference are some reasons why released halibut may be a different average size compared to the average size of retained fish. Given these various limitations of the information available, DFO does not currently use recreational release data for the purposes of recreational halibut management or allocation decisions.

Starting this year, DFO began using IPHC's estimate of Area 2B recreational release mortality. This resulted in a 2020 estimate of 50,000 lbs of release mortality. This discard mortality is accounted for before the 2B recreational catch limit is established and thus is not included in the calculation of catch relative to the recreational catch limit described elsewhere in this report.

DFO continues to work with the recreational fishery sector in BC to improve recreational fishery monitoring and catch reporting. While the focus remains on strengthening data collection and monitoring for retained catch in recreational fisheries, new reporting tools such as the iREC survey of recreational harvesters include questions about anglers' releases. As the survey continues to be refined and improved, DFO will be exploring how the data gathered on releases may be used to inform management.

2. MANAGEMENT, MONITORING and POLICY DEVELOPMENT

2.1. 2020 Recreational Fishery Management Plan

The current domestic sharing arrangement between commercial and recreational fisheries is 85% of the resource allocated to the commercial sector and 15% to the recreational sector, after accounting for First Nations' Food, Social, and Ceremonial requirements. The 15% recreational share in 2020 equates to a total allowable catch of 877,750 pounds.

The recreational halibut fishery opened on March 1, 2020. The fishery operated under the 2019 recreational licence until March 31. On April 1, the 2020 licence and management measures entered into effect. The 2020 measures were the same as in 2019 and included:

- A maximum length of 126cm (approx. 49inches) head-on length
- A possession limit is either of:
    - one (1) Halibut measuring from 90-126cm head-on length, OR;
    - two (2) Halibut measuring under 90cm head on length
    - NOTE: if in possession of one (1) Halibut 90cm head-on length or longer, you shall not possess any other Halibut
- An annual limit of six (6) in aggregate, from April 1, 2020 to March 31, 2021
- All halibut retained must be recorded on the Tidal Waters Licence plus the date and area from which each halibut is caught and its length
- A mandatory Condition of Licence to report catch when surveyed.

The opening was for all Pacific Fishery Management Areas (PFMAs) with the exception of portions of Area 121. Anglers were not permitted to fish for nor retain halibut in Area 121 outside the twelve nautical mile limit and in the waters of Swiftsure Bank.

The DFO and Sport Fishing Advisory Board (SFAB) Halibut Committee meets monthly throughout the fishing season to review estimated catches. During the summer of 2020, DFO, in consultation with SFAB, proceeded with a change to the daily limit of Halibut measuring under 90cm in length – varying the daily limit from 1 daily to 2 daily. The change was implemented after catch estimates and season forecasts demonstrated that the recreational fishery was highly unlikely to catch their allocated TAC by the end of the year. By the end of October, it was determined that the estimated harvest to date plus the forecasted catch to December 31 would likely not exceed the 877,750 pound Total Allowable Catch. The fishery will remain open until December 31, 2020.

Due to the Covid-19 pandemic, the issuance of B.C Tidal Waters Sports Fishing Licences (TWSFL) to Non-Residents was not permitted for the entirety of 2020 due to border closures. The fishery was only open to residents of Canada.

For 2021, the SFAB is considering various management options they may recommend to DFO in light of existing and continuing impacts from the Covid-19 pandemic. These options may include considering changes to:

- Minimum and Maximum size limits
- Individual annual limits
- Daily and total possession limits
- Season length
- Time and area closures

2.2. Halibut Experimental Recreational Fishery Program

In 2011, the Department piloted an experimental fishery program where interested recreational stakeholders, such as individual recreational harvesters, lodges, charters, guides or marinas, could request an experimental licence that would allow them to lease quota from commercial harvesters through a market based transfer mechanism. The experimental licence permits licence holders to fish halibut beyond the limits and times of the regular recreational licence.

In 2012, the Minister of Fisheries and Oceans Canada confirmed that the experimental licence would continue to be available and announced the Department was moving forward with a regulatory proposal to continue the experimental fishery for the long term.

Due to ongoing impacts of the Covid-19 pandemic, the 2020 experimental fishery did not occur.

3. RECREATIONAL CATCH MONITORING and REPORTING PROGRAMS

3.1. Background

Marine creel surveys in BC began in 1980. Originally developed to estimate the catch of chinook and coho salmon in the Strait of Georgia, the geographical scope expanded to include Barkley Sound and Alberni Inlet in 1984, the entire West Coast of Vancouver Island (WCVI) in 1991, Haida Gwaii and the rest of the North Coast in 1995, and most recently Johnstone Strait in 1998. The objectives of the creel survey have been expanded to include estimates for most recreationally caught finfish, including halibut. Lodges operating along the coast provide census data to the Department through the logbook program, manifest data or the electronic log (elog) pilot program. The Department also receives data from some independent guides and avid anglers via logbook programs. These data are combined with the creel survey data to produce estimates of catch for each PFMA by month where traditional monitoring and reporting programs exist.

To address monitoring gaps in the recreational fishery the Department has been using and enhancing an online survey since 2012. The Internet Recreational Effort and Catch (iREC) survey was peer reviewed by the Canadian Scientific Advisory Secretariat (CSAS) in 2015. The iREC survey was developed to provide catch and effort estimates for all areas, months, fishing methods, and species harvested by the recreational sector. To minimize the effect of potential biases in iREC survey estimates, a calibration procedure was developed to relate iREC survey estimates and creel survey estimates in areas and times not covered by a creel survey.

3.2. 2020 Recreational Fishery Catch Monitoring

DFO has been working with the Sport Fishing Advisory Board on an implementation plan to strengthen recreational fishery monitoring and catch reporting in the Pacific Region. For the 2020 recreational halibut fishery, DFO used estimates from three sources; the iREC survey, logbook and lodge manifest program, and creel surveys.

As in previous years, traditional monitoring and catch reporting programs such as logbook, lodge manifest and the creel survey were used during peak months and areas of the recreational fishery. In areas and months where traditional programs were not implemented in 2020, DFO used in-season iREC survey catch estimates.

In 2020, recreational catch monitoring programs were hampered early in the season due to the Covid-19 pandemic. Restrictions on travel and the non-issuance of Non-Resident TWSFL led to many lodges and guided fishing operations shutting down either prior to or during the fishing season. This led to a significant reduction or complete loss of effort and catch from this component of the sector and therefore led to a significant reduction in the quantity of associated catch monitoring data. Creel interviews that typically start in April or May were delayed till mid-June in some areas. Unspent funds from May and June were used to add in some additional surveys in September and October. Peak fishing times and areas in July and August were well covered with specific emphasis on halibut and chinook fishing activities. Areas not covered by early season creel estimates used calibrated iREC estimates.

3.3. Haida Gwaii

Haida Gwaii recreational monitoring and reporting programs include a lodge logbook program and a creel survey. Lodge logbook data accounts for approximately 85% of the estimated halibut catch in Areas 1 and 2. Due to Covid-19 pandemic restrictions on travel, most of the lodges in Haida Gwaii did not operate in 2020. One lodge briefly opened but was soon shut down when Provincial Health Orders for Covid-19 were strengthened. Effort in this area was significantly reduced this year leading to lower halibut catches than anticipated pre-season.

The Haida Gwaii Creel Survey (HGCS) typically estimates recreational catch from Areas 1 and 2 surrounding Haida Gwaii. Since 1995, the program has conducted creel surveys to estimate catch from recreational anglers in Masset Inlet, Naden Harbour, Langara Island, Skidegate Channel, Cartwright Sound and Rennell Sound. Fish caught in Haida Gwaii by recreational harvesters are also subject to random audits by the Haida Watchmen (Guardians) through the HGCS, which operates in the main fishing months in Area 1 and parts of Area 2.

Information collected from the creel survey is combined with data submitted through the lodge logbook program to generate total catch estimates for Areas 1 and 2. In 2020, 1,263 halibut were sampled for either length or weight.

3.4. North Coast Creel Survey

The North Coast Creel Survey program collects catch information from the recreational fishery surrounding Prince Rupert and Port Edward on the North Coast of B.C. It is focused in Areas 3 and 4, comprising the waters of Chatham Sound between the mouths of the Nass and Skeena Rivers. Chatham Sound is bordered by the Alaska/BC border to the north, Dundas and Stephens Island groups to the west and Porcher Island to the south, covering an area of approximately 4,200 km^2. This area has many lodges and guided fishing operations that were directly impacted by the Covid-19 pandemic with many lodges closing for the season.

The North Coast Creel Survey program has a hybrid design with four components: an access point angler interview survey, an aerial effort count survey, a trailer census and a fishing lodge logbook program. The study design is similar to the one used in the South Coast Creel Survey.

Access point angler interview surveys collect catch information, angling activity times and biological samples of selected species from anglers at the completion of the fishing trip. The data is used to calculate species specific Catch per Unit Effort (CPUE) values and create angler activity profiles. Aerial surveys are conducted to capture the 'instantaneous' counts of the number of boats fishing at the time of the flight and are expanded using the angler effort profiles generated from the ground surveys to produce an estimate of total daily effort. Lodges in the area submit logbooks to DFO post-season. Lodge data is treated as a complete census of catch, is summed and added to the creel estimates to get an estimate of total catch. To prevent bias in the effort estimates from lodge boats counted during the aerial surveys, a temporal-spatial analysis is conducted of lodge logbook data for days when the overflight occurs and any boats that were fishing in the survey area during the time of the flight are removed from the final count of boats fishing in the area.

In 2020, 9,102 halibut were sampled for either length or weight.

3.5. Central Coast

Catch information in Areas 7, 8 and 9 on the Central Coast is primarily collected from lodges and some charter operators operating in these areas, primarily through the logbook program. As with most areas of the coast, the Central Coast was also significantly impacted by the Covid-19 pandemic with many lodges and guided fishing operations shut down. Most lodges that were still in operation participated in the logbook program and collected catch, effort and biological data that were submitted to the Department on a monthly basis. There is no creel program to estimate the number of halibut caught by independent anglers or guides in these areas due to challenges with implementing a survey in this remote and geographically dispersed fishery.

In 2020, 601 biological samples were reported.

3.6. South Coast Creel Survey

As mentioned above, creel surveys in the southern waters of BC were hampered early in the season by the Covid-19 pandemic but were fully operational by peak recreational fishing periods in mid-June to Sept. Creel interviews that typically start in April or May were delayed till mid-June. Creel surveys continue to be the main tool to estimate catch of halibut in this area. Surveys are conducted in select fishery strata based on: the highest catch of halibut and chinook, the highest effort, in-season management requirements, and potential impact on stocks of concern. Creel surveys consist of effort surveys and estimation of catch per boat trip based on fishery observers at selected ramps and marinas.

Data collected during angler interviews are recorded in the South Coast Marine Creel Survey form and provide average catch per unit effort by species and fishing times, while aerial counts from chartered aircraft capture ‘instantaneous’ counts of the number of recreational boats fishing on randomly selected dates. Fishing times obtained from angler interviews are used to generate daily fishing activity profiles which are used to expand the ‘instantaneous’ aerial counts to estimate the number of boats fishing each day. The estimate of boats fishing is multiplied by the average catch to estimate the total number of halibut caught each day. Estimates are generated monthly, or occasionally for two week periods where samples rates are high. The estimates are stratified by weekend and holidays vs. weekday dates. In addition, logbook catch data submitted by remote fishing lodges, independent guides and expert anglers are incorporated into creel estimates post season. The survey in Kyuquot Sound (PFMA's 26, 126) is entirely logbook-based, as fishing from lodges represents essentially all recreational effort in this remote area; in 2018 estimates were improved through use of iREC survey information on the proportion of guided to unguided trips.

Catch and effort is estimated by creel sub-area and rolled up to DFO PFMAs by month. South Coast waters include PFMAs 11 through 29. The Port Hardy survey also collects information from recreational fishing trips in Area 10. Creel surveys are active during the peak season of recreational angling and vary in duration depending on location. The spatial and temporal coverage of the survey program can vary year to year in response to budget and fishery priorities.

For further details on the methodology and results of the South Coast Creel survey, including catch and effort estimates with level of uncertainty, please visit:
http://www-ops2.pac.dfo-mpo.gc.ca/xnet/content/salmon/sc%20stad/bulletins.htm

In 2020, 1,149 halibut were sampled for length or weights during the South Coast Creel survey interviews.

3.7. Biological Sampling

A total of 12,115 halibut were sampled for lengths or weights, representing 33% of the total estimated coastwide harvest. Samples were collected from lodges, guides and independent anglers interviewed at access points and converted to net weight, head off and dressed, using the following formulas developed by the IPHC:

Round Weight = Fork Length (cm)$^{3.24}$ X (6.921 X 10^{-6})
Net Weight = Round Weight X 0.75

Average net weights were calculated for each Area on a monthly basis to generate estimates of total net weight by month and area caught in the fishery.

4. APPENDICES

The following tables provide detailed catch and biological information collected during the 2020 recreational halibut fishery in BC. Note: these figures are preliminary and subject to change.

Table 5. Summary of the 2020 Recreational Halibut Catch by Pacific Fishery Management Area (PFMA)

Regional Area	PFMA	Est. Piece Count	Est. Total Net Wt. (lbs)
North Coast	1	1,578	15,033
	2	387	5,365
	3	3,576	52,861
	4	8,416	93,800
	5/6	1,774	19,675
Central Coast	7/8/9	1,003	8,179
South Coast	10/11	798	10,535
	12	1,578	15,173
	13/14	82	1,204
	15-18/28/29	960	11,699
	19	1,097	21,388
	20	856	15,441
	21/121	4,404	81,593
	23/123	5,088	82,437
	24/124	1,049	23,610
	25/125	966	15,010
	26/126	1,145	17,196
	27/127	1,625	26,153
Total Landed in Canada		36,384	516,351
Recreational TAC			877,750
Estimated Balance - END OF OCTOBER			361,399

Table 6. Recreational Halibut Monthly Catch Estimates (net wt. lbs) for 2018, 2019 and 2020

	Net Weight (lbs)			Cumulative Net Weight (lbs)		
	2018	**2019**	**2020**	**2018**	**2019**	**2020**
Feb	0	0	0	0	0	0
March	16,029	8,172	3,814	16,029	8,172	3,814
April	15,715	10,259	7,111	31,744	18,432	10,926
May	58,494	40,988	26,356	90,239	59,420	37,282
June	176,370	152,282	74,348	266,608	211,702	111,630
July	296,745	336,520	182,655	563,354	548,221	294,284
Aug	237,880	207,866	148,413	801,234	756,088	442,697
Sept	25,484	53,956	69,419	826,718	810,044	512,116
Oct	14,053	834	4,236	840,771	810,878	516,351
Nov	3,866	0	0	844,638	810,878	516,351
Dec	3,406	5,761	0	848,044	816,639	516,351
Total	848,044	816,639	516,351	848,044	816,639	516,351
					Recreational TAC	877,750
					Estimated Total Catch	516,351
					Estimated Balance - END OF OCTOBER	361,399

Table 7. Estimated 2020 Halibut Catch in Pieces by Area and Month

2020 i-Rec data	Fishery Closed	Summary of 2020 In-season Recreational Halibut Catch Estimated Halibut Pieces Retained by Area and Month												
Data Pending	2020 Catch Monitoring Program ('creel') Data	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Estimated Total Pieces by Area	% of Total Pieces by Area
PFMA	1	0	0	0	54	78	1317	51	78	0			1,578	4%
	2	0	0	20	17	220	108	17	5	0			387	1%
	3	0	0	16	207	749	1373	906	325	0			3,576	10%
	4	0	10	38	660	1595	2825	2537	743	8			8,416	23%
	5/6	0	0	40	108	196	622	643	145	20			1,774	5%
	7	0	0	0	5	11	13	21	9	35			94	0%
	8	0	0	10	47	19	60	165	52	0			352	1%
	9	0	0	0	0	54	212	258	33	0			557	2%
	10/11	0	0	0	52	210	373	160	3	0			798	2%
	12	0	86	56	64	65	321	793	177	17			1,578	4%
	13/14	0	0	0	12	18	25	23	5	0			82	0%
	15-18/28/29	0	0	0	31	89	75	444	322	0			960	3%
	19	0	43	98	299	19	290	134	209	5			1,097	3%
	20	0	86	30	46	185	167	177	150	16			856	2%
	21/121	0	0	0	6	793	1854	1436	187	129			4,404	12%
	23/123	0	0	40	82	495	1236	2268	964	3			5,088	14%
	24/124	0	20	60	11	143	174	276	340	25			1,049	3%
	25/125	0	0	20	64	60	494	105	223	0			966	3%
	26/126	0	0	0	0	65	623	424	33	0			1,145	3%
	27/127	0	0	20	50	151	400	476	528	0			1,625	4%
2020 Totals	Monthly	0	244	446	1,816	5,215	12,561	11,313	4,531	257	0	0	36,384	
	Cum.	0	244	691	2,506	7,722	20,283	31,596	36,127	36,384	36,384	36,384		

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Table 8: Average 2020 Net Weight Estimates of Retained Halibut by Area and Month

PFMA	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
1	9	9	9	9	8	9	10	13	11	11	11
2	14	14	14	14	14	14	14	14	14	14	14
3	14	14	14	14	11	18	13	15	15	15	15
4	12	12	12	14	11	12	10	11	11	11	11
5/6	11	11	11	11	11	11	12	11	11	11	11
7	11	11	11	11	12	9	8	9	9	9	9
8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	8	9	10	7	8	7	8	8	8
10/11	12	12	12	12	12	13	17	15	15	15	15
12	10	10	10	10	10	11	9	10	10	10	10
13/14	18	18	15	19	11	16	14	15	15	15	15
15-18/28/29	13	13	13	13	13	12	12	12	12	12	12
19	19	19	19	19	18	21	19	18	18	18	18
20	18	18	18	18	18	18	18	18	18	18	18
21/121	19	19	19	19	22	16	19	19	19	19	19
23/123	17	17	17	17	17	21	12	18	15	15	15
24/124	23	23	23	23	23	22	24	21	22	22	22
25/125	15	15	15	15	13	16	15	15	15	15	15
26/126	15	15	15	15	15	15	16	15	15	15	15
27/127	15	15	15	15	17	13	19	16	16	16	16

Table 9. Estimated 2020 Halibut Catch in Net Weight (lbs) by Area and Month

PFMA		Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Total
1		0	0	0	470	617	12,465	497	984	0	0	0	15,033
2		0	0	275	242	3,018	1,523	236	70	0	0	0	5,365
3		0	0	226	2,991	8,314	24,439	11,869	5,022	0	0	0	52,861
4		0	119	470	9,108	17,705	34,183	24,102	8,029	85	0	0	93,800
5/6		0	0	431	1,170	2,114	6,719	7,462	1,565	214	0	0	19,675
7/8/9		0	0	82	440	771	2,135	3,684	763	304	0	0	8,179
10/11		0	0	0	633	2,435	4,753	2,670	43	0	0	0	10,535
12		0	844	546	625	638	3,374	7,242	1,736	168	0	0	15,173
13/14		0	0	0	221	193	402	313	75	0	0	0	1,204
15-18/28/29		0	0	0	407	1,160	933	5,280	3,919	0	0	0	11,699
19		0	831	1,897	5,785	335	6,102	2,480	3,862	96	0	0	21,388
20		0	1,558	543	835	3,356	3,030	3,211	2,630	278	0	0	15,441
21/121		0	0	0	106	17,738	29,988	27,674	3,604	2,482	0	0	81,593
23/123		0	0	672	1,386	8,346	26,486	27,799	17,706	42	0	0	82,437
24/124		0	463	1,381	254	3,307	3,905	6,548	7,185	566	0	0	23,610
25/125		0	0	297	957	804	8,075	1,562	3,316	0	0	0	15,010
26/126		0	0	0	0	985	9,083	6,634	494	0	0	0	17,196
27/127		0	0	292	725	2,513	5,059	9,149	8,416	0	0	0	26,153
2020 Totals	**Monthly**	0	3,814	7,111	26,356	74,348	182,655	148,413	69,419	4,236	0	0	516,351
	Cum.	0	3,814	10,926	37,282	111,630	294,284	442,697	512,116	516,351	516,351	516,351	

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APPENDIX 3

Fisheries and Oceans Canada 2020 Enforcement Report

PREPARED BY: Fisheries and Oceans Canada (21December2020)

DATE: 21/DEC/2020

CONTRACTING PARTY: CANADA

AGENCY:

Fisheries and Oceans Canada

CONTACT:

Ann Bussell, Groundfish Enforcement Coordinator, Ann.Bussell@dfo-mpo.gc.ca

FISHERY SECTOR/S:

All

IPHC REGULATORY AREA:

IPHC Regulatory Area 2B (Canada: British Columbia)

DISCUSSION

Halibut Compliance and Enforcement – Commercial Halibut Summary 2020

2020 Commercial Halibut Fishery

The 2020 commercial halibut fishery opened at 12:00 hours local time on March 15, 2020 and closed at 12:00 hours local time on December 7, 2020. A three week extension was approved by the Minister due to impact of COVID-19. A total of **146** vessels and **565** fishing trips were recorded during the 2020 commercial halibut fishing season. **Ten (10)** vessels completed **ten (10)** fishing trips during the three week extension.

Compliance and Enforcement Priorities – 2020

Groundfish, including commercial Halibut, enforcement priorities for 2020 were identified in the Groundfish Integrated Fisheries Management Plan and by the Groundfish Enforcement Coordinator as follows:

- ***Fishing in closed areas*** such as Rockfish Conservation Areas (RCAs), Glass Sponge Reef Marine Protected Areas and in season closures;
- ***Dockside Observer Treatment Issues*** – not providing all reasonable assistance to the DFO designated observers;
- ***Non-compliance with the Dockside Monitoring Program (DMP) including hails*;**
- ***Retention of groundfish caught, retained, or possessed without authority of a licence***. Priority will be placed on occurrences where retention for the purpose of sale is indicated;
- ***Unauthorized dual fishing***. Dual fishing is defined as 'fishing for and retaining groundfish under the authority of a Commercial Groundfish Licence and a Communal Groundfish Licence during the same fishing trip;
- ***Non-compliance with electronic monitoring (EM) conditions of licence***, especially time gap occurrences;
- ***False and misleading information*** provided to dockside observers.
- ***Non-deployment of seabird avoidance gear*** as required by conditions of licence.

Links to Pacific Region Groundfish Integrated Fisheries Management Plan – 2020/2021:

Full Text: https://waves-vagues.dfo-mpo.gc.ca/Library/4088529x.pdf

Occurrences

Occurrences are reported or observed incidents which are potential violations of any Act or Regulation which falls under the mandate of a Canadian fishery officer.

Halibut Compliance and Enforcement – Recreational Halibut Summary - 2020

2020 Recreational Halibut Fishery

The 2020 recreational halibut fishery opened coast-wide at 00:01 hours on March 1, 2020 until 23:59 hours on December 31, 2020. Between January 1, 2020 and December 18, 2020 a total of 271,962 recreational licences were issued.

Halibut Compliance and Enforcement – Halibut Experimental Recreational Program – 2020

2020 Halibut Experimental Recreational Fishery

The halibut experimental recreational fishery (XRQ) did not open in 2020 due to COVID-19 and DFO Groundfish Management Unit staff working remotely.

Additional details about the XRQ program are available online:

https://www.pac.dfo-mpo.gc.ca/fm-gp/commercial/ground-fond/halibut-fletan/presentation-eng.html

Halibut Compliance and Enforcement – Commercial, Food, Social and Ceremonial (FSC) and Treaty Fisheries – 2020

For all dual fishing (commercial and FSC) halibut trips the vessel master is responsible for following the conditions of licence specific to dual fishing. All of the fish require 100% monitoring at-sea and 100% monitoring at the dock. In 2020 **forty-eight (48)** commercial halibut vessels hailed out for **142** dual fishing trips.

FSC halibut fishing does not have the same monitoring requirements as commercial and dual halibut fishing. DFO is working with indigenous nations to improve catch monitoring and reporting.

RECOMMENDATIONS: N/A

REFERENCES: See hyperlinks above and below.

APPENDICES *Pages*

Appendix 1: Tables 1-3: Occurrences

Table 1: ***Commercial Halibut Fishery*** *Occurrences - January 1, 2020 to December 7, 2020*[3]

Occurrence Type (not all are found to be violations)	**Number of Occurrences**
Observer Treatment	2
Area/Time (closed area)	7
Dual Fishing Issues	169*
EM System Issues	1
Illegal Buy/Sell/Possess	1
Sea Birds Caught	4
Gear Illegal/Used Illegally	7
Piece Count Issues	7
Registration / Licence	3
Hails	1
Release Rockfish	28**
Reported Overages	2
Species/Size Limit	8
Hold Check Not Completed	414***
Undersize Halibut	8
Prohibited Species	3
Total	**251**

Source: DFO Departmental Violations System (DVS) and Archipelago Marine Research Ltd. Portal for Clients
* Most of the Dual Fishing occurrences are of an administrative nature.
** Five rockfish release occurrences will be investigated further.
*** During Covid no hold checks were required. Not included in total occurrences.

Table 2: ***Recreational Halibut Fishery*** *Occurrences - January 1, 2020 to December 7, 2020*[4]

Occurrence Type	Number of Occurrences
Reporting	2
Quota/Bag Limits	4
Species/Size Limit	1
Registration/Licence	4
Illegal Buy/Sell/Possess	8
Illegal Transportation	3
Other Legislation	1
Total	**23**

[2]Source: DFO *Departmental Violations System (DVS)*

Table 3: ***Aboriginal Halibut Fishery*** *Occurrences - January 1, 2020 to December 7, 2020*[5]

Occurrence Type	Number Of Occurrences
Illegal Buy/Sell/Possess	11
Registration/Licence	1
Area/Time	2
Registration/Licence	2
Gear	1
Inspection	1
Total	**18**

[3]Source: DFO *Departmental Violations System (DVS)*

Appendix 2: Table 4 – Fishery Officer Enforcement Effort Summary

Table 4: *2018, 2019 & 2020 C&P Fishery Officer Groundfish enforcement hours for aboriginal, commercial, and recreational Halibut fisheries and recreational hours comparing halibut to finfish and salmon in tidal waters*[6]

ENFORCEMENT ACTIVITY – Comparison of years 2018, 2019 and 2020 (January 1 to November 30 each year)						
HALIBUT DEDICATED HOURS and % of TOTAL ENFORCEMENT EFFORT FOR PACIFIC REGION						
	2018	**2018**	**2019**	**2019**	**2020**	**2020**
FISHERY TYPE	**HOURS**	**% TOTAL ENF. EFFORT**	**HOURS**	**% TOTAL ENF. EFFORT**	**HOURS**	**% TOTAL ENF. EFFORT**
ABORIGINAL HALIBUT	220.75	0.3%	392	0.5%	176.5	0,22%
COMMERCIAL HALIBUT	318.75	0.5%	666.5	0.85%	776.25	0.97%
RECREATIONAL HALIBUT	520.75	0.8%	693.75	0.89%	356.5	0.45%
TOTAL	**1060.25**	**1.6%**	**1,752.25**	**2.24%**	**1309.25**	**1.64**
RECREATIONAL HOURS and % of TOTAL ENFORCEMENT EFFORT FOR PACIFIC REGION						
RECREATIONAL HALIBUT	520.75	0.8%	729.75	0.94%	37.25	0.047%
RECREATIONAL FINFISH – TIDAL WATERS	2057.25	3.1%	2,502.5	3.2%	626.5	0.78%
RECREATIONAL SALMON – TIDAL WATERS	6280.75	9.4%	4667.0	6.02%	1599.75	2.0%
TOTAL	**8858.75**	**13.3%**	**7,899.25**	**10.16%**	**2,263.5**	**2.83%**

***Note**: The recreational patrols are typically conducted on a "multi species" or "multi fishery" basis with the predominant effort in recreational tidal directed toward salmon and other finfish. Halibut checks are conducted on these patrols so they are included as part of enforcement effort directed towards recreational halibut fishing.*

[4] Source: DFO *Fisheries Enforcement Activity Tracking System (FEATS)*

Appendix 3: Table 5 – Aerial Surveillance Patrol Summary

Table 5: *2019, 2018, 2017, & 2016 C&P Aerial Surveillance Patrols – number of missions, total hours spent flying, and number of halibut vessels viewed during missions*[7]

AERIAL SURVEILLANCE PROGRAM (ASP) ACTIVITY			
Air Patrols	***Missions***	***Hours***	***Total Halibut Vessels Recorded Per Year***
January 1, 2020 – November 30,2020	184	*1107.3*	259 (245 l, 14 FL)
January 1, 2019 – November 30, 2019	185	1036.59	146 (130 L, 16 FL)
January 1, 2018 – November 30, 2018	178	1057	294 (263 L, 31 FL)
January 1, 2017 – December 15, 2017	166	879.49	500 (461 L, 39 FL)

L = commercial halibut licence FL= communal commercial halibut licence

[5]Source: Provincial Aerospace Limited - Surveillance Information System (SIS)

Appendix 4: Table 6 – Violation Summaries

Table 6: *2017, 2018, 2019 & 2020 Violations for Aboriginal, Commercial and Recreational Halibut – Charges Laid, Charges Pending/Under Review, and Tickets/Warnings Issued*[8]

VIOLATIONS	2017	2018	2019	2020	GRAND TOTAL
ABORIGINAL GROUNDFISH – HALIBUT	**14**	**2**	**14**	**4**	**34**
CHARGES LAID					
CHARGES PENDING/UNDER REVIEW	13	1	12	2	28
TICKET ISSUED			1		1
WARNING ISSUED	1	1		1	3
DIVERTED (ALTERNATIVE MEASURES)			1	1	2
COMMERCIAL GROUNDFISH - HALIBUT	**25**	**12**	**4**	**13**	**54**
CHARGES LAID			2		2
CHARGES PENDING/UNDER REVIEW	5	3	2	9	19
TICKET ISSUED	7			1	8
WARNING ISSUED	13	9		3	25
RECREATIONAL GROUNDFISH - HALIBUT	**80**	**64**	**85**	**55**	**284**
CHARGES LAID	8	1	6		15
CHARGES PENDING/UNDER REVIEW	10	6	38	8	62
TICKET ISSUED	26	21 (1 XRQ)	25	22	94
WARNING ISSUED	36	36 (2 XRQ)	16	25	113
GRAND TOTAL	**119**	**78**	**103**	**72**	**372**

[6]Source: DFO Departmental Violations System (DVS)

SIGNIFICANT CONVICTIONS: (*East Coast – Gulf Region*)

- *Observer Treatment – skipper fined $1500 + Court Order prohibiting skipper from:*
    - *Holding a fishing licence for 5 years*
    - *Fishing for 5 years*
    - *Being on a fishing vessel for 5 years*

  Skipper failed to provide all reasonable assistance to the observer. This conviction may be useful should similar cases come up in the Pacific Region.

SIGNIFICANT 2020 INVESTIGATIONS and/or PENDING INVESTIGATIONS:

- *Two (2) Closed Area Fishing*
- *Seven (7) Seabird Avoidance Gear Deployed*
- *Ten (10) unauthorized dual fishing*
- *Six (6) unauthorized retention of fish while dual fishing*

Link to DFO Conviction Tables**:**

https://www.dfo-mpo.gc.ca/media/charges-inculpations/pac-eng.htm

<u>Appendix 5</u>: Background Information

In 2016 the Government of Canada took action to strengthen and restore lost protections and incorporate modern safeguards to the *Fisheries Act*. In June 2019 Bill C-68, an Act to amend the *Fisheries Act* passed Parliament. On June 21, 2019 the amended *Fisheries Act* entered into force.

Fish and Fish Habitat Protection provisions came into force on August 28, 2019. New regulations are coming into force. Training for Fishery Officers is continuing.

COMPLIANCE ISSUES AND STRATEGIES

<u>Overview</u>

Fisheries and Oceans Canada (DFO) is a natural resource management organization with an infrastructure necessary to support professional law enforcement activities. The enforcement policies and activities of DFO with respect to regulatory compliance of aboriginal, commercial and recreational fisheries, is the responsibility of the Conservation and Protection (C&P) program.

The program is delivered through a three pillar enforcement approach which includes:

- Promotion of compliance through education and shared stewardship;
- Monitoring, control and surveillance activities; and,
- Management of major cases/special investigations in relation to complex compliance issues.

C & P, Pacific Region, is responsible for providing monitoring, control and surveillance activity along a coastline of 27,000 kilometers extending from the southern tip of Vancouver Island to northern British Columbia and the Yukon Territory.

Management of the groundfish fisheries off the west coast of Canada is described within the Groundfish Integrated Fishery Management Plan (IFMP). The IFMP is not enforceable; rather, fishery officers rely on conditions of licence, variation orders and acts and regulations for enforcement purposes.

There are currently 160 fishery officers in the Pacific Region, the majority of which are located within four distinct operational areas as well as within the Aquaculture Enforcement unit and Whale Protection Unit. These areas/units are supported by the National Fisheries Intelligence Service and the Major Case Unit. Currently C&P is staffing up to fill a number of vacancies in the region.

More information about DFO Compliance and Enforcement is available at the following website:

http://www.dfo-mpo.gc.ca/fm-gp/enf-loi/index-eng.htm

Sanctions and Deterrence

DFO's C&P program pursues violations of fisheries legislation and regulations in three ways.

1. For violations that are considered minor, an officer may issue warning letters or tickets that will form part of the fisher's compliance history and will be considered when investigating future occurrences.
2. Alternative Measures Agreements are now a part of the new amended *Fisheries Act* and include a range of different types of agreements which may be used as an alternative to prosecution in the court system. The focus is on the rehabilitation of the offender and the public interest which may be better served outside of the traditional criminal court process. Restorative Justice (RJ) is one example of such an agreement and is a community based approach.
3. Finally, serious or repeat offenders are dealt with through the provincial and federal courts where sentencing may include significant fines, prohibitions, licence suspensions and jail time.

MONITORING, CONTROL AND SURVEILLANCE

National Aerial Surveillance Program in Pacific Region

C&P operates a coastal air surveillance program utilizing a specially configured aircraft with a

fishery officer on board all flights. Close monitoring of the halibut fleet for compliance with hail-out, use of seabird avoidance gear, and area closures such as Rockfish Conservation Areas is an integral element of all patrols. Patrol coverage also monitors vessel activity within Canada's Exclusive Economic Zone. Air surveillance resources are utilized weekly throughout the year subject to weather conditions and conflicting requirements. A new Dash 8 specially configured plane was due to arrive in the Pacific Region in the fall of 2020. Its arrival has been delayed until 2021.

Information collected on the flights is available to fishery officers via an internet-based flight information system.

Fisheries Patrol Vessels

Inshore and near shore patrols are conducted by fishery officers using program vessels, which are primarily rigid hull inflatable boats, 7.33, 7.53, 8.5 and 10 meters in length.

Marine Patrol Program

There are two Canadian Coast Guard (CCG) mid-shore patrol vessels (MSPV) based in the southern and northern patrol areas. Each of the ships is dedicated to the C&P program and annually conduct 22 patrols each, resulting in between 286 to 309 operational days per year. There are two to three fishery officers on each patrol. In 2020 due to COVID-19 and some staffing issues not as many patrols occurred.

The National Aerial Surveillance Program and the Marine Patrol Program work together to provide effective and efficient use of C&P assets

Fisheries Observer Programs

Additionally, certified fisheries observers, both dockside and at-sea, are designated under Section 39. (1) of the *Fishery (General) Regulations* and perform duties related to monitoring of fishing activities, examination and measurement of fishing gear, collection of biological samples, recording of scientific data, monitoring of the landing of fish and verification of the weight and species of fish caught and retained. Fisheries observers are not armed and do not have authority to enforce the law. They perform an observe, record and report function.

TRANSFORMATION OF THE CONSERVATION AND PROTECTION PROGRAM

C&P continues to develop into a fully integrated, risk-based and intelligence-led program.

National Fisheries Intelligence Service (NFIS) and Major Case Management

In 2020 NFIS continued to develop its intelligence-led program. In the Pacific Region this program will improve C&P's ability to set priorities and make decisions which focus on activities that are most harmful to fisheries and ocean resources. A new initiative involves engagement with international partners. A Pacific Intelligence Partners group has been established and a number of countries from the North and South Pacific are now members.

The application of Major Case Management (MCM) principles and practices will enable the C&P program to focus its resources on investigations that lead to successful prosecutions and sanctions. Currently a dedicated MCM unit is being developed and staffed. It will work with NFIS and Fishery Officers in the Pacific Region in an advisory role.

NFIS in Ottawa has developed a national verification program for designated observer companies and individual observers. The Pacific Region had three (3) fishery officers trained. One has since moved out of the region. The trained fishery officers will conduct field checks of the DFO designation dockside observers to verify that they are carrying out their duties as required by regulation and national and regional policies and procedures. In 2021 Ottawa NFIS staff plan to conduct some of the designated observer company verifications virtually due to COVID-19 restrictions.

This national initiative along with the Marine Patrol Program and Aerial Surveillance Program round out C&P's commitment to improved compliance monitoring and enforcement.

HALIBUT ENFORCEMENT OVERVIEW

Fisheries observers and electronic monitoring (EM) systems perform a key role in observing and documenting fishing-related occurrences. Fishery officers have access to EM and observer data for enforcement purposes.

Fishery officers conduct inspections both dockside and at sea for compliance with licence conditions. Directed enforcement effort on the Halibut fishery is dependent on work load and the priorities identified by the respective C&P Area Chiefs.

The hook and line halibut fishery has 100% monitoring through the use of sophisticated GPS, hydraulic sensors and video imaging equipment, logbooks and dockside observers. This along with significant court sanctioned penalties has resulted in a high rate of compliance.

Commercial Licence Categories

A Commercial Halibut category ‘L’ or Communal Commercial Halibut category ‘FL’ licence is required to participate in the directed commercial Pacific Halibut fishery.

Category ‘L’ Halibut eligibilities are limited entry and vessel-based. Category ‘FL’ eligibilities are party-based; an indigenous group or organization is the licence eligibility holder and the eligibility must be designated to a commercially registered fishing vessel.

Vessels are permitted to conduct combined Halibut ‘L’ or ‘FL’ and Sablefish ‘K’ or ‘FK’ trips. These vessels are required to identify their intentions at the time of hail-out.

DFO INTERNATIONAL CONSERVATION & PROTECTION

The Pacific Region has a Senior Compliance Program Officer involved in monitoring and addressing illegal, unregulated and unreported (IUU) fishing in international waters. They are seeing a shifting dynamic in the “legal” fleets operating further north and east in the Pacific Ocean due to shifting climate and economics (collapse of their local stocks).

Link to Global Fishing Watch article:

https://globalfishingwatch.org/impacts/gfw-assists-us-coast-guard-patrol-in-pacific/

Prepared by Groundfish Enforcement Coordinator 2020-12-21

Fisheries and Oceans Canada | Pêches et Océans Canada

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INTERNATIONAL PACIFIC HALIBUT COMMISSION

Province of British Columbia 2020 Annual Report

PREPARED BY: British Columbia Ministry of Agriculture, Food and Fisheries

DATE: 23/DEC/2020

CONTRACTING PARTY: CANADA

AGENCY:

The Province of British Columbia represented by the Minister of Agriculture, Food and Fisheries.

CONTACT:

Mike Turner, Senior Manager, Intergovernmental Relations, Fisheries, and Aquaculture, Michael.R.Turner@gov.bc.ca

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FISHERY SECTORS:

All sectors within British Columbia.

IPHC REGULATORY AREA

IPHC Regulatory Area 2B (Canada: British Columbia)

DISCUSSION

The Province of British Columbia (B.C.) has a long history of involvement with the Pacific halibut fishery and the International Pacific Halibut Commission (IPHC). B.C recognizes the importance of Canada working bilaterally with the United States through the Pacific Halibut Treaty as well as the work done by the IPHC to develop and conserve Pacific halibut stocks. The significant history of this Treaty, as one of the first Canadian international agreements and the near-century of mutual benefit to both countries, serves as a tremendous example in global fisheries management. B.C. commends the efforts made by the Commission to reach agreement during the 96th session of the IPHC Annual Meetings in 2020. Thousands of jobs rely on this continued cooperation and it is critical that this history of collaboration continues.

The B.C. Ministry of Agriculture, Food and Fisheries is responsible for collection and reporting of data and statistics for the agri-food sector. An important part of that mandate is to analyze the impact of various sectors, including fisheries and seafood, to the broader provincial economy. B.C. commercially harvests and reports on over 25 wild fisheries including Pacific halibut which is among B.C.'s most valuable wild fishery commodities[1]. The Pacific halibut fishery supports significant commercial harvests in Canada's waters while providing many fishing and processing jobs and is significantly important to small coastal communities and First Nations across Canada's west coast. The Province licences seafood processors and annually collects data on the volumes and values of the various seafood products. In 2019, the survey showed the processing of 3,160 tonnes (6.96M lbs) of Pacific halibut, which includes some imported halibut processed in B.C. The survey also showed landed and wholesale values of $46.42M and $75.07M respectively. Pacific halibut account for 8.5% of the wholesale value of all B.C.'s wild fisheries including all groundfish, salmon, and shellfish. In 2019, B.C. exported 1.6M kilograms (3.5M lbs) of halibut products worth $35M. The Province also conducts a seafood sector employment survey every three years which provides data on jobs, wages, and seafood processing activities. The results from the most recent survey conducted in 2019 will be available for distribution in 2021. The last published data from 2016 shows 85 processing facilities that reported processing halibut and generated 319 jobs with an estimated $14M paid in wages[2].

In addition, the recreational halibut fishery supports the hundreds of fishing lodges, charter companies, and individuals that contribute tremendously to the economies of coastal communities. In 2019 and 2020, there were severe restrictions on salmon fishing in B.C. which are expected to continue into future years. This is amplifying the importance of the recreational halibut fishery to the sector which contributed to an over $1.1B (2016) annual impact on the B.C. Gross Domestic Product[3]. B.C. will continue to provide available data to the IPHC from provincially licensed seafood processors to advance the IPHC economic report which will help highlight the benefits that Pacific halibut provide. As B.C.'s agency responsible for fisheries and seafood economic data, the Ministry of Agriculture, Food and Fisheries recognizes the importance of understanding the broader socioeconomic impacts and downstream effects of the Pacific halibut fishery and looks forward to continuing to work together.

First Nations are entitled to a Food, Social and Ceremonial (FSC) allocation of the total allowable catch (TAC), and many jobs within the halibut fishery and halibut processing facilities are held by members of First Nations across British Columbia. In the commercial halibut fishery, approximately 23% of licenses are held by B.C. First Nations. In 2019, B.C. became the first province in Canada to introduce legislation aimed at adopting the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), which mandates that government bring its laws and policies into harmony with the aims of the declaration. The B.C. government has set Indigenous reconciliation as a top priority and is actively working to ensure that First Nations are meaningfully included in management of all B.C. fisheries.

B.C. has an integrated groundfish fishery with 100 per cent monitoring and 100 per cent bycatch accountability. This well-developed program, which includes at-sea observers and electronic monitoring solutions, is regarded as one of the most well-monitored fisheries in the world. In September 2009, the B.C. Pacific halibut fishery earned Marine Stewardship Council certification for being a sustainable, well-managed fishery. These extensive fisheries monitoring programs come at a direct cost to fishermen and license holders as they are entirely funded by industry. West coast Canadian fishers respect that monitoring programs level the playing field by keeping all fishery participants compliant with the rules which help to ensure sustainable stocks and the future of their industry. In 2020, with the interruption of groundfish observer programs due to the COVID19 pandemic, fisheries were able to implement an Emergency Electronic Monitoring program in place of at-sea observers and begin working on alternate methods of estimating halibut bycatch mortality like area-based halibut mortality estimations. The long running electronic monitoring programs and observer coverage along with the data sets available from these robust programs provided the ability to adapt quickly to the unprecedented changes brought on by the pandemic.

The decisions made annually by the IPHC greatly impact the livelihood of many coastal B.C. residents and local economies. With the extensive and costly efforts of accounting for all halibut bycatch in place, B.C. expects that all fishers who share access to the Pacific halibut stocks should be held to similar standards of catch accounting. B.C. fishers need to be assured that the decisions made by the IPHC are based on the best data and science possible by ensuring that all contributing data sources are as thorough and reliable as what they contribute.

The large trawl fisheries in Alaska have high volumes of bycatch that impact many species that move between Canadian and US waters. This includes over 370,000 salmon caught as bycatch in Alaskan fleets in 2020, of which 46,000 were vulnerable chinook salmon[4]. Incomplete monitoring and Alaskan bycatch of halibut in trawl fisheries impact recruitment of juvenile halibut to the fishery as many halibut caught in industrial trawl nets do not survive release. This results in significant mortality in juvenile halibut that might otherwise grow and become available to the fishery. Uncertainty regarding post-release mortality rates and its implication for total removals adds to these concerns. The annual IPHC Fishery Statistics reports continue to confirm that Regulatory Area 3 remains the area where non-directed commercial discard mortality is estimated most poorly[5]. The 2020 preliminary fishery statistics report again outlines issues in area 3 with low observer coverage and observed trips not being representative of all trips in multiple ways, leading to high uncertainty and potential for bias in the provided discard mortality estimates. The Province of B.C. supports more robust monitoring programs and increased measures to more accurately estimate bycatch and ensure that fisheries are held accountable for their catch and bycatch, especially in areas with incomplete and/or less reliable data. The integrity of the data collected in all areas is important to managing Pacific halibut as a shared resource.

With the trend of overall TAC decreasing year after year, it is exceedingly important that the issues of bycatch uncertainty and lack of bycatch accountability are addressed as soon as possible. Allowing these issues to continue in areas known to have higher levels of U26 halibut could hinder recruitment and impact future sustainability for all regulatory areas.

The Province of B.C. commends the Commission's decision during the 2020 IPHC Annual Meeting to continue work on evaluating and redefining the Total Constant Exploitation Yield (TCEY) to include the Under 26 inch (U26) component of discard mortalities, including non-directed commercial fisheries, as steps towards more comprehensive and responsible management of the resource, with the intent that each Contracting Party to the Treaty would be responsible for counting its U26 mortalities against its collective TCEY. B.C. also commends the decision to continue the development of a workplan to explore methods for improving monitoring requirements in directed and non-directed fisheries but would like to see expectations and timelines developed as to limit the continuation of unreported and unaccounted mortalities by poorly monitored fisheries.

RECOMMENDATION

The Government of British Columbia's position is that the IPHC must exercise its authority to regulate the incidental catch of Pacific Halibut in all regulatory areas by:

1. **developing a workplan for addressing the needed improvements of monitoring requirements including timelines to ensure that this priority is advanced; and**
2. **establishing a robust method of accountability for U26 bycatch within TCEY.**

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National Report:

United State of America

PREPARED BY: NOAA FISHERIES (23 DECEMBER 2020; 11 JANUARY 2021)

PURPOSE

To provide an overview of the fisheries and removals of Pacific halibut during 2020 from the IPHC Convention waters and the national waters of the United States of America.

West Coast of the United States of America – IPHC Regulatory Area 2A

The 2020 Area 2A Pacific halibut (halibut) catch limit of 1,500,000 pounds was allocated according to the 2020 Catch Sharing Plan (CSP) for Area 2A as follows:

Treaty Tribes	525,000 (35%)
Non-Tribal Total	975,000 (65%)
Non-Tribal Commercial	299,325
Washington Sport	347,100
Oregon Sport	289,575
California Sport	39,000

All weights in this report are net weight (gutted, head-off, and without ice and slime), unless otherwise noted. The structure of each fishery and the resulting harvests are described below.

Best estimates of halibut catch for Area 2A indicate harvest of 743,554 pounds of the non-tribal total quota and 488,915 pounds of the tribal quota, with a total harvest estimate of 1,232,469 pounds, or 82%, of the 1,500,000 pound catch limit. A summary of all Area 2A quotas and preliminary harvest estimates for 2020 is attached in Table 2 of this document.

Non-Tribal Commercial Fisheries

A quota of 299,325 pounds (30.7% of the non-tribal share) was allocated to two fishery components:
1) a directed longline fishery targeting halibut south of Point Chehalis, WA; and

2) an incidental catch fishery in the salmon troll fisheries off Washington, Oregon, and California.

A quota of 70,000 pounds was allocated to an incidental catch fishery in the sablefish primary fishery for vessels using longline gear north of Point Chehalis, WA. This allowance for the sablefish primary fishery is taken from the portion of the Washington sport allocation that is above 214,110 pounds, as long as the amount is at least 10,000 pounds.

Directed fishery targeting halibut

A quota of 254,426 pounds (85% of the non-tribal commercial fishery allocation) was allocated to the directed longline fishery targeting halibut in southern Washington, Oregon, and California. The fishery was confined to the area south of Point Chehalis, WA (46°53.30' N. lat.). In addition, there are closed areas along the coast defined by depth contours. Between the U.S./Canada border and 40°10' N. lat. the western boundary of the closed area is defined by a line approximating the 100 fm depth contour. The eastern boundary of the closed area is defined as follows: Between the U.S./Canada border and 46°16' N. lat., the boundary is the shoreline. Between 46°16' N. lat. and 40°10' N. lat. the boundary is the 30 fm depth contour. Fishing periods were 58 hours in duration every other week, starting Monday, June 22. In 2020, the fishery was open for five fishing periods: June 22-24, July 6-8, July 20-22, August 3-5, and August 17-19. A 32 inch minimum size limit with the head on was in effect for all openings. Vessel landing limits per fishing period based on vessel length were imposed by IPHC during all openings as shown in Table 1. Vessels choosing to operate in this fishery could not land halibut as incidental catch in the salmon troll fishery, nor operate in the recreational fishery.

Table 1. 2020 fishing period limits (dressed weight, head-on with ice and slime, in pounds per vessel) by vessel size.

Vessel Class/Size (ft)		Jun 22-24	Jul 6-8	Jul 20-22	Aug 3-5	Aug 17-19
0-25	A	905	1,810	2,263	2,263	905
26-30	B	905	1,810	2,263	2,263	905
31-35	C	905	1,810	2,263	2,263	905
36-40	D	1,364	2,728	3,410	3,410	1,364
41-45	E	1,364	2,728	3,410	3,410	1,364
46-50	F	1,818	3,636	4,545	4,545	1,818
51-55	G	1,818	3,636	4,545	4,545	1,818
56+	H	2,045	4,090	5,113	5,113	2,045

- The five directed commercial open periods resulted in a catch of approximately 242,647 pounds. Final catch amounts will be available from the IPHC in 2021.

  Incidental halibut catch in the salmon troll fishery

A quota of 44,899 pounds of Pacific halibut (15% of the non-tribal commercial fishery allocation) was allocated to the non-tribal commercial salmon troll fishery in Area 2A as incidental catch during salmon troll fisheries.

- Halibut retention was permitted in the salmon troll fisheries beginning May 1, with the following ratio: one halibut (minimum 32 inches) per two Chinook salmon landed by a salmon troller, except that one halibut could be landed without meeting the ratio requirement, and no more than 35 halibut could be landed per trip.

- On July 1, the fishery was extended at the same ratio and landing limit.
- The fishery is estimated to have taken 29,012 pounds, and closed October 31.Fishing with salmon troll gear is prohibited within the Salmon Troll Yelloweye Rockfish Conservation Area (YRCA) off the northern Washington coast. Additionally, the "C-shaped" North Coast Recreational YRCA off Washington is designated as an area to be avoided (a voluntary closure) by salmon trollers.

Incidental halibut catch in the sablefish primary longline fishery north of Point Chehalis, WA

A quota of 70,000 pounds was allocated to the primary sablefish fishery in Area 2A as incidental catch north of Point Chehalis, WA. This incidental fishery is only available to vessels with a groundfish limited entry permit endorsed for longline gear with a sablefish tier limit and with an IPHC license.

The fishery is confined to an area seaward of a boundary line approximating the 100-fm depth contour. Fishing is also prohibited in the North Coast Commercial YRCA, an area off the northern Washington coast. In addition, the "C-shaped" North Coast Recreational YRCA off Washington is designated as an area to be avoided (a voluntary closure) by commercial longline sablefish fishermen.

- Beginning April 1, the incidental landing limit was 200 pounds (dressed weight) of halibut per 1,000 pounds (dressed weight) of sablefish and up to 2 additional halibut in excess of the landing limit ratio. On October 19, the landing limit increased to 250 pounds (dressed weight) of halibut per 1,000 pounds (dressed weight) of sablefish and up to 2 additional halibut in excess of the landing limit ratio.
- At the September meeting, the Council recommended extending the sablefish fishery until December 31, and allowing incidental halibut retention until the IPHC season closure on November 15.
- This fishery is projected to have landed 63,358 pounds.

Sport Fisheries

675,675 pounds were allocated between sport fisheries in Washington (35.6% of non-tribal share, minus 70,000 pounds allocated to the incidental catch in the sablefish primary fishery), Oregon (29.7% of the non-tribal share), and California (4.0% of the non-tribal share). The allocations were further subdivided as quotas among six geographic subareas as described below. Unless otherwise noted, the daily bag limit in all subareas was one halibut of any size, per person, per day.

- Recreational halibut fisheries in all Washington subareas were significantly impacted by restrictions related to the global pandemic. Restrictions included complete fishery closures, closed ports, and revised season dates. Details are summarized in this WDFW report to the PFMC (Agenda Item I.1.a, Supp WDFW Report 1, September 2020)

Washington Inside Waters Subarea (Puget Sound and Strait of Juan de Fuca)

This area was allocated 77,550 pounds (23.5% of the first 130,845 pounds allocated to the Washington sport fishery, and 32% of the Washington sport allocation between

130,845 and 224,110 pounds). The fishery in Puget Sound was open May 20 through June 30 on alternating days. The fishery reopened August 6-8, 13-15, 20-22, 27-29, September 3-5, 10-12, 17-19, 24-26, and 27-29.

- The estimated total catch in this area is 59,002 pounds, which is 18,548 pounds under the quota.

Northern Washington Coastal Waters Subarea (landings in Neah Bay and La Push)

The coastal area off Cape Flattery to Queets River was allocated 128,187 pounds (62.2% of the first 130,845 pounds allocated to the Washington sport fishery, and 32% of the Washington sport allocation between 130,945 and 224,110 pounds). The fishery was open August 6-8, 13-15, 20-22, 27-29, September 3-5, 10-12, 17-19, 24-26, and 27-29. The "C-shaped" North Coast Recreational YRCA, southwest of Cape Flattery, was closed to sport halibut fishing.

- The estimated total catch for this area is 59,993 pounds, which is 68,194 pounds under the quota.

Washington South Coast Subarea (landings in Westport)

The area from the Queets River to Leadbetter Point was allocated 62,896 pounds (12.3% of the first 130,845 pounds allocated to the Washington sport fishery and 32% of the Washington sport allocation between 130,845 and 224,110 pounds). In 2020, this subarea operated with an all-depth fishery as the primary fishery, and the nearshore fishery did not open. The all-depth fishery was open August 6, 13, 16, 20, 23, 27, 30, September 3, 4, 6, 10, 11, 13, 17, 20, 24, and 27-29.

- The all-depth fishery estimated catch is 54,550 pounds which is 8,346 pounds under the quota.

Columbia River Subarea (Leadbetter Point to Cape Falcon)

This sport fishery subarea was allocated 18,450 pounds, consisting of 2.0% of the first 130,845 pounds allocated to the Washington sport fishery, and 4.0% of the Washington sport allocation between 130,845 and 224,110 pounds, 2.3% of the Oregon sport allocation, and any quota over 8,000 pounds in the Southern Oregon subarea. The fishery operates with an all-depth and nearshore fishery. The nearshore fishery is allocated 500 pounds to accommodate incidental halibut retention during groundfish fishing when the all depth halibut fishery in this area is closed.

- This fishery normally opens in early May, however due to restrictions due to the global pandemic in 2020, was delayed until early August. This subarea opened at the same time as other subareas in Washington.
- The all-depth fishery was open August 6, 13, 16, 20, 23, 27, 30, September 3, 4, 6, 10, 11, 13, 17, 20, 24, 27, 28, and 29. The nearshore fishery was open August 10 Monday –Wednesday each week until September 30.
- The all-depth fishery estimated catch is 5,617 pounds which is 12,333 pounds under the subarea quota.

Oregon Central Coast Subarea (Cape Falcon to Humbug Mountain)

This sport fishery subarea was allocated 271,582 pounds (93.79% of the Oregon sport allocation).

Three seasons occurred in this subarea:

1. a restricted depth nearshore (inside 40-fathom) fishery, opened May 1, seven days a week;
2. a fixed Spring season in all depths that was open on May 21-23, 28-30, June 11-13, 18-20, July 9-11, 16-18, 23-25, and July 30-August 1;
    a. the opening of the fishery was delayed by one week from May 14-16 to May 21-23, at the request of several counties and harbors in the northern part of this subarea, due to restrictions from the Oregon Governor's "Stay at Home" emergency order.
3. a Summer season in all depths that was open August 6-8, and was open every other Thursday through Saturday until October 31. On August 27, the fishery opened every Thursday through Saturday until October 31.

Harvest in this subarea in these seasons is summarized in the bullets below.

- The Spring all-depth fishery resulted in an estimated catch of 114,235 pounds, which is 56,868 pounds under the spring allocation. The remaining quota would shift to other fisheries as needed.
- The Summer all-depth fishery has an estimated catch of 20,160 pounds, which is 47,738 pounds under the initial allocation.
- The inside 40-fathom fishery has an estimated catch of 23,493 pounds, which is 9,098 pounds under the initial allocation.

Southern Oregon (Humbug Mountain to the OR/CA Border)

This sport fishery was allocated 8,000 pounds (3.9% of the Oregon sport fishery allocation minus the Oregon contribution to the Columbia River subarea). This area has a pre-set season of 7 days per week from May 1 to October 31.

- This fishery has estimated catch of 7,380 pounds, which is 620 pounds under the quota.

California (Off the California Coast)

This sport fishery was allocated 39,000 pounds (4.0% of the non-tribal share). The fishery was open May 1- August 11, and closed after the quota was estimated to be taken.

- The fishery has an estimated catch of 64,107 pounds which is 25,107 pounds over the quota.
- See APPENDIX I for more details from California Department of Fish and Wildlife

Tribal Fisheries

525,000 pounds (35% of the Area 2A catch limit) was allocated to tribal fisheries. The tribes estimated that 32,200 pounds would be used for ceremonial and subsistence (C&S) fisheries and the remaining 492,800 pounds were allocated to the commercial fishery.

- The unrestricted fishery was open 55 hours for each tribe between March 14 and September 30. The unrestricted fishery landed 277,421 pounds.
- The first restricted fishery was open 222 hours for each tribe between March 14 and September 30. The first restricted fishery landed 94,400 pounds.
- The second unrestricted fishery was open 36 hours for each tribe between March 14 and September 30. The second unrestricted fishery landed 84,449 pounds.

- The late fishery is open October 5- November 15, with a restricted 800 pound limit. The fishery caught 32,645 pounds.
- The total landings for all tribal fisheries is 488,915 pounds, which is 3,885 pounds under the tribal commercial allocation. The C&S fishery will continue through December 31 and catch estimates will be reported by the tribes in January 2021.

Table 2. Summary of all Area 2A quotas and preliminary 2020 harvest estimates, updated with fishery information reported to NMFS through 12/18/2020.

2020 Area 2A Catch Limit and Catch (in pounds)			2020 Quota	Catch to date	% Quota taken
Tribal			525,000		
Tribal	C&S		32,200	-	-
Tribal	Comm		492,800	488,915	99
Non-Tribal			975,000	743,554	76
Commercial			299,325	271,659	91
Commercial	Directed		254,426	242,647	95
Commercial	Incid. Salmon Troll		44,899	29,012	65
WA Sport			347,100	236,903	68
WA Sport	Incid. Sable		70,000	63,358	91
WA Sport	Puget Sound		77,550	59,002	76
WA Sport	North Coast		128,187	59,993	47
WA Sport	South Coast		62,896	54,550	87
WA/OR	Columbia River	All-Depth	17,950	5,617	31
WA/OR	Columbia River	Nearshore	500	-	0
OR Sport			289,575	165,268	57
OR Sport	Central OR Coast	Spring all-depth	171,103	114,235	67
OR Sport	Central OR Coast	Summer all-depth	67,898	20,161	30
OR Sport	Central OR Coast	Nearshore	32,591	23,491	72
OR Sport	Southern OR		8,000	7,381	92
CA Sport			39,000	64,107	164
Total			1,500,000	1,232,469	82

Enforcement

Enforcement of the commercial, tribal and recreational Pacific halibut fisheries in International Pacific Halibut Commission Area 2A is an ongoing multi-agency effort performed cooperatively by NOAA Fisheries Office of Law Enforcement (OLE), West

Coast Division (WCD), the U.S. Coast Guard (USCG), California Depart of Fish and Wildlife Enforcement Division (CDFW), Oregon State Patrol Fish and Wildlife Division (OSP), Washington Department of Fish and Wildlife Police (WDFW), and Tribal Enforcement. Table 3 presents a consolidated summary of IPHC Area 2A commercial and recreational statistics for 2020 using data elements provided by OLE, USCG, CDFW, OSP, and WDFW. See APPENDIX II for more information on West Coast Enforcement.

Table 3. Area 2A Consolidated Enforcement Statistics -2020

2020 AREA 2A CONSOLIDATED ENFORCEMENT STATISTICS						
EFFORT	NOAA OLE (WCD)	USCG (D11/D13)	CDFW	OSP	WDFW	TOTAL EFFORT
AIRCRAFT PATROLS						
Number of Patrols		31				31
Hours		117				117
VESSEL PATROLS						
Number of Patrols		102			42	144
Hours		900		311	230	1441
SHORESIDE PATROLS						
Number of Patrols	31				3	34
Hours	167		13	414	13	607
AIRCRAFT PATROL PERSONNEL HOURS	39					39
VESSEL AT-SEA PERSONNEL HOURS			9	461	608	1078
SHORESIDE PERSONNEL HOURS	167		66	264	219	716
BOARDINGS AND CONTACTS	43	323	161	802	1,680	3009
ACTIONS						TOTAL ACTIONS
ENFORCEMENT ACTIONS	29	0	0	57	432	518
Compliance Assistance	11					11
Written Warnings	1				113	114
Citations	5				103	108
Warnings and Citations Combined				57	216	273
Other	12					12
RESULTS						TOTAL RESULTS
RECORDED WARNINGS/VIOLATIONS						
Undersized Halibut		1		1		2
Over Limit	8	1		6		15
Prohibited Gear					3	3
Logbook/Reporting	3					3
Permit/License				1	4	5
Restricted/Closed Area					27	27
Failure to Validate Tag				7		7
Illegal Harvest				13		13
Take/Possess Groundfish with Halibut on Board				4		4
VMS	8	3				11
Prohibited Species					2	2
Seabird Avoidance	7					7
Non-Compliance/Not Specified	3			54		57

Alaska, United States of America – IPHC Regulatory Areas 2C, 3 and 4

Charter Halibut Fisheries

Harvest under 2020 Annual Management Measures in Areas 2C and 3A

The Area 2C and 3A Halibut Catch Sharing Plan was implemented in 2014, and is the method for determining allowable levels of charter halibut harvests in those areas. The Catch Sharing Plan also endorses a process through which the North Pacific Fishery Management Council (Council) recommends annual management measures to the IPHC that are likely to limit charter harvests to their annual catch limits.

In 2020, charter operations were regulated under two distinct periods in Areas 2C and 3A: the initial period began on March 13 and extended through June 14; the second period began on June 15 and lasted through the end of 2020. The second period was the result of regulatory changes recommended by the North Pacific Fishery Management Council and IPHC to address an unexpected decline in charter fishing effort in the 2020 season. These actions are described in more detail in the report sections below.

In Area 2C, the 2020 charter catch limit was 780,000 pounds (lb.). The fishery was initially managed under a daily bag limit of one fish that had to be 38 inches or less or greater than 80 inches total length. The lower length of the slot limit was changed to 45 inches or less in the latter portion of the fishing season. The preliminary 2020 charter halibut harvest estimate of 499,535 lb is 36.0 percent below the catch limit.

In Area 3A, the 2020 charter catch limit was 1,710,000 lb. The fishery was initially managed under a two-fish daily bag limit; a maximum size limit of 28 inches was implemented for one of the retained fish; halibut retention was prohibited on all Wednesdays and five consecutive Tuesdays; a 4-fish annual limit, a one-trip per day per charter vessel limit, and a one-trip per day per charter halibut permit limit. In the latter portion of the season, the 4-fish annual limit was rescinded, charter halibut retention was allowed on all days of the week, and the 28-inch maximum size limit was raised to 32 inches. The preliminary 2020 charter halibut harvest estimate of 1,710,000 lb in Area 3A was 6.6 percent below the catch limit.

In December 2020, the Council recommended charter management measures for the 2021 fishery. These management measures are described in sections below.

Guided Angler Fish Program- 2020 Summary

In 2014, NMFS implemented the guided angler fish (GAF) program to authorize limited annual transfers of commercial halibut IFQ as GAF to qualified charter halibut permit holders for harvest by charter vessel anglers in Areas 2C and 3A. The GAF program allows qualified charter halibut permit holders to offer charter vessel anglers the opportunity to retain halibut up to the limit for unguided anglers when the charter management measure in place limits charter vessel anglers to a more restrictive harvest limit.

In 2020, charter vessel anglers who used GAF in Area 2C and Area 3A could harvest up to two halibut of any size per day, and GAF were not subject to the annual limit or daily closures in the first part of the Area 3A season. Table 1 summarizes IFQ to GAF transfers for 2014 through 2020. From the outset of the program, GAF is has been used more frequently in Area 2C than 3A, but overall in 2020 the use of GAF decreased substantially in both areas. In Area 2C in 2020, 57,645 pounds of IFQ was transferred as GAF to the charter fishery; this translated into 801 harvestable halibut, of which 95% (765 fish) were actually taken. In Area 3A in 2020, 5,240 pounds IFQ was transferred as GAF, resulting in 92 harvestable fish. However, only 41% (38 fish) of the Area 3A GAF was taken. This was likely related to changes in the regulations that rescinded the 4-fish annual limit for Area 3A halibut in the latter portion of the season.

Table 1. Summary of IFQ to GAF transfers

Year	IPHC Regulatory Area	Number of GAF Permits Issued	IFQ Pounds Transferred	Number of GAF Transferred	Number of GAF Harvested (% of amount transferred)
2014	2C	92	29,498	1,117	800 (72%)
	3A	19	11,654	910	269 (30%)
	Total	111	41,152	2,027	1,069 (53%)
2015	2C	119	36,934	548	428 (78%)
	3A	25	10,337	269	143 (53%)
	Total	144	47,271	817	571 (70%)
2016	2C	132	47,064	723	529 (73%)
	3A	26	10,442	289	220 (76%)
	Total	158	57,506	1,012	749 (74%)
2017	2C	207	53,206	719	576 (80%)
	3A	22	9,786	233	157 (67%)
	Total	229	62,992	952	733 (77%)
2018	2C	332	80,656	1,222	972 (80%)
	3A	31	12,760	304	215 (71%)
	Total	363	93,416	1,526	1,187 (78%)
2019	2C	341	97,680	1,601	1,237 (77%)
	3A	29	13,524	338	266 (79%)
	Total	370	111,204	1,939	1,503 (78%)
2020	2C	235	57,645	801	764 (95%)
	3A	15	5,240	92	38 (41%)
	Total	250	62,885	893	802 (90%)

NPFMC Charter Halibut Fishery actions in 2020

December 2020 Council Meeting

On December 4, 2020 the Council approved management measures for charter halibut fishing in Areas 2C and 3A for the 2021 fishing season. These recommendations are submitted as Regulatory Proposal B1 to the IPHC for the January 2021 annual meeting. The measures approved by the Council were developed by the Charter Halibut Management Committee based on analyses provided by ADF&G at APPENDIX I as well as the needs of the fishery. These measures are expected to constrain overall charter removals to the final 2021 area allocations, as determined by the IPHC under the Catch Sharing Plan.

May 2020 Special Council meeting

At a special meeting held in May 2020, the Council took action to recommend less restrictive charter halibut management measures for IPHC Regulatory Areas 2C and 3A for the remainder of the 2020 fishing season. The IPHC subsequent addressed the issue at a special session held on May 20, and adopted the recommendations.

The Council decision was in response to a proposal received from Area 2C and 3A charter representatives related to the impacts of the COVID-19 pandemic on the charter halibut fishery. Within the proposal to the Council, charter representatives submitted two requests. The first request asked to relax the established Area 2C and 3A charter halibut management measures (e.g. bag limits, size restrictions, and day of the week closures – details are provided in the section above) for the remainder of the 2020 charter fishing season. Significant charter cancellations and a large reduction in angler interest resulted in lower than expected levels of charter fishing effort than suggested in the Council's December 2019 analysis. Relaxing management measures provided some additional market opportunity for this struggling sector while still keeping each Regulatory Area under its allocation as established by the Catch Sharing Plan.

The charter representatives' second request was for a rollover of unused charter allocation from 2020 to 2021 in IPHC Regulatory Areas 2C and 3A; however, the Council did not recommend the rollover. The Council's decision was partly based on comments received from the IPHC Secretariat that suggested a rollover of this nature would primarily be an allocative issue, as projected harvests that are not completely taken in 2020 will be factored into the stock assessment and population dynamics in the subsequent year.

February 2020 Council Meeting

At this meeting the Council reviewed a supplemental analysis from ADF&G of potential charter halibut management measures for implementation in Area 3A in 2020 and ultimately identified their recommended management measures for implementation in 2020.

In December 2019 the Charter Halibut Management Committee was not able to identify management measures for Area 3A that would meet the reference level of halibut removals specified at the November IPHC Interim Meeting, but did identify management measures for Area 2C that the Council recommended for implementation. The committee held a teleconference on January 23, 2020 to evaluate additional measures for Area 3A that could achieve the reference TCEY. The Alaska Department of Fish and Game (ADF&G) conducted a supplemental analysis to evaluate additional management measures requested by the committee.

The Council's Charter Halibut Management Committee report contained statements from Area 2C and Area 3A representatives that the restrictions placed on the charter fleet in both areas is likely to result in a number of charter businesses and other support businesses closing in fishing communities around the State. Council members acknowledged the "very real and severe economic challenges" that the proposed regulations for 2020 will create, and also acknowledged that additional challenges are likely to occur in the near future.

The Council also reviewed and approved suggested language to clarify the Council's intent in IPHC proposal IPHC-2020-AM096-PropB1 that described the Council's proposed management measures for Area 2C charter halibut fishing in 2020.

Commercial Groundfish Fisheries

Halibut Bycatch

Current Halibut Bycatch Amounts and Management

Halibut bycatch mortality in the Bering Sea and Aleutian Islands (BSAI) and Gulf of Alaska (GOA) groundfish fisheries is highly regulated and closely managed by the Council and NMFS through the Fishery Management Plans (FMPs) for each management area. Through regulations implementing the FMPs, NMFS manages halibut bycatch by (1) establishing annual halibut prohibited species catch (PSC) limits, (2) apportioning PSC limits to fishery categories and seasons to accommodate halibut PSC needs in specific groundfish fisheries, and (3) managing groundfish fisheries to prevent PSC from exceeding the established limits.

The FMPs specify that halibut bycatch in groundfish fisheries is managed as PSC. Catch of PSC species must be avoided while fishing for groundfish and PSC species may not be retained unless required under the FMP. Halibut PSC limits are an apportioned, non-retainable amount of halibut provided to a groundfish fishery to provide an upper limit on the bycatch of halibut in a fishery. When a halibut PSC limit is reached in an area, further fishing with specific types of gear or modes of operation is prohibited by those types of operations taking halibut PSC in that area.

Although halibut PSC is taken by vessels using all types of gear (trawl, hook-and-line, pot, and jig gear), halibut PSC primarily occurs in the trawl and hook-and-line (non-trawl) groundfish fisheries. The Council and NMFS annually establish halibut PSC limits for vessels in the trawl and non-trawl groundfish fisheries in the BSAI and GOA. NMFS manages groundfish fisheries to ensure these limits are not exceeded.

The established halibut PSC limits and total estimated halibut PSC use for 2020 are shown in Tables 2 and 3.

Table 2. 2020 BSAI halibut PSC limits and estimated halibut PSC use

BSAI Fishery	Halibut PSC Limit metric tons (mt)	Halibut PSC Use (mt)	Remaining PSC limit (mt and %)
Trawl (Amendment 80 and BSAI Trawl Limited Access)	2,490	1,465	1,025 (41%)
Non-trawl	710	76	634 (89%)
Community Development Quota (trawl and non-trawl)	315	115	200 (64%)
TOTAL	3,515	1,656	1,656 (47%)

Table 3. 2020 GOA halibut PSC limits and estimated halibut PSC use

GOA Fishery	Halibut PSC Limit (mt)	Halibut PSC Use (mt)	Remaining PSC limit (mt and %)
Trawl	1,706	788	918 mt (54%)
Non-trawl	257	3	254 mt (99%)
TOTAL	1,963	791	1,172 mt (60%)

As shown in Figures 1-3 below, halibut PSC use has not exceeded established limits in the trawl or non-trawl fisheries in the BSAI or GOA in recent years.

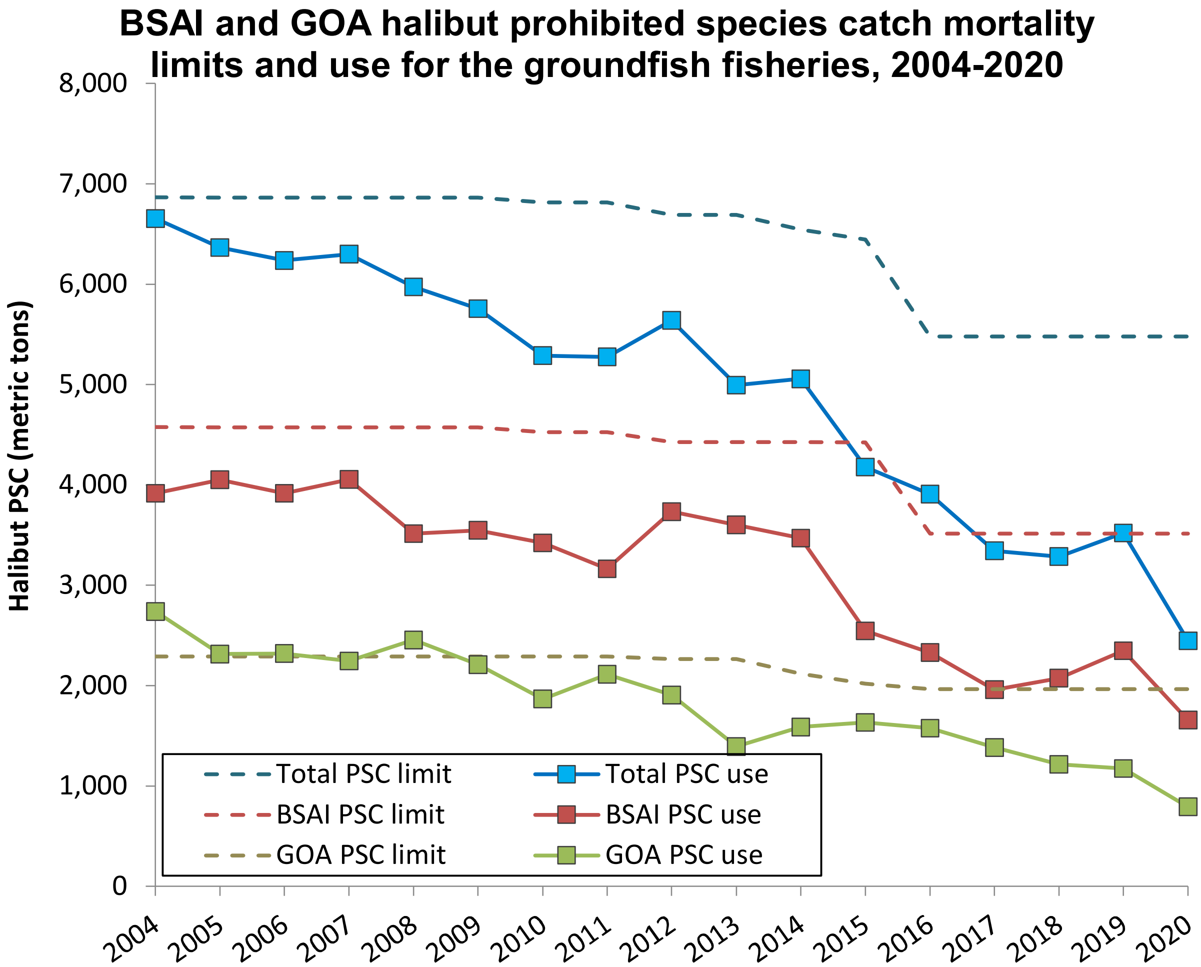


Figure 1. Total BSAI (including CDQ and deck sorting exempted fishing permit for 2016 - 2019) and GOA halibut prohibited species catch limits and use for all groundfish fisheries, 2004 through 2020.

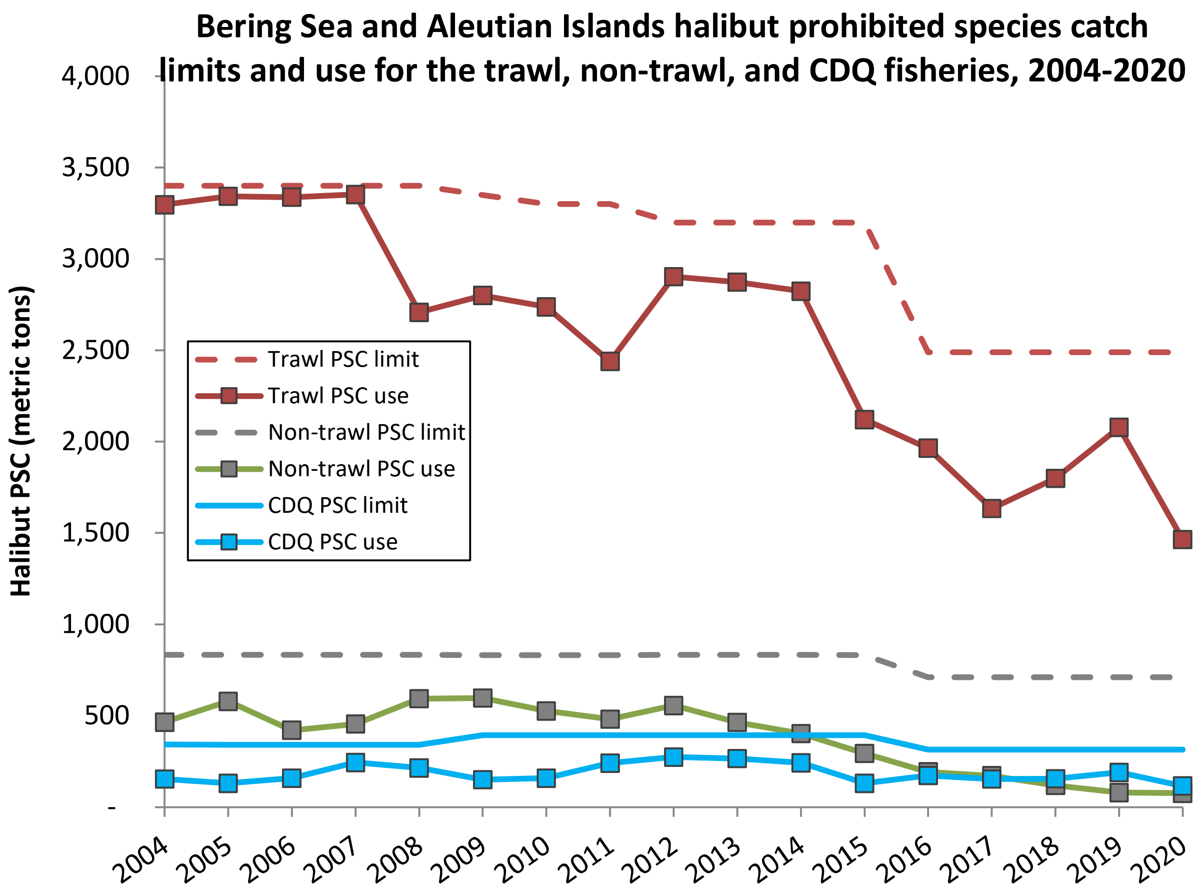


Figure 2. BSAI halibut prohibited species catch limits and use for the trawl (including deck sorting exempted fishing permit for 2016 - 2019), non-trawl, and CDQ groundfish fisheries, 2004 through 2020.

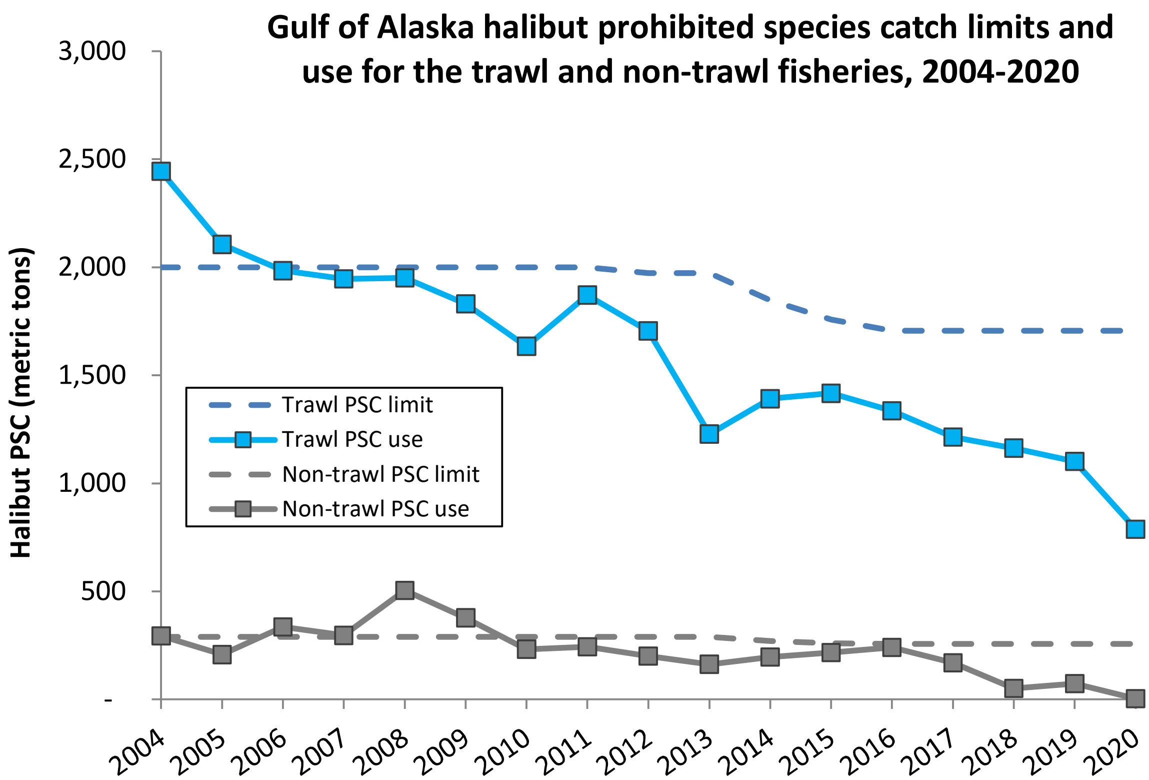
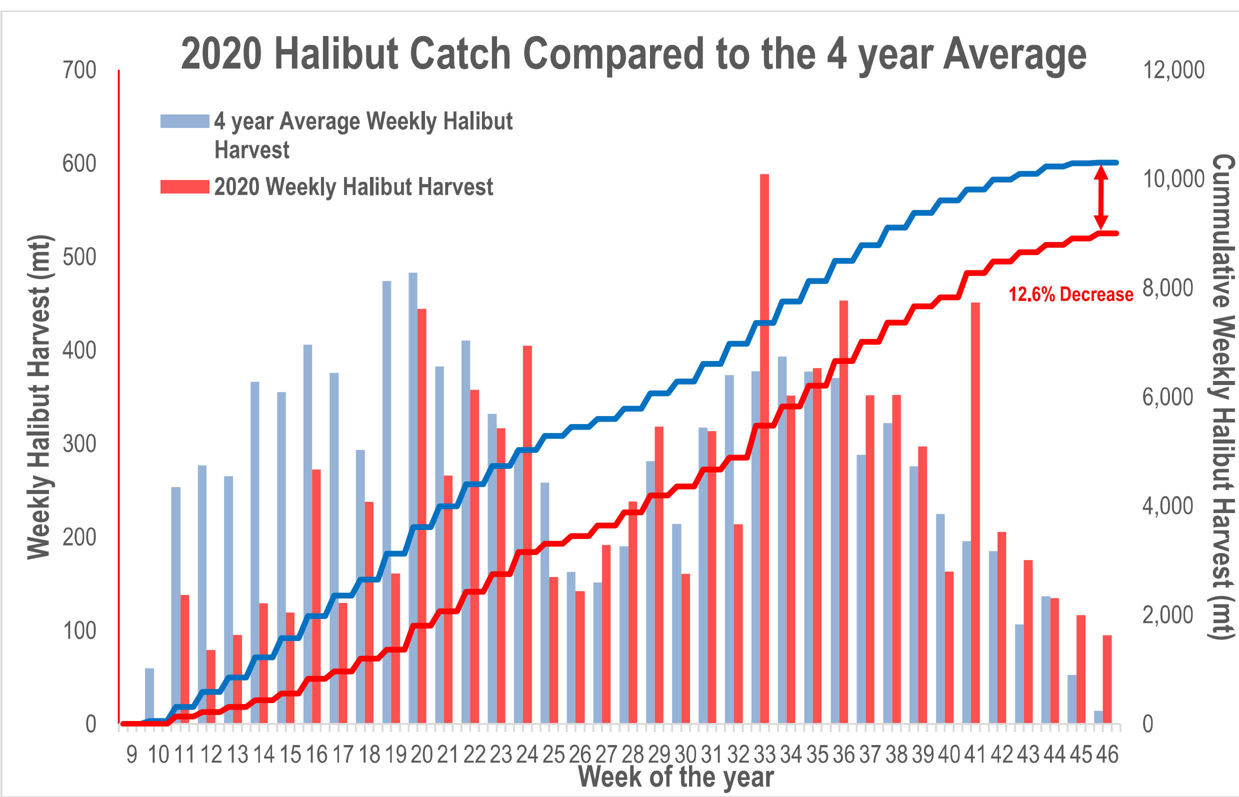


Figure 3. GOA halibut prohibited species catch limits and use for the trawl and non-trawl groundfish fisheries, 2004 through 2020.



2020 Halibut PSC Estimates

The 2019 halibut PSC estimates were developed using a method to spatially account for PSC. This is the same method developed in 2015 by NMFS in consultation with the IPHC. NMFS submitted preliminary 2019 PSC data to the IPHC for its halibut stock assessment in October 2019. NMFS provided final revised estimates to the IPHC in early January 2020 and are incorporated into APPENDIX IV of this document.

Halibut Bycatch Management Actions in Progress

This report covers actions that are under development by NMFS. Please refer to the Council's management letter for actions under development by the Council.

Exempted fishing permit (EFP) application

NMFS received an application for an EFP from the Alaska Seafood Cooperative (AKSC). The EFP was requested by John Gauvin from AKSC on June 2, 2020. This EFP would enable a collaborative study with Amendment 80 fishermen of halibut excluders in the Bering Sea flatfish trawl fishery to conduct field testing to explore improved designs.

This EFP would involve one trip with twin trawls on the vessel North Star, which would do up to 70 tows in the one trip in both yellowfin and flatfish fisheries. To address potential differences in catch rates, the excluder device would be switched from one side to the other at the half way point for each part of the EFP testing (i.e. halfway through the tows in the yellowfin target; same for the tows in the flathead target). This would allow a separate analysis of excluder performance in each net, which would help to identify differences in catch rates for halibut and target species between sides. Ancillary data collection will involve taking fin clips from halibut to see whether the sex can be identified. This information is of interest to the IPHC.

The applicant is aiming to do the field testing in August 2021. The activities proposed under the EFP are not expected to have a significant impact on the human environment. To conduct this experiment, exemptions would be necessary from two regulations. First, an exemption would be necessary from the requirement to minimize catch of prohibited species at § 679.21(a)(2)(i) in the event higher than average catch of halibut is encountered during field testing.

NMFS will send a letter to the IPHC in January to provide notice of this EFP application for review and determination as to whether this action requires further consultation.

Halibut Abundance Based Management

In October 2020, The Council reviewed both a preliminary draft environmental impact statement (DEIS) and a discussion paper on approaches to indexing Amendment 80 (A80) halibut prohibited species catch (PSC) limits to abundance. The discussion paper also contained information on other approaches to incentivize the A80 sector to minimize halibut bycatch.

The action alternatives in the preliminary DEIS were initially proposed by stakeholders and refined and adopted by the Council over a series of meetings. Alternatives 2 through 4 set PSC limits based on control rules that are indexed to either the EBS trawl survey (Alternative 2) or the IPHC setline survey (Alternatives 3 and 4). The alternatives include a range of elements and options for floors, ceilings and other features that modify the responsiveness of the control rule that establishes the PSC limit based on abundance. The model-based analysis of alternatives indicated that the magnitude of change in PSC limits over time would be higher than the change in directed fishery catch and that, given the information available on Pacific halibut recruitment projected forward, PSC limits within the projected range negligibly impact long-term spawning stock biomass (SSB), but near-term trends in SSB vary mainly based on the current IPHC assessment age structure. Lower PSC limits are projected to result in greater directed halibut fishery catches (although at less than a 1:1 ratio) and are expected to reduce gross revenues for the A80 groundfish sector to varying degrees. The Council also reviewed a social impact assessment (SIA) that evaluates community and regional patterns of engagement in, and dependency on, the BSAI Amendment 80 groundfish fishery and the BSAI/Area 4 commercial and non-commercial halibut fisheries as well as the potential for community level impacts under the no-action and action alternatives.

The discussion paper provided information on three proposed approaches that could substitute for the ABM approach analyzed in the DEIS: a look-up table control rule with breakpoints based on states of both surveys, a PSC performance standard applied to the status quo limit, and a concept that would shift halibut mortality from the A80 PSC limit to the CDQ reserve for directed commercial halibut harvest in Area 4CDE.

Following extensive review of the DEIS and discussion paper, SSC and AP review, and considerable public testimony, the Council revised the purpose and need statement to more directly address the action before the Council. In doing so the Council noted that it was removing the previously derived objectives and relying upon those folded into the new purpose and need as the stated objectives for any future action. The revised purpose and need statement is shown below:

> *Halibut is an important resource in the Bering Sea and Aleutian Islands (BSAI), supporting commercial halibut fisheries, recreational fisheries, subsistence fisheries, and groundfish fisheries. The International Pacific Halibut Commission (IPHC) is responsible for assessing the Pacific halibut stock and establishing total annual catch limits for directed fisheries and the North Pacific Fishery Management Council (Council) is responsible for managing prohibited species catch (PSC) in U.S. commercial groundfish fisheries managed by the Council. The Amendment 80 sector is accountable for the majority of the annual halibut PSC mortality in the BSAI groundfish fisheries. While the Amendment 80 fleet has reduced halibut mortality in recent years, continued decline in the halibut stock requires consideration of additional measures for management of halibut PSC in the Amendment 80 fisheries.*
>
> *When BSAI halibut abundance declines, PSC in Amendment 80 fisheries can become a larger proportion of total halibut removals in the BSAI, particularly in Area 4CDE, and can reduce the proportion of halibut available for harvest in directed halibut fisheries. The Council intends to establish an abundance-based halibut PSC management program in the BSAI for the Amendment 80 sector that meets the requirements of the Magnuson-Stevens Act, particularly to minimize halibut PSC to the extent practicable under National Standard 9 and to achieve optimum yield in the BSAI groundfish fisheries on a continuing basis under National Standard 1. The Council is considering a program that links the Amendment 80 sector PSC limit to halibut abundance and provides incentives for the fleet to minimize halibut mortality at all times. This action could also promote conservation of the halibut stock and may provide additional opportunities for the directed halibut fishery.*

The Council revised its alternatives to meet the purpose and need, and direction was provided to analysts on the scope of the analysis for the next draft of the preliminary DEIS. The Council recommended replacing the existing suite of action alternatives in the DEIS with the following three action alternatives based upon different look up tables utilizing breakpoints determined by both the IPHC setline survey and the EBS trawl survey. Under any of the action alternatives, the PSC limit would be determined annually based on survey values from the most recent year available. A synopsis of the alternatives is provided below; the actual look up tables contained in the Council's motion are posted to the October eAgenda.

Alternative 2: A 3X2 look-up table with PSC limits that range from current PSC limit to 20% below current limit.

Alternative 3: A 4X2 look-up table with PSC limits that range from 15% above current PSC limit to 30% below current limit.

Alternative 4: A 4X2 look-up table with PSC limits that range from current PSC limit to 45% below current limit.

The Council also adopted four options that could be applied to any of the alternatives.

Option 1: PSC limit is determined using a 3-year rolling average of survey index values instead of the most recent survey value.

Option 2: PSC limit varies no more than (suboptions: 10% or 15%) per year.

Option 3: Establish an annual limit of (suboptions: 80% or 90%) of the PSC limit generated by the look-up table. In 3 of 7 years, the A80 sector may exceed the annual limit up to the PSC limit generated by the look-up table. If the A80 sector has exceeded the annual limit in 3 of the past 7 years, then (suboptions: 80% or 90%) of the PSC limit generated by the look-up table is a hard cap for that year.

Option 4: (mutually exclusive with Options 2 and 3) PSC unused in one year may roll to the following year to increase the PSC limit generated by the lookup table up to 20%. Any PSC savings in excess of 20% would stay in the water.

The Council requested that the next version of the DEIS shift the analytical focus from a management strategy evaluation (MSE) approach centered on evaluating objectives with respect to performance metrics to a more traditional impacts analysis on the affected fishing sectors and other affected resource components. The analysis will provide the information necessary for the Council to understand the expected impacts of each alternative on the affected sectors and use the information to develop an action that balances the requirements of the Magnuson-Stevens Act. The analysis is scheduled for initial review in April 2021 which following timing requirements for NEPA with an EIS would set up final action in Fall 2021.

Observer Fee Increases

In October 2019, the Council unanimously recommended to increase the observer fee to 1.65 percent. Beginning on January 1, 2021, a fee equal to 1.65 percent of the ex-vessel value will be assessed on the landings of groundfish and halibut subject to the fee. The fee is increased from 1.25 percent to 1.65 percent to support observer and electronic monitoring deployment at rates more likely to meet the Council's and NMFS' monitoring objectives (85 FR 41424, July 10, 2020). Ex-vessel value is determined by multiplying the standard price for groundfish by the round weight equivalent for each species, gear, and port combination, and the standard price for halibut by the headed and gutted weight equivalent. Standard prices are determined by aggregating prices by species, gear, and area grouping to arrive at an average price per pound for each grouping. NMFS reviews each vessel landing report and determines whether the reported landing is subject to the observer fee and, if so, which groundfish species in the landing are subject to the observer fee. All IFQ or CDQ halibut in a landing subject to the observer fee will be included in the observer fee calculation. For any landed groundfish or halibut subject to the observer fee, NMFS will apply the appropriate standard ex-vessel prices for the species, gear type, and port, and calculate the observer fee associated with the landing. Each year NMFS publishes standard prices in a notice in the Federal Register (85 FR 82447, December 18, 2020).

Increasing the fee percentage does not strictly mean that fee revenues will increase relative to previous years. Gross fee revenues are a function of the harvest and standard ex-vessel prices, which may be independent of fee percentage charged against gross ex-vessel revenue and are therefore affected by market fluctuations. Additionally, the cost of monitoring services (observer and EM deployment) affect the amount of coverage that can be purchased with available funds.

Observer Coverage Rates

Overall, for all federal fisheries off Alaska, 4,497 trips (41.6%) and 510 vessels (47%) were monitored by either an observer or EM system in 2019. A total of 404 individual observers were trained, briefed, and equipped for deployment to vessels and processing facilities operating in the BSAI and GOA groundfish and halibut fisheries.

Observers collected data on board 398 fixed gear and trawl vessels and at eight processing facilities for a total of 39,989 observer days (36,068 full coverage days on vessels and in plants; and 3,921 observer deployment days in partial coverage).

A summary of the number of vessels and trips in each stratum and realized coverage rates in 2019 were as follows:

Coverage category	Strata	Total vessels	Total trips	Sampled trips	Coverage rate
Full coverage	Full	161	3,343	3,338	99.9
Partial coverage	Hook-and-Line	318	1744	307	17.6
	Pot	73	528	74	14.0
	Tender Pot	30	44	13	29.5
	Trawl	78	1568	395	25.2
	Tender Trawl	26	56	20	35.7
	EM Hook-and-Line	138	916	291	31.8
	EM Pot	21	165	60	36.4
No selection	Zero Coverage	393	2005	0	0.0
	Zero Coverage- EM Research	4	29	0	0.0

In December, 2019, NMFS released the final 2020 ADP with the following strata and deployment rates:

- No Selection – 0%
- Trawl – 20%
- Hook-and-line – 15%
- Pot – 15%
- Fixed-Gear EM – 30%
- Trawl EM EFP–100% at-sea EM; plus: 30% shoreside monitoring in GOA or 100% shoreside monitoring in BS

Starting in March, 2020, the COVID-19 pandemic created limitations on available air travel and "shelter in place" restrictions, particularly in many remote Alaskan communities. Under the emergency rule signed on March 24, 2020, NMFS temporarily waived the requirement for vessels in the Partial Coverage Category to carry a fishery observer from March 27 through April 19, 2020. On April 18, 2020, NMFS announced a limited extension of the temporary waiver of observer requirements, which narrowed the scope and reinitiated deployment of observers on trips departing from the port of Kodiak, Alaska (the majority of GOA trawl fisheries occurred out of Kodiak during this timeframe). On June 28, 2020, NMFS expanded observer deployment in the partial coverage category to include 13 ports in addition to Kodiak, which further reduced the scope of waivers issued. The largest component of the Alaskan groundfish fisheries, vessels, and processors in the full coverage category (including catcher processors and participants in limited access privilege programs), were not issued waivers in 2020. Additionally, requirements for deployment of EM was not waived for trawl catcher vessels fishing under the trawl EM exempted fishing permit and only a few trips were released from coverage under the fixed gear EM portion of the partial coverage category for circumstances when an EM service technician was unable to travel.

Table 1. Sampling strata and selection pools in the partial coverage category from 2013 to the present. The partial coverage selection rates set through the Annual Deployment Plan since 2013 are noted and the realized coverage rates evaluated in the Annual Report are noted in parentheses. CP = catcher/processor vessel; CV = catcher vessel; GOA= Gulf of Alaska; BS = Bering Sea; H&L = hook-and-line gear; LOA = vessel length overall.

Year	**Observer trip selection pool** Observer coverage required on all randomly selected trips	**EM trip selection pool** EM required on randomly selected	**Trawl EM**	**Observer vessel selection pool**	**No selection pool** Observer coverage not required	
2020	Trawl: 20%; H&L: 15%; Pot: 15%	Fixed gear (H&L and Pot) EM: EM required on randomly selected 30% of trips	100% at-sea EM; 30% shoreside monitoring in GOA and 100% shoreside monitoring in BS	n/a	Vessels <40' LOA and Jig gear	EM Innovation Research 4 vessels
2019	Trawl: 24% (25.2); Trawl Tender: 27% (35.7); H&L: 18% (17.6); Pot: 15% (14.0); Tender Pot: 16% (29.5)		n/a			
2018	Trawl: 20% (20.3); Trawl Tender: 17% (35.0); H&L: 17% (15.5); Pot: 16% (15.5); Tender Pot: 17% (29.0)	H&L EM: 30%; Pot EM Pre-implementation: 30%				
2017	Trawl: 18% (20.7); Trawl Tender: 14% (18.8); H&L: 11% (12.0); H&L Tender: 25% (0); Pot: 4% (7.7); Pot Tender: 4% (5.3)	n/a				Voluntary EM Pre-implementation ~90 vessels
2016	Trawl: 28% (28.0); H&L: 15% (15.0); Pot: 15% (14.7)					Voluntary EM Pre-implementation 60 vessels
2015	Large Vessel: 24% (23.4) Trawl CVs, Small CPs, H&L/Pot CVs ≥ 57.5'; Small Vessel: 12% (11.2) H&L/Pot CVs >40' and <57.5'					Voluntary EM Pre-implementation 12 vessels
2014	All Trawl CVs and H&L/Pot vessels ≥ 57.5' LOA: 16% (15.1)			H&L/Pot CVs >40' and <57.5': 12% (15.6)		Voluntary EM
2013	All Trawl CVs and H&L/Pot vessels ≥ 57.5' LOA: 14.5% (14.8)			H&L/Pot CVs >40' and <57.5': 11% (10.6)	Vessels <40' LOA and Jig gear	

Commercial Halibut IFQ Program

IFQ Medical and Beneficiary Transfer Provisions

In April 2019, the Council took final action to modify the medical and beneficiary transfer provisions of the Individual Fishing Quota (IFQ) Program for the fixed-gear commercial Pacific halibut and sablefish fisheries.

NMFS published a Final Rule to implement IFQ Beneficiary and Medical Transfer Provisions published on February 14, 2019 (85 FR 8477), effective March 16, 2020. This action is intended to simplify administration of the medical and beneficiary transfer provisions while promoting the long-standing objective of maintaining an owner-operated IFQ fishery. NMFS expects to publish a final rule in early 2020.

Temporary Transfers of IFQ for 2020 Fishing Year

On June 25, 2020, NMFS published an emergency rule to modify the temporary transfer provision of the IFQ Program for the fixed-gear commercial Pacific halibut and sablefish fisheries for the 2020 IFQ fishing year. Temporary transfer of IFQ was permitted for all quota share holders. Other aspects of the IFQ Program such as IFQ area designation, vessel size designation, use (ownership) caps, and vessel caps were not modified by this action. The emergency rule was effective from June 25, 2020 through December 22, 2020. The Council recommended action was specific to the 2020 fishing year and, as such, NMFS did not solicit comments on this temporary rule and therefore this rule cannot be extended.

The NPFMC recommended this temporary action with the recognition that travel restrictions, health mandates, and other logistical and operational challenges posed by the COVID-19 pandemic presented management challenges for the IFQ fisheries. The Council concluded that increased flexibility to temporarily transfer IFQ pounds would reduce the amount of anticipated forgone harvest and would accommodate the wide variety of operational plans that IFQ owners and vessel operators use to harvest halibut and sablefish. The Council further noted that existing hired master provisions and medical transfer provisions leave out a portion of IFQ holders who might be affected by the challenges of actively prosecuting the 2020 fishery. As a result, the Council chose the broadest temporary transfer provision from the options it was presented.

Halibut IFQ Vessel Use Caps in Areas 4B, 4C, and 4D

On May 15, 2020 the NPFMC recommended an emergency rule to modify Halibut IFQ Vessel Use Caps in Areas 4B, C, and D. On July 9, 2020, NMFS published a final rule modifying Halibut IFQ Vessel Use Caps in Areas 4B, C, and D for the remainder of the 2020 season. That rule did not modify other aspects of the IFQ Program. The Council determined at the time that vessel capacity was uncertain for the aforementioned areas due to health and logistical challenges associated with the COVID-19 pandemic. The action was intended to reduce the risk that a portion of the halibut IFQ harvest would be forgone due to limited vessel capacity. The Council did not extend its recommendations to sablefish or to halibut in other IPHC management areas because fewer vessels have operated at or near vessel caps in those areas during previous years. The Council was clear that it strongly supports vessel caps in the IFQ Program and this emergency request represented a rare circumstance that does not indicate support to consider changing vessel caps in the future.

CQE Fish-Up in Area 3A

In June 2019, the Council recommended to allow category D halibut Individual Fishing Quota (IFQ) held by an Area 3A (Southcentral Alaska) Community Quota Entity (CQE) to be harvested on category C vessels from August 15 to the end of the IFQ fishing season. Modifying the regulations to allow D-category IFQ to be harvested on larger C-category vessels near the end of the IFQ season would provide more flexibility to CQE participants to fully harvest category D IFQ in Area 3A. NMFS published a final rule to implement this action on July 21, 2020 (85 FR 44021), effective August 20, 2020.

Subsistence

Through a grant from the National Marine Fisheries Service (NMFS) (NA18NMF4370086), the Alaska Department of Fish and Game (ADF&G) Division of Subsistence conducted a study to estimate the subsistence harvests of Pacific halibut in

Alaska in 2018. The full results appear in Technical Paper No. 456, "Subsistence Harvests of Pacific Halibut in Alaska, 2018" (Fall and Koster 2020). Results from this study were included in the AM096 documents.

Due to budget constraints, a survey to estimate subsistence halibut harvests in Alaska in 2019 did not take place. The grant between NOAA and the Division of Subsistence was extended and supplemented with funding to support developing a subsistence halibut harvest estimate for Alaska for 2020. The first round of mailed surveys to all Subsistence Halibut Registration Certificate (SHARC) holders will go out in January 2021, followed by two more surveys to non-respondents. We will report preliminary results at AM098 (January 2022).

NOAA Fisheries Office of Law Enforcement Alaska Enforcement Division

Report to the International Pacific Halibut Commission

January 1, 2020 to December 15, 2020

NOAA Office of Law Enforcement
Alaska Enforcement Division
P.O. Box 21767
Juneau, AK 99802
907-586-7225

TO REPORT VIOLATIONS:
Call 1-800-853-1964

The Alaska Enforcement Division (AKD) utilizes enforcement officers, special agents, and partnerships with the Alaska Wildlife Troopers and the U.S. Coast Guard to enforce federal fishing regulations in Alaska, covering 842,000 square miles of ocean, 6,600 miles of coastline, and 2,690 islands. Compliance is achieved by providing outreach and education, conducting patrols, monitoring offloads, and investigating violations of civil and criminal marine resource laws, including the Northern Pacific Halibut Act.

In 2020, there were 3,382 Individual Fishing quota (IFQ) halibut permits issued in Alaska and 30 IFQ landing ports. There were 955 charter halibut permits issued (529 for IPHC Area 2C; 426 for IPHC Area 3A), and 6,394 subsistence halibut permits.

Patrol and Boardings

In 2020, AKD personnel spent over 3,210 hours conducting patrols to deter potential violators, to monitor fishing and other marine activities, detect violations, provide compliance assistance, and provide outreach and education. OLE boarded 1,129 vessels with 648 of those boardings being related to halibut.

Results of Vessel Boardings

	2018	2019	2020
	Vessel Boardings	Vessel Boardings	Vessel Boardings
Subsistence Halibut	33	14	27
Commercial Halibut	473	216	314
Charter Halibut	190	302	136
Sport Halibut	168	261	171
Total	**864**	**793**	**648**

Compliance Assistance

In 2020, AKD personnel spent over 1,531 hours providing outreach and education to marine resource users. Outreach efforts at a number of organized events, as well as contacts in communities, ports, and at-sea, were canceled due to COVID-19. The goal of OLE outreach efforts is to ensure the most current and accurate regulatory information is widely distributed and understood.

Incidents

In 2020, AKD opened 885 halibut-related incidents, including outreach, vessel boardings, dockside monitoring, and compliance assistance. Of those 885 incidents, officers identified 396 halibut-related violations, which were resolved by compliance assistance, summary settlement, or a written warning.

Alaska Halibut Violations

	2018	2019	2020
Subsistence Halibut	58	29	14
Commercial Halibut	136	250	197
Charter Halibut	150	159	50
Sport Halibut	64	57	51
Commercial Groundfish involving Halibut	43	60	84
Total	**451**	**555**	**396**

***Not all violations resulted in an enforcement penalty**

2020 Halibut Related Violations documented by NOAA in Alaska:

14 Subsistence halibut fishing violations; most common violations included:

- Unqualified person applied for a SHARC
- Subsistence halibut with sport caught halibut.
- Improperly or unmarked subsistence halibut fishing gear
- Subsistence halibut fishing without a SHARC
- Exceeding vessel hook limit
- Fillet, mutilate, or otherwise disfigure subsistence halibut in any manner that prevents the determination of the number of fish caught, possessed, or landed
- Non-resident pulling subsistence halibut gear
- Subsistence halibut offered for sale.

197 Commercial IFQ/CDQ halibut violations; most common violations included:

- IFQ halibut overages greater than 10%
- Record keeping or reporting violations (PNOL, Landing Report, Logbook, PTR, Production Reports)
- Gear marking violations
- Failure to release undersized halibut with a minimum of injury by allowing fish to hit the crucifier.
- Retain undersized halibut, or discarding legal sized halibut
- Hired master and permit holder violations
- Vessel cap overages
- Misreporting IFQ area fished or fishing in an area with no IFQ available
- Fishing without an FFP

84 Commercial groundfish violations involving halibut; most common violations included:

- Failure to carefully release halibut or allow halibut to contact a crucifier or hook stripper
- Release halibut caught with longline gear by any method other than— positioning the gaff on the hook and twisting the hook from the halibut, straightening the hook by using the gaff to catch the bend of the hook, and bracing the gaff against the vessel or any gear attached to the vessel
- Puncture halibut with a gaff or other device
- Failure to have an IFQ hired master permit, as appropriate, in the name of the individual making the landing

51 Sport halibut violations; most common violations included:

- Sale or attempted sale of sport caught halibut
- Exceeding bag and/or possession limits
- Filleting, mutilating or skinning halibut onboard a vessel, other than 2 ventral pieces, 2 dorsal pieces, and 2 cheek pieces, with a patch of skin on each piece, naturally attached
- Fishing without a license/permit
- Using illegal gear
- Sport caught halibut onboard with commercial caught salmon

50 Charter halibut fishing violations; most common violations included:

- Logbook violations-
- Failure to ensure charter halibut anglers sign the logbook
- Failure to record CHP in the ADFG logbook/invalid CHP
- Report inaccurate information
- Failure to report GAF in the required time period or submitting inaccurate information
- Illegal guiding - no CHP
- Filleting, mutilating or skinning halibut onboard a vessel, other than 2 ventral pieces, 2 dorsal pieces, and 2 cheek pieces, with a patch of skin on each piece, naturally attached
- Exceeding bag limit, possession limit, size limits, or annual limits
- Charter fish without a CHP

Photo: OLE seizing halibut aboard a fishing vessel in a condition other than whole filets with skin on, in violation of IPHC Fishery Regulations § 26(1)(d).

Partnerships & Patrols

From April 1, 2020 to September 30, 2020, the Office of Law Enforcement (OLE), Alaska Division (AKD) conducted extensive patrols for the purposes of enforcement and education. In addition to daily dockside and vessel patrols, AKD conducted several multi-day patrols. Patrols were often coordinated with partners including U.S. Customs and Border Protection (CBP), U.S. Fish and Wildlife Service (USFWS), U.S. Coast Guard (USCG), Alaska Wildlife Troopers (AWT) and National Park Service (NPS). Partnered patrols provide the benefit of broader enforcement and outreach opportunities.

In July, an enforcement officer partnered with AWT for a 13-day patrol on the AWT P/V ENFORCER in Southeast Alaska. The team conducted 104 joint boardings. Six federal fisheries violations were documented during the patrol; including five violations for failure to have a valid 2020 CHP and one for fishing with longline gear in federal waters without a Federal Fishing Permit (FFP).

USCG MSST-Seattle and an AKD enforcement officer conducted sea patrols in July in the vicinity of Sitka Sound, Peril Straits, Salisbury Sound, and Crawfish Inlet. Boarding teams identified violations related to vessel safety, charter halibut, IFQ, and marine mammal viewing. OLE provided boarding teams guidance regarding charter halibut and IFQ regulations.

In July, three enforcement officers completed an eight day patrol on the P/V CAPE ELIZABETH. The team boarded 45 commercial, charter, and recreational vessels between Seward and Tuxedni Bay. 45 boardings resulted in 31 documented violations including halibut over-limits, oversized halibut, exceeding a CHP passenger capacity, and exceeding halibut line limits.

In September, three enforcement officers completed a patrol onboard the P/V CAPE ELIZABETH in waters off of Homer, Anchor Point, Halibut Cove, Seldovia, and Port Graham. The operation resulted in 11 boardings and documented 6 federal violations.

Significant Halibut-Related Investigations

Civil Administrative Cases

AKD referred cases to the NOAA Office of General Counsel, Enforcement Section (GCES), which issued Notices of Violation and Assessment (NOVA) in the following civil administrative cases. A NOVA is not evidence of liability; it is only an allegation. A respondent is entitled to a fair hearing before an administrative law judge at which the government must prove liability by a preponderance of the evidence.

AK1805481 – Harley Ethelbah (operator of the F/V Jean C and IFQ permit holder), Aaron Phillips (IFQ permit holder), and Moderation Enterprises, Inc. (vessel owner) were charged under the Northern Pacific Halibut Act with retaining more IFQ halibut while fishing in Area 2C than the total amount of unharvested Area 2C IFQ aboard. A $44,494.10 Notice of Violation and Assessment (NOVA) was issued.

AK1805110 – Kent Huff, Greg Taylor, and John Young were charged under the Northern Pacific Halibut Act with failing to carry onboard the charter vessel a legible copy of a valid GAF permit with the assigned charter halibut permit at all times that GAF fish were retained onboard. The $500 NOVA was settled for $450.

AK1805495 – Michael Sharrah (vessel owner/operator) and Kyla Young (IFQ permit holder) were charged under the Northern Pacific Halibut Act with taking and possessing at least sixteen undersized Pacific halibut. The $6,000 NOVA was settled for $5,400.

AK1708987 – Bradley Stewart Haynes (vessel owner/vessel operator/IFQ permit holder) and Gregory Beam (IFQ permit holder) were charged under the Northern Pacific Halibut Act and the Magnuson-Stevens Act with IFQ two-area violations and for making false statements. A $195,555.34 NOVA was issued.

Criminal Referral

GCES referred the following case to the U.S. Attorney's Office for the District of Alaska for criminal prosecution:

AK1708175 – James Stevens, operator of the F/V ALASKAN STAR and F/V SOUTHERN SEAS, pled guilty to one felony count of Lacey Act false labeling. In his plea agreement, Stevens admitted knowingly making and submitting false records regarding where he caught IFQ halibut and IFQ sablefish during 26 fishing trips between 2014 and 2017. Stevens further admitted that the records he falsified related to approximately 903,208 pounds of IFQ halibut and IFQ sablefish, which had a total approximate dock value of $4,522,210. Among other things, he agreed to pay a $1,000,000 fine by the time of sentencing and to recommend that the Court impose a term of imprisonment of no less than one year and one day. Sentencing is scheduled for May 10, 2021.

U. S. COAST GUARD ENFORCEMENT REPORT

TO THE INTERNATIONAL PACIFIC HALIBUT COMMISSION

(IPHC Areas 2C, 3A, 3B, 4A, 4B, 4C, 4D and 4E)

Prepared By:
Seventeenth U.S. Coast Guard District
Enforcement Branch (dre)

Coast Guard Resources in Alaska

The U.S. Coast Guard (USCG) 17th District (D17) covers the U.S. waters of Alaska. The area of responsibility includes all waters off Alaska out to 200 nautical miles, and encompasses the IPHC Areas 2C, 3A, 3B, 4A, 4B, 4C, 4D, and 4E. Resources used for fisheries enforcement include cutters, aircraft, and boats from coastal stations.

Cutters:

- The 378-foot High Endurance Cutter USCGC DOUGLAS MUNRO and 282-foot Medium
- Endurance Cutter USCGC ALEX HALEY home-ported in Kodiak, AK regularly patrol the Bering Sea in addition to periodic patrols of North Pacific waters.
- 418-foot National Security Cutters from California and Hawaii and 378-foot High Endurance Cutters from Washington are periodically assigned to patrol D17 waters or to monitor fisheries activity during transits to other operating areas.
- Four 225-foot buoy tenders conduct periodic law enforcement and are home-ported in Sitka, Cordova, Kodiak, and Homer.
- Two 154-foot Fast Response Cutters (FRC’s), home-ported in Ketchikan, AK and conduct routine law enforcement throughout Southeast and occasionally South Central Alaska.
- Five 110-foot patrol boats conduct routine law enforcement and are home-ported in Petersburg, Juneau, Valdez, Seward, and Homer.
- Two 87-foot Coastal Patrol Boats located in Puget Sound and Strait of Juan de Fuca ports make occasional patrols to SE Alaska.

Aircraft:

- Fixed wing and rotary wing aircraft are based out of Air Stations in Kodiak and Sitka. o Aircraft in Alaska: C-130, HH-60, HH-65.

Stations:

- The three coastal small boat stations, operating 29' and 45' boats, are located in Ketchikan, Juneau, and Valdez.

The primary at-sea fisheries enforcement assets are our cutters, ranging in size from the 87-foot patrol boats up to 418-foot cutters. Patrol boats are limited in sea keeping abilities, and conduct the majority of enforcement inside of 50 nautical miles from shore. This role is fulfilled by 154foot FRC's and 110-foot patrol boats in Alaskan waters with occasional deployments from 87-foot cutters from Washington state, which provide regular law enforcement presence in the commercial, charter, subsistence, and recreational fishing fleets. By 2024, D17 anticipates the addition of four more FRC's and two 87-foot patrol boats throughout Alaska that will eventually completely replace the 110ft patrol boat fleet and greatly enhance boarding capabilities.

Beyond 50 nautical miles, we rely upon our larger cutters to enforce all federal fisheries regulations, with National Security Cutters and High Endurance Cutters from throughout the west coast assigned to patrol Alaskan waters.

Small boat stations primarily focus on recreational, subsistence, and charter halibut activity in their regions, although this does not preclude them from boarding commercial vessels sighted in the course of normal duties.

Fisheries law enforcement flights are frequently conducted from Air Stations in Kodiak and Sitka, using a variety of assets from fixed wing HC-130 to MH60 and MH65 helicopters.

All units involved in fisheries enforcement receive training from the Coast Guard's North Pacific Regional Fisheries Training Center in Kodiak, Alaska prior to patrolling the region. NOAA Office of Law Enforcement (OLE) agents and state fisheries enforcement officers routinely participate in the training, as well as accompany cutters and aircraft during some fisheries enforcement patrols. The success of USCG fisheries enforcement operations is enhanced by collaboration with our enforcement partners from NOAA OLE and the state of Alaska, ensuring consistent presence on the fishing grounds and at offload sites.

Commercial Halibut Enforcement

In 2020, the USCG distributed its enforcement assets throughout the IPHC Areas, with boarding numbers listed in Table 1. The USCG enforcement focus is to protect the resource in accordance with the fishery management plan, to ensure equal economic opportunity for all participants, and to enhance safety of life at sea.

Table 1. 2019 & 2020 Geographic Distribution of Boardings on Vessels Targeting Halibut

IPHC Area	2019 Boardings	2020 Boardings
2C	426	264
3A	225	134
3B	5	0
4A	17	16
4B	3	3
4C	0	0

4D	6	1
4E	0	0
Total	676	418

There was a 38% decrease in halibut boardings this year, largely due to the significant decrease in charter halibut boardings as a result of COVID-19.

In Areas 2C through 4E, the commercial fishery is rationalized with the 2020 season lasting from March 14th to November 15th. D17 law enforcement assets routinely patrolled the fishing grounds, often conducting joint boardings with or in collaboration with NOAA OLE.

Joint operations with NOAA OLE were conducted throughout the season from the Bering Sea to Southeast Alaska. These operations included at-sea boardings, aircraft patrols, and dockside inspections. The joint agency efforts are a regular and important aspect of law enforcement coordination as they enable the broadest contact rate with the fishing fleets in order to compel compliance with federal regulations while also providing the most accurate and complete picture of fishing activity on the fishing grounds and at catch offload sites.

Routine patrols are essential to maintain awareness of halibut fishing activity. The long duration of the commercial season relieves the pressure to fish during inclement weather. This also gives participants the opportunity to spread their effort throughout the season as well as their permitted area.

The lack of a universal requirement for fishing vessels targeting halibut to be equipped with VMS on board means there is not a centralized means to assess and monitor fishing activity in Areas 2C through 4E. Time intensive patrols by surface and aviation assets are the primary means to identify where vessels are fishing for halibut. The need for patrols is amplified when market forces and/or fair weather conditions cause an increase in fishing activity.

Participants in the commercial halibut fishery only make up a portion of the hook and line vessels on the fishing grounds. During boardings of the hook and line vessels, USCG enforcement efforts focus on (1) adherence to permit requirements for area and individual quota, (2) safe release of halibut bycatch by other commercial vessels, (3) consistent use of seabird avoidance gear, (4) indicators of high-grading catch, (5) retention of rockfish and Pacific cod, (6) complete offload of catch, and (7) timely compliance with all recordkeeping requirements.

Recreational Halibut Enforcement

Recreational activity occurs in Areas 2C, 3A, and 3B in the form of individual and charter fishing. The season lasts from 01 February to 31 December but is most prevalent from May through September. USCG assets increase fisheries patrols during this time to focus on popular fishing grounds in Southeast Alaska, Prince William Sound, Cook Inlet, and the Gulf of Alaska. 76% of the halibut boardings accomplished by D17 assets in 2020 were conducted on the recreational and charter vessels.

During boardings, emphasis is placed on compliance with licensing and charter operation requirements as well as requirements which determine the size and number of halibut allowed to be caught.

Violations and Enforcement Summary

Overall, USCG assets boarded a total of 418 vessels and detected 11 IPHC violations. Violations are documented and referred to NOAA OLE or Alaska Wildlife Troopers (for violation detected on recreational vessels) for final action. Table 3 compares at-sea boardings and violations between 2019 and 2020.

Table 3. 2019 & 2020 Boarding and Violation Summaries by Industry Sector

2019 Boardings/Violations		2020 Boardings/Violations	
Total Fleet	5,025	Total Fleet	5,025
Commercial	825	Commercial	825
Charter	950	Charter	950
Recreational/Subsistence	3,250	Recreational/Subsistence	3,250
Total At-Sea Boardings	679	Total At-Sea Boardings	418
Commercial	167	Commercial	98
Charter	177	Charter	73
Recreational/Subsistence	332	Recreational/Subsistence	247
Fisheries Violations	11	Fisheries Violations	11
Commercial	7	Commercial	8
Charter	1	Charter	3
Recreational/Subsistence	3	Recreational/Subsistence	0
Fisheries Compliance Rates	98.3%	Fisheries Compliance Rates	97.4%
Commercial	95.8%	Commercial	91.8%
Charter	99.4%	Charter	95.8%
Recreational/Subsistence	99.1%	Recreational/Subsistence	100%

In Area 2C:

- One commercial vessel was cited for failing to have permits on board.
- One charter vessel was cited for failing to retain carcass of size restricted charter halibut
- One charter vessel was cited for mutilated halibut and logbook discrepancies

In Area 4A:

- A commercial vessel was cited for logbook violations and discarding required retention species.
- A commercial vessel was cited for not having correct permits on board

In Area 4B:

- A commercial vessel was cited for multiple discard and logbook violations.

Detected violations are transferred to NOAA OLE for disposition and outcomes ranged from compliance assistance, summary settlements, or catch seizures. The violations described above by their IPHC Area are listed below in Table 4 by violation type. This summary of IPHC and federal violations compares 2019 violations to 2020 violations detected by USCG units.

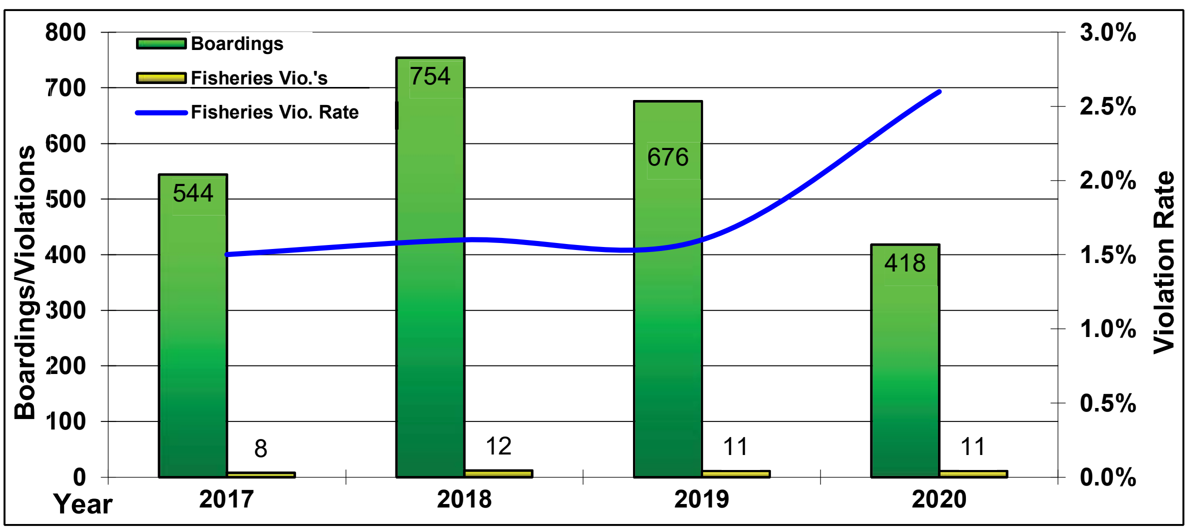
Table 4. 2019 & 2020 Description of Fisheries Violations in All Sectors

2019	2020
Mutilation of catch……………………………..1	Mutilation of catch……………………………..1
Not filling out harvest ticket.....…………….…… 1	Size restricted catch ………...………………… 1
Permit not available for inspection...…..……….6	Permit not available for inspection…....………..2
No pilot ladder …………………………………1	Discards…….. …………………………………2
Fishing without license…………………………1	Logbooks………………………………………5
Retaining over legal limit....……………………1	
Total…………………………………………..11	Total…………………………………………..11

In addition to the IPHC violations summarized in Tables 3 and 4, vessel safety issues encountered by our law enforcement assets across all halibut sectors included insufficient lifesaving equipment, improper navigation equipment, and missing documentation totaling 39 safety violations across all sectors. The USCG continues to pursue increased at-sea boarding opportunities to promote compliance with both safety and fisheries regulations.

The USCG continues to maximize joint enforcement efforts and information sharing with federal and state fisheries enforcement partners to optimize operations. Similar to recent seasons, USCG field commands held pre-season meetings with federal and state partners to coordinate efforts.

Figure 1. 2017-2020 Boardings and Fisheries Violations



The halibut fisheries violation rate averaged 1.8% over the last four years. The USCG continues to pursue a steady focus on compliance across IFQ, charter, subsistence, and recreational fisheries by maximizing boarding opportunities and detecting violations where they occur.

COVID-19 Impacts

The Coast Guard saw the largest impact of COVID-19 in the charter halibut sector. With travel restrictions and quarantine very few people traveled to hire charter halibut vessels. There was noticeably less charter operations on the water in 2020.

In order to safely continue operations, the Coast Guard implemented safety measures to include wearing additional personal protective equipment, quarantining and testing prior to patrols to Alaska, and health screenings prior to boardings.

Enforcement Plans for 2021

The USCG will continue joint pulse operations with NOAA and state enforcement partners to focus enforcement efforts across the commercial, charter, subsistence, and sport sectors of the halibut fishery.

The USCG will continue to enforce regulatory requirements which became effective in 2015 and 2016; mandatory dockside Commercial Fishing Vessel Safety Examinations (CFVSE) for all vessels which operate beyond three nautical miles from shore, and the carriage of AIS units for vessels over 65 feet in length. Commercial Fishing Vessel Safety inspectors continued to educate the industry about both requirements and have facilitated dockside exams to bring vessels into compliance. Vessels which operate beyond three nautical miles without a CFVSE or which fail to meet applicable AIS carriage requirements may receive a notice of violation if the deficiency is observed during an at-sea boarding.

The commercial and recreational halibut fisheries in Alaskan waters continue to draw high national and international interest. D17 will continue to actively patrol throughout the season and emphasize joint operations with our federal and state partners, NOAA OLE and the Alaska Wildlife Troopers.

By sustaining effort to patrol all areas where halibut fisheries occur, the USCG will strive to continually promote a level playing field for all participants and enhance safety at sea. Our goal is consistent and targeted enforcement presence applied fairly across all commercial, charter, subsistence, and recreational fleets.

With the continued replacement of the 110ft cutters with Fast Response Cutters, there will be higher contact rates with the fishing fleets. The longer range and better sea keeping abilities will allow the FRC's to stay on scene longer and more effectively monitor the fisheries.

APPENDICES

APPENDIX I. California Department of Fish and Wildlife Report

APPENDIX II. West Coast Enforcement Division Report

APPENDIX III. Alaska Department of Fish and Game Report

APPENDIX IV. Alaska Groundfish Report

APPENDIX I

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE REPORT ON THE 2020 RECREATIONAL PACIFIC HALIBUT FISHERY

The 2020 recreational Pacific halibut fishery in California was open May 1-August 11 and closed for the year on August 11 at 11:59 p.m., due to projected attainment of the quota. The California Department of Fish and Wildlife's (CDFW) 2020 preliminary season catch estimate is 64,107 net pounds, or 164 percent of the 39,000 net pound quota.

CDFW tracks recreational catch of Pacific halibut on a weekly basis during the open season. For the week ending July 26, projected catch was 14,760 net pounds, or 38 percent of the quota. The following week of July 27-August 2, an unprecedented 256 Pacific halibut were reported as kept by anglers and catch projections through August 2 indicated the quota had been exceeded. This is a record-high weekly value for California and set new monthly high records as well. Prior to this event, the record monthly high total sampled fish was 198 fish sampled in July 2014. Adding to the unusual nature of this event, in 2019 the California recreational fishery attained only 17,440 pounds of its 39,000-pound quota.

Upon receipt of sample data through August 2 two days later, CDFW initiated the consultation process with other Area 2A managing entities, as described in the Catch Sharing Plan. On August 6 and August 7, CDFW consulted with the International Pacific Halibut Commission, National Marine Fisheries Service (NMFS), and Pacific Fishery Management Council to discuss take to date and determine a closure date. Participants agreed that August 11 at 11:59 p.m. was the earliest date the fishery could be closed to accommodate the time needed to provide notice of the closure to the public. The closure was announced via the NMFS halibut hotline, CDFW news release, CDFW halibut hotline, and flyers CDFW posted at primary launching facilities.

In response to the record high number of fish sampled in such a short period of time, CDFW is exploring enhancements or modifications to the inseason catching tracking and monitoring approaches beginning in 2021 including increasing the frequency of reporting from weekly to daily or bi-weekly during peak months.

The anomalous high catches witnessed this year were primarily from the Eureka area, with approximately 71 percent of fish reported from this area. The high catch seen in the Eureka area was not seen in the California ports of Trinidad, Crescent City or Shelter Cove.

CDFW field samplers did not examine (measure/weigh) fish this year due to physical distancing requirements necessary to maintain staff health and safety during the COVID pandemic. Following standard estimation methods, in the absence of weight data, CDFW used prior year average fish sizes when calculating monthly catch estimates for this year. However, anecdotal reports this year indicated many fish caught off California were significantly smaller than the average size seen in prior years (20-25 pounds) with this year's fish potentially being in the 10-pound range. CDFW is exploring innovative options to measure a sub-set of fish in 2021 while meeting COVID-safe sampling procedures.

For more information about California's Pacific halibut fishery, contact:

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APPENDIX II

Annual IPHC Area 2A Enforcement Report to the International Pacific Halibut Commission

NOAA Fisheries Office of Law Enforcement

West Coast Division

December 2020

Annual Report to the

International Pacific Halibut Commission

NOAA Office of Law Enforcement

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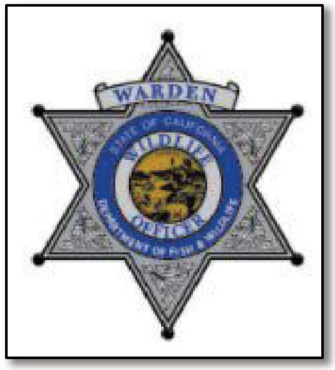
WEST COAST ENFORCEMENT - OVERVIEW

NOAA's Office of Law Enforcement (OLE) protects marine wildlife and habitat by enforcing domestic laws and international treaty requirements implemented to ensure these global resources are available for future generations. The 2020 IPHC Area 2A Enforcement Report summarizes the collective activities of the IPHC Area 2A cooperating federal and state entities, and includes the individual state enforcement reports to provide more detailed information about their respective enforcement and compliance efforts. Tribal reports are provided separately.

Enforcement of the commercial, tribal and recreational Pacific halibut fisheries in International Pacific Halibut Commission Area 2A is an ongoing multi-agency effort performed cooperatively by NOAA Fisheries Office of Law Enforcement (OLE), West Coast Division (WCD), the U.S. Coast Guard (USCG), California Depart of Fish and Wildlife Enforcement Division (CDFW), Oregon State Patrol Fish and Wildlife Division (OSP), Washington Department of Fish and Wildlife Police (WDFW), and Tribal Enforcement. Table 1 presents a consolidated summary of IPHC Area 2A commercial and recreational statistics for 2020 using data elements provided by OLE, USCG, CDFW, OSP, and WDFW.

Table 1. Area 2A Consolidated Enforcement Statistics -2020

2020 AREA 2A CONSOLIDATED ENFORCEMENT STATISTICS						
EFFORT	NOAA OLE (WCD)	USCG (D11/D13)	CDFW	OSP	WDFW	TOTAL EFFORT
AIRCRAFT PATROLS						
Number of Patrols		31				31
Hours		117				117
VESSEL PATROLS						
Number of Patrols		102			42	144
Hours		900		311	230	1441
SHORESIDE PATROLS						
Number of Patrols	31				3	34
Hours	167		13	414	13	607
AIRCRAFT PATROL PERSONNEL HOURS	39					39
VESSEL AT-SEA PERSONNEL HOURS			9	461	608	1078
SHORESIDE PERSONNEL HOURS	167		66	264	219	716
BOARDINGS AND CONTACTS	43	323	161	802	1,680	3009
ACTIONS						TOTAL ACTIONS
ENFORCEMENT ACTIONS	29	0	0	57	432	518
Compliance Assistance	11					11
Written Warnings	1				113	114
Citations	5				103	108
Warnings and Citations Combined				57	216	273
Other	12					12
RESULTS						TOTAL RESULTS
RECORDED WARNINGS/VIOLATIONS						
Undersized Halibut		1		1		2
Over Limit	8	1		6		15
Prohibited Gear					3	3
Logbook/Reporting	3					3
Permit/License				1	4	5
Restricted/Closed Area					27	27
Failure to Validate Tag				7		7
Illegal Harvest				13		13
Take/Possess Groundfish with Halibut on Board				4		4
VMS	8	3				11
Prohibited Species					2	2
Seabird Avoidance	7					7
Non-Compliance/Not Specified	3			54		57



California Department of Fish & Wildlife (CDFW) – Law Enforcement Division

CDFW Pacific halibut land-based enforcement activities include conducting dockside patrols to monitor catch off-loads, including incidental catch, and individual and vessel licenses; activities also include other compliance and verification checks and conducting collaborative enforcement efforts. CDFW at-sea responsibilities include patrolling the Pacific Ocean, conducting operations, joint enforcement, and inspecting at-sea vessels and personnel for licenses, federal permits, logbooks, marine permits and registration, and catch on board, with emphasis on activities within the Exclusive Economic Zone. Most CDFW activities focused on Pacific halibut is isolated to the North Coast of California, from Mendocino County to the Oregon/California border.

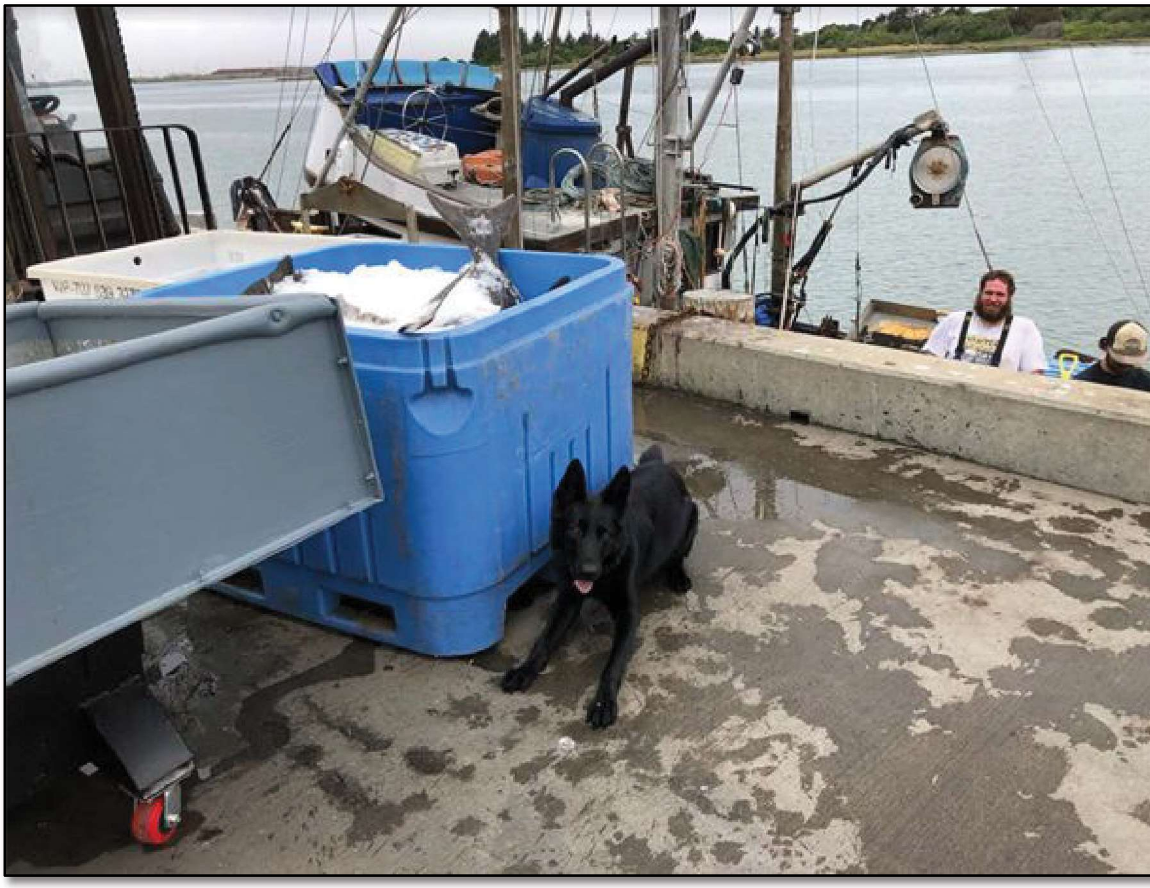
2020 CDFW IPHC Enforcement Efforts:

During 2020, CDFW Wildlife Officers worked joint operations with USCG and NOAA uniformed personnel during the halibut season. The CDFW halibut patrols covered the major ports in Mendocino, Humboldt and Del Norte Counties, and approximately 15 sport boat launch ramps. CDFW patrolled, contacted, and regularly checked 9 party boats targeting halibut between Shelter Cove and Crescent City. Numerous dockside and at-sea contacts were made where halibut were present. Offshore halibut patrols were made in combination with salmon and rockfish patrols. No violations were observed this year.

CDFW IPHC Enforcement Statistics			
	2020	**2019**	**2018**
Participating CDFW Wardens	9	11	11
Dockside Personnel Hours	66	85	110
At-Sea Personnel Hours	9	13	64
Contacts Made (Total)	161	399	436
Commercial	14	20	56
Recreational	147	379	380
Enforcement Actions			
Warnings	0	0	25
Citations	0	1	3

***2020* CDFW IPHC Enforcement Highlights:**

- CDFW acquired a new 38’ MetalCraft Marine patrol boat for offshore fisheries patrols in the Eureka area. This boat is fully equipped with the latest electronics equipment including radar, GPS, VHF radio, night vision, auto pilot, State radio and satellite phone. The patrol boat is powered by dual 300 HP Yamaha outboard engines, and has a 375 gallon fuel capacity which gives it great range for long offshore fisheries patrols. CDFW Wildlife Officers Michael Hampton and Taylor Norris are the primary operators of this new patrol boat. This new vessel was funded jointly with CDFW and NOAA JEA funds.



- CDFW Wildlife Officer Michael Hampton's K9 Leeloo is a four-year old German Shepherd who is assigned to the Patrol Vessel Mako in Eureka, California. Leeloo is POST certified in the detection of fish, crustaceans, and mollusks. K9 Leeloo assisted with the inspection of commercial and recreational vessel inspections with the goal of locating concealed halibut. Leeloo was also deployed at local boat docks and ramps with the same goal. Leeloo's training consists of concealing fish and wildlife odors in various locations that they are likely to encounter during CDFW patrols. CDFW Officer Hampton has trained Leeloo specifically with Pacific Halibut and California Halibut odors for many hours which has made her quite proficient at detecting either odor.

Oregon State Police (OSP) – Fish & Wildlife Division

OSP Pacific halibut land-based enforcement activities include conducting dockside patrols to monitor catch off-loads, including incidental catch, and individual and vessel licenses; activities also include other compliance and verification checks, as well as conducting collaborative enforcement efforts. OSP at-sea responsibilities include patrolling its Pacific Ocean jurisdiction, conducting operations, joint enforcement, and inspecting at-sea vessels and personnel for licenses, federal permits, logbooks, marine permits and registration, and catch on board, with emphasis on activities within the Exclusive Economic Zone.

2019 OSP IPHC Enforcement Efforts:

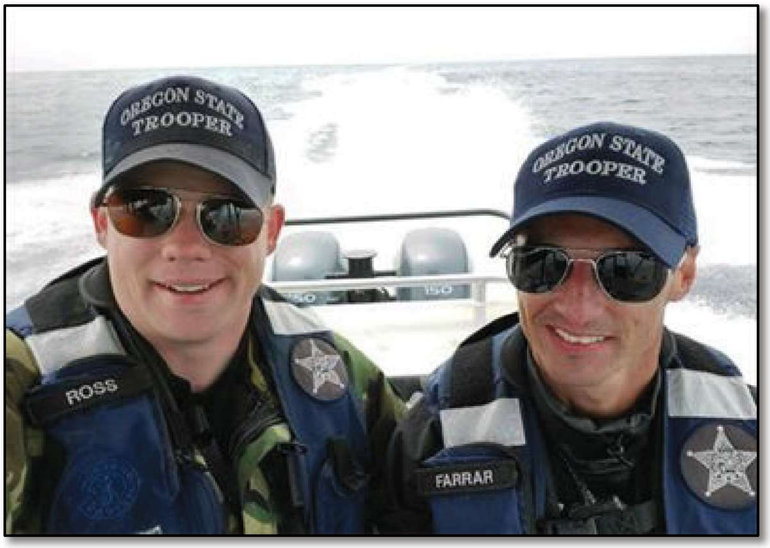
During 2020, OSP committed seventeen commissioned staff to Pacific halibut enforcement activities, for a total of 725 operational (vessel and personnel) hours. In conjunction with dockside enforcement efforts, at-sea resource hours included long-range and nearshore patrols. Also, in addition to the IPHC enforcement statistics noted below, OSP observed a 93% compliance rate for recreational contacts and a 96% compliance rate for commercial vessels in 2020, as compared to 87% for recreational contacts and 94% for commercial contacts during 2019.

OSP IPHC Enforcement Statistics			
	2020	**2019**	**2018**
Participating OSP Troopers	17	13	23
Dockside Personnel Hours	264	191	165
At-Sea Personnel Hours	461	162	183
Contacts Made (Total)	802	379	912
Commercial	93	99	53
Recreational	709	280	859
Enforcement Actions			
Warnings / Citations	57**	18*	40

***1 federal referral**

**** 3 federal referrals**

2020 OSP IPHC Enforcement Highlights:



Fish and Wildlife Troopers conducted a boat patrol in the Pacific Ocean out of Charleston focusing on nearshore Halibut and other marine fish. During the patrol, multiple anglers were contacted, and three citations were issued for **Failing to Immediately Validate Harvest Card - Halibut**.

The Marine Fisheries Team and Newport Fish and Wildlife Troopers conducted an offshore Guardian patrol for the busy Saturday All Depth Halibut fishery. One boat was observed entering the Stonewall Banks RCA and stop and begin fishing for halibut well inside of the Closure. The vessel was contacted and both anglers were cited. They were aware of the closure but had their plotter zoomed in too far they were unaware where they were. Multiple boats were boarded at sea and seven citations were issued for **Fail to Validate Harvest Card**.

Fish and Wildlife Troopers conducted an ocean patrol out of Depoe Bay on the opening day of recreational halibut. Fishing pressure out of Depoe Bay was nonexistent due to weather, but the troopers checked a handful of halibut boats north of Newport. One citation was issued for **Angle with More Than One Rod**.

Fish and Wildlife Troopers conducted boat patrols in Tillamook Bay and in the Pacific Ocean during a three- day halibut opener. Ocean conditions were not ideal, so a significant amount of the patrol time was conducted in Tillamook Bay. Several anglers were contacted during the patrols angling for halibut, Spring Chinook salmon, bottom fish, and crabbing from boats. Bank anglers on the Barview Jetty were also contacted during the patrol. Two of the subjects contacted had filleted their catch (one halibut and two Rock fish) while their respective boats were underway. Because the species were still easily recognizable and length/sex of the fish were not an issue, they were both warned for **Possession of Mutilated Fish**.

Fish and Wildlife Troopers conducted a boat patrol in the Pacific Ocean out of Garibaldi focusing on nearshore Halibut and marine fish. During the patrol, multiple anglers were contacted, and various warnings were issued for **Failing to Immediately Validate Harvest Card - Halibut** and **Improper Validation of Harvest Card - Halibut**.

Fish and Wildlife Troopers conducted an ocean patrol from Garibaldi to Cannon Beach. The troopers checked numerous nearshore Halibut anglers, Rockfish anglers, and commercial Lingcod fishermen. Multiple warnings were given, and no citations were issued.

A Fish and Wildlife Trooper conducted a halibut patrol at the South Beach boat launch in Newport during the all depth halibut fishery. Angling pressure and halibut retention was slow due to poor weather conditions. During the patrol, a boat returned to the ramp with two halibut on board that were not tagged. One of the anglers did not have a combined angling tag in his possession and the other angler failed to electronically validate his tag. Two citations were issued for **Fail to Immediately Validate Harvest Card** and one warning was issued for **No Valid Angling License/Tag in Possession**.

A Fish and Wildlife Trooper worked a three-day patrol aboard the U.S. Coast Guard Cutter Robert Ward during the commercial halibut fishery. The three-day patrol covered halibut fishing areas between Newport and the California border. Multiple fishing vessels were contacted with no violations observed. A fishing vessel was contacted off Coos Bay while the crew was pulling in a longline. There were eight halibut on the deck of the vessel which were below the 32 inch minimum size limit. The captain was interviewed, and he stated he was

going to wait until they were done pulling in the longline and then measure the fish. Several of the undersized halibut had lower jaws ripped apart and all eight fish were dead. The captain was issued a citation for **Unlawful Take/Possession of Undersized Halibut**. The eight halibut were seized.

Marine Fisheries Team Troopers conducted a joint operation onboard the PV Guardian with USCG boarding team from the USCG Cutter Alert. Troopers and Coastguard personnel focused enforcement efforts on the commercial halibut opener. Multiple contacts were made. Two vessels were found out of compliance with the new seabird avoidance rules when deploying gear to minimize impacts to seabirds. Another VMS violation was detected for a vessel fishing without transmitting required VMS positioning. The cases were referred to NOAA for enforcement action.

Troopers from the Marine Fisheries Team conducted a Guardian patrol out of Newport during the second Commercial Halibut opener. Sport anglers and commercial vessels were contacted, and compliance was high.

Members of the MFT conducted a multi-day offshore patrol on the PV Guardian from Newport to Florence to Winchester Bay. The enforcement focus was on sport halibut and sport and commercial salmon. The team also received two calls of possible infractions in the Cape Perpetua Marine Reserve which later was determined unfounded. Fishing pressure was high due to the flat ocean conditions. During that patrol, Troopers encountered numerous sport angling offenses that included the following:

- Angling Prohibited Method, Barbed Hooks
- Fail to Properly Validate Harvest Card
- Fail to Immediately Validate Harvest Card
- Aiding in a Wildlife Offense- Fail to Validate Harvest Card
- Aiding in a Wildlife Offense- Angling Barbed Hooks.
- Unlawful Possession of Canary Rockfish –Angler had caught and illegally retained a canary rockfish on an all depth Halibut day and was using cut up fillets as bait. One fillet was seized.

Fish and Wildlife Troopers conducted an offshore patrol out of Newport for a commercial halibut opener. Seven commercial fishing vessels were monitored to ensure they didn't start setting gear until the legal set time. Additionally, once gear was legally allowed to be set, the Troopers monitored the vessels to ensure they were deploying the required seabird avoidance devices for vessels retaining sablefish. One vessel had deployed avoidance gear but it was not working properly. The captain of the vessel was able to remedy the issue with the gear and was able to have a functional streamer lines for his second set of longline gear. Two vessels were found without deploying any type of avoidance devices but later it was determined they did not retain any sablefish so therefore were not required to have avoidance gear. Another vessel suspected of fishing his sablefish tier permit without having the required permit holder onboard was contacted and it was verified the permit holder was in fact onboard the vessel for that trip.

A Fish and Wildlife Trooper finished an investigation regarding a charter fishing vessel out of Newport. A complainant reported an incident that took place on May 21st in which he went on an all depth halibut trip. During the trip, he reported they angled for halibut near an area known as the "Chicken Ranch", approximately 30 miles offshore and SW of the port of Newport. During the trip he witnessed a charter vessel employee throw groundfish overboard without the use of a descender device. He reported observing approximately 12 rockfish thrown overboard that were unable to descend on their own and were seen floating on top of the water. The captain and the deckhand of the charter vessel were both interviewed and criminally cited for **Fail to Immediately Release Fish Unharmed**. During the interview, the deckhand also stated that rather than using a descender device, he has been popping the rockfish swim bladders and then releasing them in the water, so they do not float to the surface.

Washington Department of Fish & Wildlife (WDFW) – Police

WDFW Pacific halibut land-based enforcement activities include conducting dockside patrols to monitor catch off-loads, including incidental catch, and individual and vessel licenses; activities also include other compliance and verification checks and conducting collaborative enforcement efforts. WDFW at-sea responsibilities include patrolling the Pacific Ocean, conducting operations, joint enforcement, and inspecting at-sea vessels and personnel for licenses, federal permits, logbooks, marine permits and registration, and catch on board, with emphasis on activities within the Exclusive Economic Zone. Pacific halibut is shared among four user groups in Washington State: recreational, directed non-Indian commercial, non-Indian incidental, and Tribal fishermen.

2020 WDFW IPHC Enforcement Efforts:

WDFW IPHC Enforcement Statistics			
	2020	**2019**	**2018**
Participating WDFW Officers	20	22	18
Dockside Personnel Hours	219	299	110
At-Sea Personnel Hours	608	430	351
Contacts Made (Total)	1,680	752	1,444
Commercial	unk	unk	81
Recreational	unk	unk	1,363
Enforcement Actions			
Warnings / Citations	216	163	128

2020 WDFW IPHC Enforcement Highlights:

- 20 Officers were involved in Halibut patrols during the 2020 Halibut season

- 219.1 dockside hours worked by WDFW personnel focused on Halibut
- 33 separate patrols, 608.4 hours at-sea personnel hours were worked in support of halibut
- 245.6 patrol hours utilizing type-2 vessels, 33 total patrols (per type of vessel, i.e., long-range, medium-range, or near-shore) were used in support of halibut
- 1,680 contacts – 875 dockside, 805 via vessel. 399 individual vessels boarded, 99 vessels not in compliance.
- 216 enforcement actions were taken focused on Halibut: 113 were issued warnings, 103 were issued either a citation or an infraction. Of the above actions, 22 individual contacts were made for closed area.

Officer Cilk at the helm while Officers Baldwin and Bolt conduct sport halibut checks

Recreational Season

Officer Bolt, Officer Baldwin and Officer Cilk patrolled recreational halibut anglers in Marine Area 2 during the opener. Compliance was poor, with 16 citations issued in total. One boat with 3 anglers was found in possession of 6 halibut, despite two of the anglers not having a halibut Catch Record Card. The skipper also failed to record his halibut. The anglers were cited for No License, Fail to Record, and First-Degree Overlimit. 5 out of the 6 fish were seized. The officers also cited several other individuals for Fail to Record and several additional anglers for No License. 8 halibut in total were seized.

Eight sport halibut seized on opening day offshore of Westport by Officers Cilk, Bolt, and Baldwin.

Officer Dielman patrolled Marine Areas 2, 3, and 4 with Sergeant Rosenberger during the recreational halibut opener. Citations were written for fished in a Rockfish Conservation Area, overlimit, and FTR. Warnings were given for FTR and NLOP.

Sgt. Rosenberger on a boat found to have filleted halibut and ling cod from "yesterday" on board in addition to a limit of halibut from the current day.

Officer Bolt, Officer Cilk, and Officer Baldwin patrolled Marine Area 2 for a combined recreational salmon/halibut patrol. Compliance continued to be poor, with 13 citations issued in total. The first boat the officers contacted was fishing just off the Grays Harbor south jetty inside the closed Grays Harbor Control Zone. The four occupants had 3 Chinook salmon on board and were actively fishing. Three of the four anglers were cited for closed-season possession and their salmon (2 wild, 1 hatchery) were seized. Two other anglers in the Control Zone were cited infractions for fishing closed-season without possession, and another angler was cited for barbed hooks. Although compliance with halibut-specific regulations was slightly better than the previous week, the officers still found several vessels in violation. Two anglers were cited for No License and their halibut seized. Several anglers were cited for Failure to Record, and one angler was cited for a rockfish overlimit. The officers also contacted a vessel with four limits of halibut and four limits of rockfish on board. Officer Bolt boarded the boat to inspect their catch and found 3 closed-season yelloweye rockfish on board. The anglers claimed they could not tell the difference between a yelloweye and a canary rockfish. The yelloweye were seized for evidence and the anglers cited.

Officers Cilk, Bolt, and Baldwin with seized Chinook, yelloweye rockfish, and halibut from a very productive vessel patrol offshore of Point Chehalis.

Officers Bolt, Dielman, and Baldwin conducted a boat patrol of salmon and halibut anglers in Marine Area 2. In addition to issuing several barbed hook citations, the officers contacted and cited three groups of anglers fishing in the Westport Yelloweye Rockfish Conservation Area. One of the vessels contacted in the closure was in possession of 7 lingcod and a skate, which were seized and donated. Additional violations were handled including fishing with two poles and barbed hooks.

Officers Bolt & Baldwin with seized bottomfish Officer Baldwin boarding a boat fishing the YRCA

Officer Ariss, Officer Dielman, and Sergeant Alexander conducted a boat patrol out of Westport in MA2 on a day closed to salmon and halibut angling. They contacted very few boats, all of which were found fishing for bottomfish.

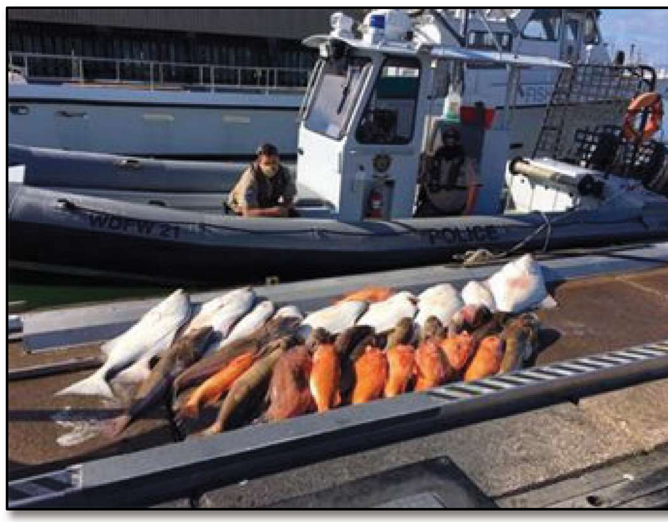
Officer Ariss aboard a halibut charter offshore of Point Chehalis.

While patrolling halibut anglers in MA 2, Officers Bolt, Cilk and Baldwin checked the Westport Yelloweye Rockfish Conservation Area and the South Coast Yelloweye Rockfish Conservation Area. Several anglers were warned for fishing in the closure.

Officers Dielman and Cilk patrolled Marine Area 2 during a recreational halibut opener. They contacted 5 vessels fishing in the YRCA. All five vessels had the YRCA pre-programmed into their GPS units. The captains

of the vessels were cited and the fish seized. The total take was 10 halibut, 11 lingcod, 7 canary, one bocaccio, and one yelloweye. The haul of fish was so large it more than filled the fish box on DFW #21. The fish were donated to the local mission.

Officers Dielman and Cilk with seized halibut and bottomfish caught in the YRCA offshore of Westport.



Officers Dielman and Cilk were attempting to contact a vessel heading in from the halibut grounds. The vessel was travelling at a high rate and the officers pulled alongside. One subject, who is a known offender came out on deck while the boat was still underway. The vessel turned sharply in front of the patrol boat and Officer Cilk needed to react quickly to avoid a collision. The subject on the deck then dumped the contents of a 5-gallon bucket over the far side of the boat. Officer Dielman observed what appeared to be white fillets sinking to the bottom. Once on board, the subjects denied dumping anything. Two of their three halibut were unrecorded. They were cited for this and charges for fail to submit will be forwarded to the prosecutor.

2019 Case Not Previously Reported

Detachments 2 & 3 conducted joint JEA patrols with USCG and NOAA for the tightly regulated commercial halibut opener in MA1. Oregon and California were also joint participants along their respective coasts. The effort included dockside inspections for the subsequent offloads. While investigating suspicious circumstances surrounding a late commercial halibut offload in Westport, Sgt. John found the skipper had caught his halibut within a rockfish conservation area closure. The offload of 132 halibut was seized.

Commercial offload of 132 closed area halibut seized by Sgt. John in Westport

Detachment 8 Officers conducted boat patrols in Marine Areas 3 and 4 for the second weekend of halibut opening on the northern coast of Washington. Anglers were largely successful, but not everyone was following the rules in the process. Anglers were cited for a variety of violations, including not having purchased their halibut catch record card to begin with, not having their CRC on their person, failure to record their catch, possession of rockfish outside of the 20 fathom line, and possession of yelloweye rockfish.

Two cases of note for the patrol was a recreational vessel bottom fishing beyond the 20 fathom line for bottomfish. As the officers approached they observed two yelloweye rock fish floating next to the opposite side of the vessel. The men onboard the vessel had conflicting stories on whether they were targeting salmon (legal area/but using unlawful gear), or fishing for bottomfish (closed area). The men claimed to have descended the yelloweye rockfish, but the fish had just happened to pop up within 15 feet of their boat. The men were found to have several rockfish and a lingcod aboard the vessel. The three men will be cited criminally for fishing for groundfish in a closed area.

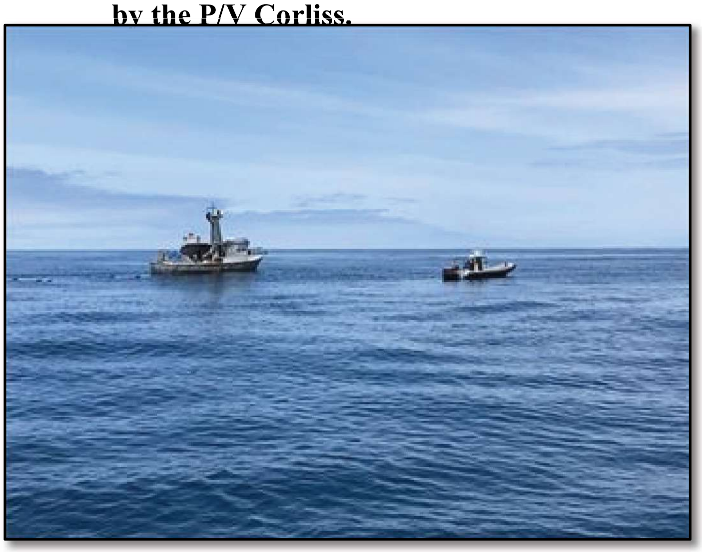
They cited anglers for possession of closed area rockfish, undersized cabezon, fishing for salmon with two poles, amongst other violations. Officers investigated a Charter vessel returning from the ocean side of Marine Area 4 that was closed to Halibut fishing. The vessel was contacted as it just passed through the cut by Tatoosh Island. The two men aboard the vessel showed the Sgt. limits of ocean rockfish, one cabezon and one lingcod. When the Sgt. asked the men if there was any fish aboard in the holds of the vessel the men stated that they had 2 halibut which they had previously caught in Marine Area 5. (Marine Area 5 was open for halibut that day, but Marine Area 4 was not.) The Sgt. advised the men that he did not believe their story, but even if they had caught the halibut in Marine Area 5 that morning it would be unlawful to fish in a Marine Area closed to halibut fishing with halibut onboard. The halibut were seized and the investigation ongoing. The violations being investigated included retaining over the annual limit of halibut, closed area halibut fishing/possession, and providing false information. Both men have been under investigation for similar violations in the past.

Officer Dielman and Sgt. Rosenberger patrolled out of La Push for three days working the Ocean recreational halibut opener. One of the first vessels contacted Thursday contained nine anglers who had claimed to have retained their limits of halibut. Only two of the halibut had been recorded on catch record cards. The skipper of the vessel failed to have his license or catch record card on him, and Sgt. Rosenberger’s inspection yielded a total of 10 halibut onboard for the nine anglers.The skipper claimed responsibility for the over limit (same skipper from the closed area investigation above). The anglers will all be cited through the mail for the violations. The illegal halibut were seized. Other violations found over the patrol included possessing more than one daily limit of halibut onboard a vessel, fail to record halibut, and no license on persons.

Commercial Fishery

Detachments 2 and 3, USCG, NOAA, CA, and OR worked joint patrols in their respective states for the second three-day round of the coastal commercial halibut season. Local officers appreciated the assistance of travelling officers Murry and Ward. Detachment 2 operated the P/V Corliss out of Westport, while Detachment 3 officers operated the P/V 29' RHIB out of Ilwaco. One vessel encountered a number of yellow-eye rockfish and a vessel was failing to comply with new sea bird protection regulations.

A number of rockfish, many of which were yellow-eye, encountered by a directed halibut vessel. Sgt. Alexander with two large examples recovered by the P/V Corliss.



Officers Dielman, Jacobson, Murray, and Ward monitoring a commercial halibut violator making a weak attempt at complying with new bird protection rules – after noticing enforcement presence.

Detachments 2 and 3 worked planned joint patrols with NOAA, USCG, OR, and CA for the annual Pacific Coast commercial halibut season opener. Officer Dielman, SO Ariss, and Sgt. John conducted a boat patrol on the opener's south WA coast, while Officer Cilk, Officer Baldwin, and Sgt. Alexander conducted a boat patrol on the WA central coast. Participation in the fishery was low due to poor COVID19 impacted markets and low quotas. Education was provided on the new seabird avoidance gear rules implemented for groundfish protection. Officer Jacobson monitored several commercial halibut off loads in Ilwaco issuing one verbal warning for a small over quota limit. The overage was seized by WDFW.

Officer Dielman piloting one of WDFW's coastal 29' RHIBs during the commercial halibut opener off the WA south coast.

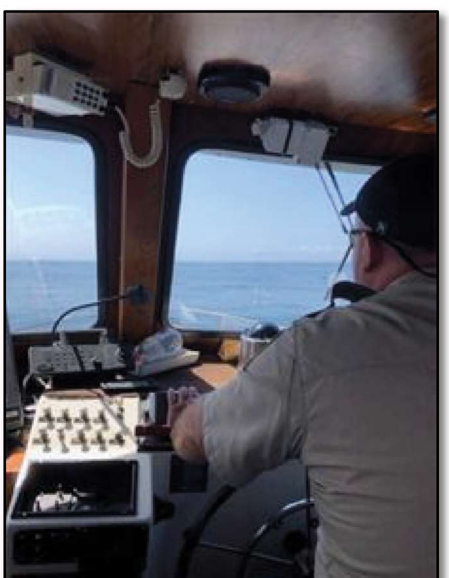
Officer Dielman, SO Ariss, and Sgt. John patrolled Marine Area 1 during the commercial halibut opener. An otherwise routine patrol was interrupted when they attempted to contact a commercial tuna boat headed back towards the Columbia River. Upon approaching, the officers heard a loud "pop". The officers tried numerous times to contact the operator of the vessel without success. They could not see the operator anywhere in the cabin, he would not respond to radio calls, and did not appear when the patrol vessels sirens were activated. After several minutes, the operator was contacted via radio and Officer Dielman and SO Ariss boarded the vessel. The operator eventually explained he had purchased a new gun and shot it into the water. He then realized his vessel was leaking diesel and had been down in the engine room, thereby unable to hear the radio and sirens.

Officer Dielman and SO Ariss contacting a commercial fishing vessel offshore of the Columbia River Bar after officers heard a gunshot on board.

Detachments 2 and 3 teamed up to patrol the third commercial halibut opener. The detachments worked joint patrols with USCG, NOAA, CA, and OR in their respective states. The P/V Corliss out of Westport and the P/V 29’ RHIB out of Ilwaco were utilized. In addition to halibut vessels, tuna and salmon trollers, and sport salmon vessels were also contacted or boarded. Dockside halibut offloads were also monitored.

Officer Dielman piloting the P/V 29’ RHIB while Officer Bolt prepares to jump back on board after boarding a commercial halibut vessel miles offshore of Cape Disappointment. Timing and a steady operator is everything.

Detachments 2 and 3 teamed up for the fourth commercial halibut opener as well as the sport halibut opener. Commercial halibut patrols were a joint effort with NOAA, USCG, OR, and CA in their respective states. Sport halibut efforts were focused primarily in MA2 out of Westport where activity was greatest and opportunity for sport salmon was still available. Violations were found and fish seized in both sport fisheries.



Officer Cilk at the helm of the P/V View from the deployed tender on the right. G.H. Corliss on commercial halibut patrol offshore of Point Chehalis.

NOAA Fisheries Office of Law Enforcement – West Coast Division

The primary objective of OLE's IPHC enforcement effort is to ensure compliance with the commercial and recreational fishery regulations so there is trust in the integrity of the fishery and the resource is protected for generations to come.

During 2020, OLE's West Coast Enforcement Division (WCD) continued to work closely with JEA partners and the USCG to monitor activity associated with Pacific halibut fisheries, pursuant to IPHC regulations. As one of its annual enforcement priorities, OLE-WCD Enforcement Officers, along with JEA partners from WDFW, OSP, and CDFW, conducted patrols and vessel boardings, primarily focused in support of enforcement efforts associated with the Area 2A Pacific halibut directed commercial fishery.

2020 WCD IPHC Enforcement Efforts:

OPERATION FLATFISH FRENZY

This annual enforcement effort is planned and executed annually in support of the IPHC Area 2A Commercial Directed Fishery. NOAA OLE WCD, USCG District 11 and District 13, CDFW, OSP, and WDFW coordinated efforts and provided assets and personnel to ensure compliance during Area 2A Directed Halibut Derbies on June 22-24, July 6-8, and subsequent derbies every other week until the quota was attained.

NOAA supervisory enforcement officer and USCG crew from Sector North Bend after a successful flight monitoring the start time of the first day of the derby.

ENFORCEMENT CONCERNS:

- This was the first year the directed commercial fishery was changed from a series of 10 hour openers to 54 hour openers.
- This was the first year vessels targeting both halibut and groundfish were required to use Seabird Avoidance Gear when setting gear (new regulations apply to longline groundfish fishery).
- Due to the lower profit margins and low per-vessel limits, there was an increased concern of overages, retention of undersize halibut and illegal bycatch, and over-the-gunwale, dark-of-night transfers.
- Ensuring the safety of the fishing community and enforcement personnel due to COVID-19.

TARGET ACTIVITY AREA:

- Along the 100-150 fathom curve off Grays and Astoria Canyons, Heceta and Stonewall Banks, and the Bandon High Spot.

FEDERAL AND STATE ASSETS PROVIDED AND ACTIVITIES CONDUCTED:

- **OLE WCD**
  - Provided Enforcement Officers (EOs) for aircraft and shoreside enforcement activities alongside USCG and state personnel.
- **USCG**
  - Conducted daily C-27 fixed wing air patrols.
  - Conducted helicopter air patrols from Astoria, Newport, and North Bend with NOAA riders.
  - Conducted vessel patrols on the WAHOO, CUTTYHUNK, ALERT, ORCAS, ROBERT WARD, and DORADO.
- **OSP**
  - Deployed GUARDIAN out of Newport and provided shoreside presence.
- **WDFW**
  - Deployed 2 RIBs out of Westport and Ilwaco, and provided shoreside presence.

NOAA enforcement officer inspecting catch

West Coast Division Overview

Staffing Snapshot

41 Full-Time Employees

- 14 Special Agents
- 12 Enforcement Officers
- 7 Mission Support
- 7 Investigative Support
- 1 Compliance Liaison
- 1 Contractor

Annual Budget:

$8.3 million

Headquarters

7600 Sand Point Way NE
Seattle, WA 98115

Field Offices

Alameda, CA

Arcata, CA

Astoria, OR

Bellingham, WA

Coos Bay, OR

The National Oceanic and Atmospheric Administration (NOAA) Fisheries, Office of Law Enforcement (OLE), West Coast Division (WCD) provides marine enforcement and compliance assistance for the western region of the continental United States; primarily California, Idaho, Oregon and Washington. The WCD's area of responsibility also includes the inland states of Arizona, Colorado, Montana, Nevada, North Dakota, South Dakota, Utah, and Wyoming.

The northwestern states of Washington, Idaho, Montana, and North Dakota share an international border with Canada that spans a distance of 1,327 miles; California and Arizona's international border with Mexico in the southwest covers a distance of 513 miles. Combined, California, Oregon, and Washington include 1,293 miles of Pacific Ocean coastline, 7,863 miles of tidal shoreline, 5 National Marine Sanctuaries, 290 Marine Conservation Areas, 21 major international seaports, and 18 international airports. Federal jurisdiction in the U.S. Pacific Coast Region encompasses an Exclusive Economic Zone (EEZ) of over 222,471 square nautical miles, a landmass of 339,375 square miles with numerous rivers and tributaries flowing into the Pacific Ocean, and the U.S. waters of the Strait of Juan de Fuca and Puget Sound in the Salish Sea.

WCD staff is comprised of Special Agents, Enforcement Officers, support, and administrative personnel working at the WCD main office in Seattle, or in field offices in California, Oregon, and Washington. OLE staff perform duties under three general job classifications: 1) Operational - which includes the Special Agents (SAs) and Enforcement Officers (EOs), 2) Investigative Support - consisting primarily of Investigative Support Technicians, and 3) Mission Support - made up of administrative and information technology staff.

WCD SAs and EOs are posted in two geographic regions: for SAs, District One incorporates the states of Washington and Oregon; and District Two covers California. Both districts are assigned a supervisory Assistant Special Agent-in-Charge (ASAC) to oversee the seven SA positions allotted in each district. Four of the seven SA positions in District One are currently staffed; and four of the seven positions are filled in District Two.

Similarly, EOs in Patrol North provide uniformed enforcement services for Washington and Oregon; and Patrol South EOs cover California. Future plans call for a total of fifteen uniformed officers operating in two patrol districts; each with its own Supervisory Enforcement Officer (SEO). Both Patrols are assigned a supervisory Enforcement Officer (SEO) to oversee six positions in the North and seven positions in the South. Five of the six position in Patrol North are currently staffed; and four of the seven positions are filed in Patrol South.

The Investigative Support Team is fully staffed and provides valuable support to IPHC Area 2A enforcement activities. Specifically, WCD's Investigative Support Team provided daily VMS data to aid operational assets with resource allocation and positioning during dedicated enforcement operations; past Pacific halibut fishing activity was analyzed to identify potential areas and regulations requiring additional focus; and vessel monitoring system information was monitored and post-commercial open period landing data was audited to verify compliance. The WCD Investigative Support team identified fifteen VMS declaration discrepancies and other potential violations of the IPHC regulations that occurred during Area 2A directed commercial Pacific halibut fishing periods in 2020.

Currently there are 12 vacancies in the WCD due to retirements, relocations, and professional advancements. At 86% of its current staffing allotment, OLE is continues to fulfill its critical missions; and is making significant progress in filling vacancies as budgetary and HR resources will allow.

Office of Law Enforcement – Enforcement Priorities

The NOAA Office of Law Enforcement released six National Priorities for Fiscal Years 2018-2022. Input from the Council, along with various stakeholders and the public greatly assisted in the development of the Priorities. A full description of OLE Enforcement Priorities is available at this link and the priorities are summarized below: OLE Enforcement Priorities, Fiscal Years 2018 - 2022

1) ***Sustainable Fisheries***: NOAA Fisheries - in close coordination with the regional fishery management councils and state partners - is responsible for fostering healthy, productive, and sustainable living marine resources and habitats. NOAA Fisheries achieves these outcomes through: effective, transparent management actions supported by strong science; habitat conservation and restoration programs; an ecosystem approach to fisheries management; partner and stakeholder coordination and communication; and effective enforcement.
2) ***Protected Resources:*** The Endangered Species Act and the Marine Mammal Protection Act were enacted to help recover species that are facing extinction and to protect marine mammals. NOAA Fisheries is responsible for the conservation and recovery of protected species and their habitats, as mandated by the MMPA and ESA, through specific efforts focused on reducing negative effects of human activities, enforcing regulations against harming marine mammals and endangered species, and developing plans to guide the recovery and conservation of these protected species.
3) ***Illegal, Unreported, and Unregulated (IUU) Fishing/International:*** The vast majority of the seafood consumed in the U.S. is imported. This demand for seafood makes the U.S. an attractive market for IUU fish and fish products, and also places pressure on wild stocks from all over the world. Like domestic regional fishery management councils, regional fisheries management organizations (RFMOs) work to ensure that seafood caught within their governing areas is taken in an authorized and sustainable manner. Those who circumvent RFMO conservation and management measures are engaged in IUU fishing. The Seafood Import Monitoring Program, or SIMP, establishes reporting and recordkeeping requirements for imports of certain seafood products, to combat IUU caught and/or misrepresented seafood from entering U.S. commerce. IUU fishing disadvantages legal fishermen globally, including U.S. fishing fleets and coastal communities, and negatively impacts global fish stocks such as salmon and tuna.
4) ***Seafood Fraud:*** Seafood fraud - typically in the form of mislabeling or other forms of deceptive misidentification of seafood products with respect to quality, quantity, origin, or species - undermines the economic viability of U.S. and global fisheries, and deceives consumers. Seafood fraud is generally driven by economic motives and can occur at multiple points along the supply chain.
5) ***Wildlife Trafficking:*** Illegal wildlife trafficking is a multi-billion-dollar-per-year enterprise that targets some of the most iconic and endangered species on the planet. As economic opportunists, wildlife traffickers are also frequently involved in other illegal activities such as human trafficking, illegal weapons sales, and the illicit drug trade.
6) ***Outreach and Education:*** A primary goal of OLE is voluntary compliance by members of the public or regulated industries with marine resource protection laws and implementing regulations. Engaging in outreach and education activities to foster voluntary compliance is the cornerstone of this goal. While conducting patrol efforts, OLE enforcement officers have day- to-day interactions with industry members and the general public, and use these daily opportunities to answer questions and provide information. As part of the Vessel Monitoring System (VMS) program, OLE investigative support technicians routinely answer calls from industry members concerning regulations and make proactive contact with owners of vessels.

Office of Law Enforcement – WCD Cooperative Enforcement Program

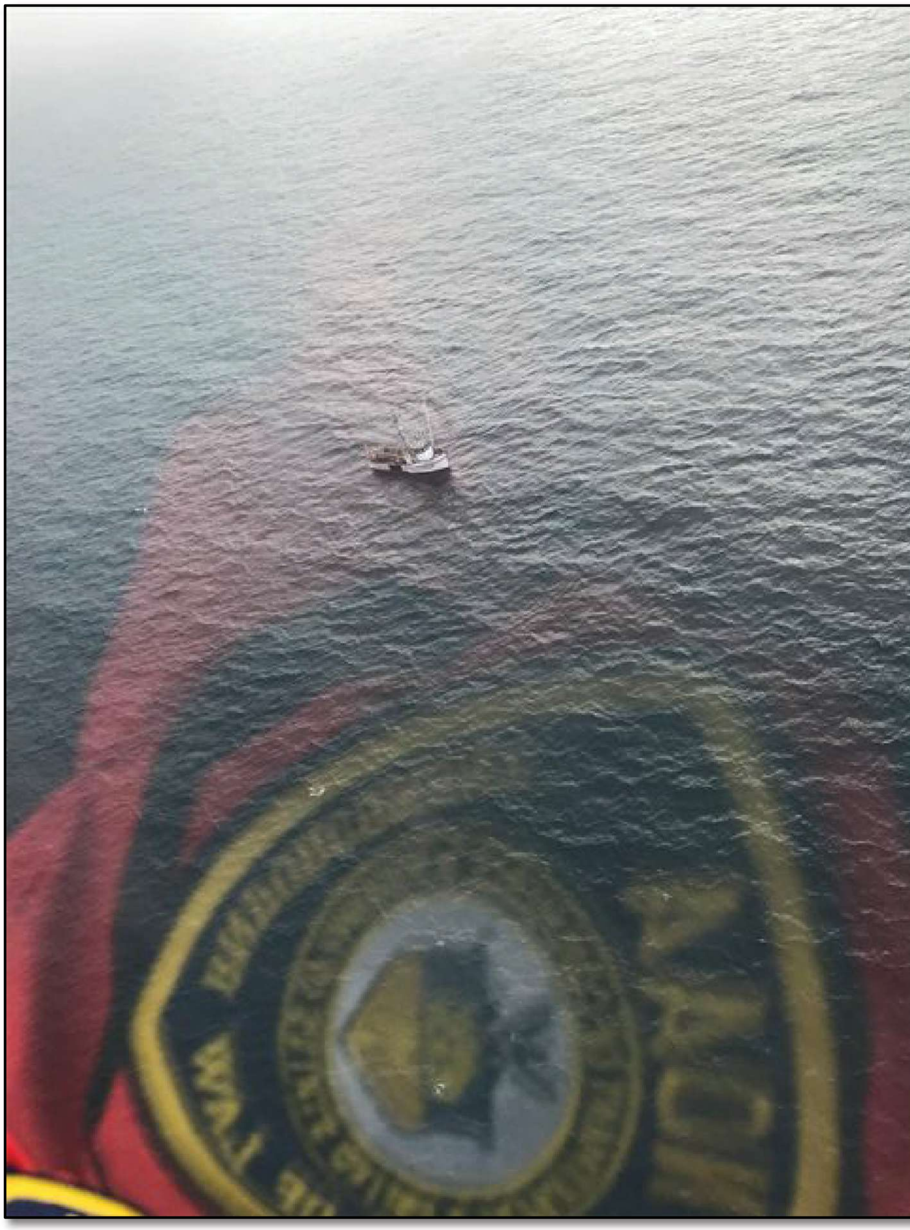
Under the Federally-funded NOAA Cooperative Enforcement Program (CEP), OLE has ongoing formal Cooperative Enforcement Agreements (CEA) and Joint Enforcement Agreements (JEA) with all three West Coast States: California Department of Fish and Wildlife (CDFW) – Law Enforcement Division, Oregon State Police (OSP) – Fish and Wildlife Division, and Washington Department of Fish and Wildlife (WDFW) - Police. These agreements extend federal authority for state agencies to enforce specific federal laws and regulations as defined in specifically agreed upon federal priorities within each agreement. Officially affording partner officers, troopers, and wardens with formal federal deputation and specific federal marine law enforcement authority to assist NOAA.

In addition to providing reimbursement for direct federal fisheries enforcement work performed by state officers, wardens, and troopers in support of federal fisheries enforcement priorities, the agreements also provide funding for state administrative overhead and program-related direct purchases of large marine enforcement assets (e.g., boats, vehicles, etc.) as well as small or portable assets (e.g., dry suits, thermal imaging, cameras, etc.), in addition to targeted program meetings, specific training needs, and services (maintenance of equipment and vessels).

Within the framework of each agreement, there are defined marine law enforcement, compliance assistance, and living marine resource management responsibilities under mutually agreed upon federal priorities; these typically include both land-based and at-sea services, and may include air services, if available within a state partner agency and if determined to be of added value in support of one or more federal priorities.

JEA execution priorities, as well as funding, performance, and reporting requirements, are formally defined for each JEA on an annual basis. The performance threshold for 2020 JEAs required state partners to direct a minimum of 75% toward execution priorities designated by OLE, and assign the remaining 25% to other general enforcement and compliance priorities. 2020 NOAA CEP federal funding in the WCD totaled $2.651M, a .7% increase from 2019. CEP funding is equitably distributed to the three state partner agencies based on the three-year average provided for the years 2015 to 2018.

These agreements foster a cooperative environment, producing a viable collaborative approach to federal and state living marine resources enforcement and management. There are consistent ongoing cooperative efforts between WDFW, OSP, CDFW, OLE, and the U.S. Coast Guard (USCG) for the enforcement, preservation, and management of living marine resources. In addition to the states, the USCG is a valuable federal partner, providing premier at-sea and air resources, and willingly supporting state partner and federal operations. WDFW Officers, CDFW Wardens, and OSP Troopers ensure comprehensive protection and compliance through the monitoring of directed and incidental commercial, recreational, and tribal fisheries. This is accomplished by conducting vessel boardings, monitoring off- loads, inspections of processors, wholesalers, dealers, markets, buyers, restaurants, air and sea ports, and cold storage facilities, as well as through follow-up, surveillance, investigations, and collaborative operations. The significant contributions of our West Coast Cooperative Enforcement Program Partners (CDFW, OSP, WDFW), and the USCG, formulate the foundation of our successful coastal living marine resource protection and compliance.



NOAA Enforcement Officer Observing Fishing Vessel during USCG Air Patrol

APPENDIX III

Alaska Department of Fish and Game

THE STATE of ALASKA
GOVERNOR MIKE DUNLEAVY

Department of Fish and Game

333 Raspberry Road
Anchorage, Alaska 99518-1565
Division of Subsistence: 907.267.2353
Division of Sport Fish: 907.267.2294

DATE: 12/15/2020

CONTRACTING PARTY: UNITED STATES OF AMERICA

AGENCY: Alaska Department of Fish and Game

Sarah Webster

Fishery Biologist – Division of Sport Fish

sarah.webster@alaska.gov

907-267-2212

Lauren Sill

Subsistence Resource Specialist –Subsistence Section

lauren.sill@alaska.gov

907-465-3617

FISHERY SECTORS

Recreational and Subsistence

IPHC REGULATORY AREAS

2C, 3, and 4 (USA: Alaska)

DISCUSSION

Recreational

In October 2020, the Alaska Department of Fish and Game provided final estimates of the 2019 sport harvest and preliminary estimates of the 2020 sport harvest for Areas 2C, 3A, 3B, and 4. The full report is in Attachment 1.

2019 Final Harvest Estimates

The Area 2C charter fishery allocation for 2019 was 0.82 Mlb (harvest and release mortality). Regulations included a one-fish bag limit with a reverse slot (or “protected slot”) limit that allowed harvest of halibut less than or equal to 38 inches and halibut greater than or equal to 80 inches. The Area 3A charter allocation was 1.89 Mlb (harvest and release mortality). Regulations included a two-fish bag limit with a maximum size on one of the fish of 28 inches, a limit of one trip per charter vessel per day (on which halibut are harvested), a limit of one trip per Charter Halibut Permit (CHP) per day, a closure to halibut retention on Wednesdays all year, five Tuesday closures (7/16 thru 8/13), and a 4-fish annual limit with a harvest recording requirement. Charter captains and crew were not allowed to retain halibut while guiding clients in Area 2C or Area 3A under regulations of the North Pacific Fishery Management Council’s Catch Sharing Plan (CSP) for these areas. Charter fishery regulations in the remainder of the state included a daily bag limit of two fish of any size and there is no prohibition on retention of halibut by captains or crew. Unguided fisheries statewide were managed under a bag limit of two fish of any size.

The 2019 Area 2C estimated sport harvest (excluding release mortality) was 131,410 fish, for a yield of 1.831 million pounds. 2C charter removals (including release mortality) were estimated to be 0.697 Mlb. Unguided removals were estimated to be 1.183 Mlb. The Area 3A estimated sport harvest was 246,804 fish, for a yield of 3.718 Mlb. 3A charter removals were estimated to be 2.054 Mlb. Unguided removals were estimated to be 1.705 Mlb. Areas 3B and 4 do not have separate charter allocations. The final harvest estimates were 712 halibut in Area 3B and 983 halibut in Area 4. Applying the unguided average weight from Kodiak of 16.92 lb resulted in yield estimates of 0.012 Mlb in Area 3B and 0.017 Mlb in Area 4. Additional detail on numbers of fish harvested and released, releases by size category, average weights, and confidence intervals can be found in tables 1, 3, and 4 of Attachment 1. Information on harvest by port and historical harvest can be found in Area 2C and 3A Final 2019 Charter Harvest Estimates (North Pacific Fisheries Management Council 2020).

2020 Preliminary Harvest Estimates

The Area 2C charter fishery allocation for 2020 was 0.78 Mlb. Regulations included a one-fish bag limit with a reverse slot limit of less than or equal to 40 inches and greater than or equal to 80 inches through June 14, then changed June 15 by emergency action due to the COVID-19 pandemic to a one-fish bag limit with a reverse slot limit of less than or equal to 45 inches and greater than or equal to 80 inches for the remainder of the year. The Area 3A charter allocation was 1.71 Mlb. Regulations through June 14 included a two-fish bag limit with a maximum size on one of the fish of 26 inches, a limit of one trip per charter vessel per day and per CHP per day, a closure to halibut retention on Tuesdays and Wednesdays, and a 4-fish annual limit with a recording requirement. Regulations were changed by emergency action on June 15 and included a two-fish bag limit with a maximum size on one of the fish of 32 inches and limits of one trip per charter vessel per day and per CHP per day; there were no closure days or annual limits after the regulation change. Charter captains and crew were not allowed to retain halibut while guiding clients in Area 2C or Area 3A. Charter fishery regulations in the remainder of the state included a bag limit of two fish of any size. Unguided fisheries statewide were managed under a bag limit of two fish of any size.

The preliminary estimates of 2020 charter harvest (excludes release mortality) and removals (includes release mortality) in 2C were estimated to be 37,415 fish and 0.500 Mlb, respectively. Unguided removal estimates in 2C used time series forecasts that did not account for any differences that may have occurred in 2020 due to the COVID-19 pandemic. Unguided harvest and removals in 2C were estimated to be 61,960 fish and 1.160 Mlb. The preliminary estimates of charter harvest and removals in 3A were estimated to be 108,379 fish and 1.597 Mlb. Unguided removal estimates in 3A used the same methods as 2C and did not account for the COVID-19 pandemic. Unguided harvest and removals in 3A were estimated to be 109,298 fish and 1.700 Mlb. The preliminary harvest estimates for 2020 in Areas 3B and 4 also did not account for the pandemic and were 595 halibut in Area 3B and 863 halibut in Area 4. Applying the unguided average weight from Kodiak of 18.40 lb resulted in removal projections of 0.011 Mlb in Area 3B and 0.016 Mlb in Area 4. Additional detail on numbers of fish harvested and released, releases by size category, average weights, and confidence intervals can be found in tables 2, 4, and 5 of Attachment 1.

2C and 3A Charter Halibut Management Measure Analyses

In addition to estimating all recreational halibut harvest in Alaska, the Alaska Department of Fish and Game is responsible for analyzing alternative management measures for the charter halibut fisheries in Areas 2C and 3A. Analyses were requested by the Charter Halibut Management Committee on 27 October 2020 and results were presented at the North Pacific Fisheries Management Council meeting in December. Projected removals in 2021 under status quo regulations in the absence of continued impacts of the COVID-19 pandemic are 1.03 Mlb in 2C and 2.92 Mlb in 3A. Under the suite of management measures recommended by the Council at the December 2020 meeting, including a recommended reduction in effort projections of 35% in 2C and 25% in 3A to account for continued impacts of the pandemic, removal projections range from 0.645 to 0.786 Mlb for 2C and from 1.784 to 1.853 for 3A.

A full report of the analyses and results can be found in Analysis of Charter Management Options for the Area 2C and 3A charter halibut fisheries for 2021 (Webster and Powers 2020).

Subsistence

Through a grant from the National Marine Fisheries Service (NMFS) (NA18NMF4370086), the Alaska Department of Fish and Game (ADF&G) Division of Subsistence conducted a study to estimate the subsistence harvests of Pacific halibut in Alaska in 2018. The full results appear in Technical Paper No. 456, “Subsistence Harvests of Pacific Halibut in Alaska, 2018” (Fall and Koster 2020). Results from this study were included in the AM096 documents.

Due to budget constraints, a survey to estimate subsistence halibut harvests in Alaska in 2019 did not take place. The grant between NOAA and the Division of Subsistence was extended and supplemented with funding to support developing a subsistence halibut harvest estimate for Alaska for 2020. The first round of mailed surveys to all Subsistence Halibut Registration Certificate (SHARC) holders will go out in January 2021, followed by two more surveys to non-respondents. We will report preliminary results at AM098 (January 2022).

REFERENCES

Fall, J.A. and D. Koster. 2020. Subsistence Harvests of Pacific Halibut in Alaska, 2018. Alaska Department of Fish and Game, Division of Subsistence Technical Paper No. 456. Anchorage.

North Pacific Fisheries Management Council. 2020. Area 2C and 3A final 2019 charter halibut harvest estimates. Retrieved 09 December 2020, from https://www.npfmc.org/halibut-charter-management/charter-management-committee/

Webster, S. and R. Powers 2020. Analysis of management options for the Area 2C and 3A charter halibut fisheries for 2021: A report to the North Pacific Fishery Management Council, December 2020. Alaska Department of Fish and Game. Agenda item C3. Unpublished. Retrieved 09 December 2020, from https://meetings.npfmc.org/Meeting/Details/1745

ATTACHMENTS

Attachment 1 – Letter to Lara Erikson (IPHC) from Sarah Webster, Mike Jaenicke, Diana Tersteeg, Martin Schuster, and Marian Ford (ADFG – DSF) reporting on the Alaska recreational halibut fishery

Attachment 2 – Summary of Subsistence Harvests of Pacific Halibut in Alaska, 2018

Attachment 1

THE STATE of ALASKA
GOVERNOR MIKE DUNLEAVY

Department of Fish and Game

DIVISION OF SPORT FISH

333 Raspberry Road
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P.O. Box 110024
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Main: 907-235-8191
Fax: 907-235-2448

October 30, 2020

Lara Erikson
International Pacific Halibut Commission
2320 West Commodore Way
Salmon Bay, Suite 300
Seattle, WA 98199-1287

Dear Ms. Erikson:

This letter represents our report on the Alaska recreational halibut fishery in support of the annual IPHC stock assessment. This year's letter provides:

1. Final 2019 estimates of sport fishery harvest and yield by IPHC regulatory area,
2. Preliminary 2020 estimates of harvest and yield by IPHC area,
3. Final 2019 and preliminary 2020 estimates of sport fishery release mortality by IPHC area, and
4. Final 2019 estimates of sport fishery yield prior to the mean IPHC longline survey date in Areas 2C and 3A.

Each section includes a summary of the methods used and basic results. More detailed information on methods can be found in the following project operational plans:

Southeast Region creel sampling: *http://www.adfg.alaska.gov/FedAidPDFs/ROP.SF.1J.2019.05.pdf*

Southcentral Region creel sampling: *http://www.adfg.alaska.gov/FedAidPDFs/ROP.SF.2A.2016.20.pdf*

Statewide halibut estimation: *http://www.adfg.alaska.gov/FedAidPDFs/ROP.SF.4A.2020.04.pdf*

We hope this information satisfies the IPHC's needs. Please feel free to contact us if you require clarification or additional information.

Sincerely;

(sent via email)

Sarah Webster, Mike Jaenicke, Diana Tersteeg, Martin Schuster, and Marian Ford
Fishery Biologists

Final Estimates of 2019 Sport Harvest and Yield

In October 2019 we provided preliminary estimates of the 2019 sport harvest for Areas 2C, 3A, 3B, and 4. This letter provides final estimates of the 2019 sport harvest based on Alaska Department of Fish and Game (ADF&G) saltwater logbook data as of September 17, 2020, and final estimates from the ADF&G Statewide Harvest Survey (SWHS). The final estimates for Area 2C and 3A will also be posted on the North Pacific Fishery Management Council website.

The Area 2C charter fishery regulations for 2019 included a one-fish bag limit and reverse slot (or "protected slot") limit that allowed harvest of halibut less than or equal to 38 inches and halibut greater than or equal to 80 inches. The Area 3A charter regulations included a two-fish bag limit with a maximum size on one of the fish of 28 inches, a limit of one trip per charter vessel per day (on which halibut are harvested), a limit of one trip per Charter Halibut Permit (CHP) per day, a closure to halibut retention on Wednesdays all year, five Tuesday closures (7/16 thru 8/13), and a 4-fish annual limit with a harvest recording requirement. Charter captains and crew were not allowed to retain halibut while guiding clients in Area 2C or Area 3A under regulations of the North Pacific Fishery Management Council's Catch Sharing Plan (CSP) for these areas. Charter fishery regulations in the remainder of the state included a bag limit of two fish of any size; there was no prohibition on retention of halibut by captains or crew. Unguided fisheries statewide were managed under a bag limit of two fish of any size.

Methods:

For Areas 2C and 3A, sport fishery yield was calculated separately for the charter and unguided sectors as the product of the number of fish harvested and average weight of harvested halibut. Yield estimates do not include release mortality (provided later in this document). Estimates were done for six subareas in Area 2C and eight subareas in Area 3A and summed. Charter harvest was based entirely on logbook data, per the provisions of the CSP. Unguided harvest was estimated through the SWHS. Standard errors of the SWHS estimates for the unguided sector were obtained by bootstrapping. Average net weight was estimated by applying the IPHC length-weight relationship to length measurements of harvested halibut sampled at major ports in Areas 2C and 3A. All fish from each vessel-trip selected for sampling were measured. Bootstrapping was used to estimate the standard errors of average weight. The estimate of charter average weight for Homer was stratified to account for differences in sizes of halibut cleaned at sea and cleaned in port. Length measurements from sites in the Glacier Bay subarea included fish caught in Areas 3A and 2C; average weights were calculated separately for each area and sector. All unguided harvest in the Glacier Bay subarea was assumed to have occurred in Area 2C. Charter-caught halibut taken under a Guided Angler Fish (GAF) permit from the National Marine Fisheries Service were not included in charter harvest calculations because the CSP specifies that this harvest accrues toward the commercial catch limit.

Final estimates of sport fishery yield for Areas 3B and 4 are for the charter and unguided sectors combined and are based entirely on the SWHS. Because ADF&G does not sample the sport harvest in these areas, we followed past practices and used the average weight of Kodiak sport harvest as a proxy for average weight in Areas 3B and 4. Specifically, we used the average weight from the unguided sector because it was unaffected by size limits. Use of the Kodiak average weight may bias the yield estimates for these areas.

As has been done historically, harvest from SWHS Area R (Alaska Peninsula and Aleutian Islands south of Cape Douglas) was apportioned to IPHC Areas 3B and 4 using specific locations reported in the survey. In some years, Area R harvest estimates have included harvests for sites that are actually in Area 3A. Since 1991, the estimated harvest of Area 3A halibut included in Area 3B estimates has ranged from 0 to 728 fish per year (average = 116). In 2019, 76 halibut were estimated from Area 3A locations in Area R.

Results:

The 2019 Area 2C estimated sport harvest (excluding release mortality) was 131,410 fish, for a yield of 1.831 million pounds (Table 1). Charter yield represented 36% of the total. Average net weight was estimated at

13.93 lb overall and was lower for the charter sector due to size limit restrictions. Average weight was estimated from samples of 4,160 charter halibut and 3,771 unguided halibut.

The Area 3A estimated sport harvest was 246,804 fish, for a yield of 3.718 Mlb (Table 1). The charter sector accounted for 55% of the total yield. Average net weight was estimated at 15.06 lb overall and was slightly lower for the charter sector. Average weight was estimated from samples of 4,754 charter halibut and 2,449 unguided halibut.

The final estimates of charter halibut yield were about 4.5% higher than last year's preliminary estimate in Area 2C and 1.8% higher than the preliminary estimate in Area 3A. These differences were largely due to errors in estimating the proportions of harvest taken through July 31, the cutoff date for using logbook data. The final estimates of unguided yield were 2.9% higher than the preliminary estimate in Area 2C and 2.8% higher in Area 3A. The preliminary estimates were derived from simple exponential time series forecasts (SAS ESM procedure) and large forecasting errors are expected due to high interannual variability in the harvest time series.

The final harvest estimates for western areas were 712 halibut in Area 3B and 983 halibut in Area 4 (Table 1). Applying the Kodiak unguided average weight of 16.92 lb resulted in yield estimates of 0.012 Mlb in Area 3B and 0.017 Mlb in Area 4. These final estimates were up from last year's preliminary estimates of 0.004 in Area 3B and 0.014 in Area 4.

Preliminary 2020 Estimates of Harvest and Yield

Methods:

Sport charter fishery mortality for Areas 2C and 3A is based on numbers of halibut reported harvested and released in ADF&G mandatory charter logbooks. Harvest and release estimates from the SWHS are still used for all unguided fishery estimates as well as total sport fishery estimates for Areas 3B and 4. Neither complete logbook data nor SWHS estimates are available for the current year, and creel sampling is not designed to produce estimates of harvest. A variety of methods were used to provide preliminary estimates of the numbers of fish harvested by each sector or regulatory area.

Charter harvest for Areas 2C and 3A was estimated using partial-year logbook data. Logbook data were entered and available in mid-October for most trips taken through August 31. Harvest data were corrected to account for late logbook submissions and other reporting errors based on past data and assumptions. This adjusted the harvest in Area 2C by 2.6% and in 3A by 2.4%. Harvest and standard errors for the months of September through December were assumed to be the 6-year average of harvest in those months (average since the CSP was implemented). Average harvest in September – December was used due to the disproportionate effort throughout the 2020 season and because known harvest to date exceeded estimates from time series forecasts. Use of averages increased harvest estimates by about 8% in each area.

Unguided harvest in Areas 2C and 3A, and overall sport harvests for Areas 3B and 4 were projected from the existing time series of SWHS estimates using simple exponential smoother forecasts. This likely over estimated harvest in 2020 due to expected changes in effort related to the COVID-19 pandemic, especially with respect to non-resident anglers due to interstate travel mandates. Unguided harvest data for 2020 will be available in the fall of 2021 and estimates will be updated at that time.

Charter and unguided yield were estimated by multiplying the subarea harvest forecasts by the corresponding estimates of average weight. Average weights were estimated by applying the IPHC length-weight relationship to length measurements of harvested halibut obtained through sampling of the recreational harvest. The estimates of charter average weight for Homer, Seward, and Whittier were stratified to account for differences in sizes of halibut cleaned at sea and cleaned in port in 2020. No sampling was conducted in Areas 3B or 4 in 2020, so the Kodiak area average weight from the unguided fishery was again substituted for these areas. Additionally, there were no samples from the charter sector in the 3A portion of SWHS Area G due to the absence of a port sampler in Elfin Cove in 2020, so the Yakutat area (SWHS Area H) average weight from the charter fishery was substituted for this area; Yakutat was the nearest port in Area 3A from which samples were obtained.

Results:

The preliminary estimate of 2020 sport halibut harvest in Area 2C (excluding release mortality) was 99,375 halibut, or 1.622 Mlb (Table 2). Average weight was estimated at 16.32 lbs. The charter average weight was more than 5.7 lbs lower than the unguided average weight due to the charter fishery size limit. Average weights for Area 2C were based on length measurements of 2,272 charter halibut and 3,553 unguided halibut.

The preliminary estimate for Area 3A was 217,677 halibut, for a total sport fishery yield of 3.257 Mlb (Table 2). The estimated average weight in Area 3A was 14.96 lbs overall. Average weights were estimated from samples of 4,663 charter and 1,888 unguided halibut.

The preliminary harvest estimates for 2020 were 595 halibut in Area 3B and 870 halibut in Area 4. Applying the unguided average weight of 18.40 lbs from Kodiak resulted in yield projections of 0.011 Mlb in Area 3B and 0.016 Mlb in Area 4 (Table 2). Although the levels of sport harvest are low, there is large uncertainty in the time series forecasts as well as use of the Kodiak unguided average weight as a proxy for average weight in these areas.

Final 2019 and Preliminary 2020 Estimates of Release Mortality

Methods:

Release mortality (R) was calculated in pounds net weight for each subarea of Areas 2C and 3A as:

$$R = \hat{N} \cdot DMR \cdot \hat{\bar{w}}$$

where

$\hat{N} =$ the number of fish released,

$DMR =$ the assumed short-term discard mortality rate due to capture, handling, and release, and

$\hat{\bar{w}} =$ the estimated average net weight (in pounds) of released fish.

The numbers of halibut released ($\hat{N}$) in the charter sector in 2019 were based on final logbook data. The numbers of halibut released in 2020 used data through August from the charter logbooks and the average number of releases from logbooks since the CSP was implemented. For the unguided fishery and the overall sport fisheries in Areas 3B and 4, the estimated number of fish released in each subarea in 2019 was obtained from the SWHS. The projections for 2020 were simple exponential time series forecasts using previous release numbers from the SWHS. This likely over estimated releases in 2020 due to expected changes in effort related to the COVID-19 pandemic, as mentioned above.

Assumed mortality rates (*DMRs*) were 5% for Area 3A charter-caught halibut, 6% for Area 2C charter and Area 3A unguided, and 7% for Area 2C unguided halibut. These rates were developed by assuming a 3.5% mortality rate for halibut released on circle hooks and a 10% mortality rate for halibut released on all other hook types. The hook type data were collected in 2007 and 2008 in Area 2C, and every year since 2007 in Area 3A. These rates were applied to the reported number of fish released on each hook type to calculate a weighted mean mortality rate for each user group in each subarea. These weighted mean rates were then rounded up to the next whole percentage point to address uncertainty and account for possible cumulative effects of multiple recaptures. A discard mortality rate of 6% was assumed for Areas 3B and 4, as no data on hook use were collected.

For most IPHC regulatory areas, the average weights of released fish in each subarea were estimated using a logistic model of the proportion of catch retained at length, as described in the operational plan for statewide halibut estimation (see cover page for link). The model uses the length composition of the retained fish to infer the length distribution of released fish and average weight was calculated using the IPHC length-weight relationship.

For the Area 2C charter fishery, additional steps were needed to estimate release mortality due to the reverse slot limits in place in 2019 and 2020. In 2019, charter anglers were prohibited from harvesting fish between 38 and 80 inches in length. This required partitioning the released fish into size categories as follows: the 2019 size classes were U38 (≤ 38 inches), 38-80, and O80 (≥ 80 inches); the 2020 size classes were U45 (≤ 45 inches), 45-80, and O80 (≥ 80 inches)). The proportions of fish in each size class were obtained from creel survey interviews where anglers were asked to report the numbers of released fish by size class. The average weight of released fish in the U38 or U45 size class was estimated using the model described above. The average weights of released fish in the protected slot and above the upper limit were estimated as the average weight of fish in these size ranges in 2010, the most recent year without a charter size limit.

The North Pacific Fishery Management Council's Scientific and Statistical Committee reviewed the logistic modeling approach in 2007 and concluded that it provided "reasonable" estimates of average weight given the lack of data. One problem inherent in this method is that the size distribution of released fish is truncated at the size of the smallest fish measured in the harvest sample. It is likely that some halibut are released that are smaller than the smallest halibut retained and measured. Therefore, the method may in effect underestimate the numbers of small fish released but overestimate average weight. Because the model assumes that the percent of fish kept at length never exceeds 95%, it may also overestimate the numbers of large fish released, but probably has little effect on their average weight.

Results:

For 2019, estimated release mortality was 0.050 Mlb in Area 2C, with 0.035 Mlb from the charter fishery. The size class breakdown of the Area 2C charter release mortality indicated that while the majority of fish released were in the U38 length range, the poundage of release mortality was greatest in the O38-U80 range because of the higher average weight (Table 4). Estimated release mortality in Area 3A was 0.042 Mlb, with 0.019 Mlb from the charter fishery (Table 3). Areas 3B and 4 each had negligible amounts of release mortality from the sport fishery.

For 2020, estimated release mortality was 0.037 Mlb in Area 2C, 0.040 Mlb in Area 3A, and virtually zero in Areas 3B and 4 (Table 5). The size class breakdown of the Area 2C charter release mortality indicated that while the majority of fish released were in the U45 length range, the poundage of release mortality was greatest in the 45-80 inch range because of the higher average weight (Table 4).

The 2019 total sport fishery removals, including harvest and all sizes of release mortality, was 1.881 Mlb in Area 2C and 3.759 Mlb in Area 3A. Release mortality made up 2.7% of all Area 2C removals and 1.1% of Area 3A removals in 2019. For 2020, the preliminary estimates of total sport removals are 1.659 Mlb in Area 2C and 3.297 Mlb in Area 3A. Release mortality accounted for 2.3% of Area 2C removals and 1.2% of Area 3A removals in 2020.

Sport Fishery Yield Prior to the Mean IPHC Survey Dates in 2019 (Areas 2C and 3A only)

This information is provided to aid the IPHC's adjustment to survey CPUE that is used to apportion estimated exploitable biomass among regulatory areas. The mean survey dates for 2019 were July 11 in Area 2C and July 1 in Area 3A.

Methods:

The proportions of harvest prior to the mean survey date were calculated separately for the charter and unguided sectors. For the charter sector, the proportion of harvest taken prior to the mean survey date in 2019 was obtained from logbook harvest data. For the unguided sector, the proportions were calculated based on harvest reported in dockside interviews. These proportions were calculated separately for each subarea of Area 2C and 3A and weighted by the 2019 final estimated harvests in each subarea to derive the overall proportions. The total sport yield taken prior to the mean survey date was calculated by multiplying the charter and unguided proportions by their respective final or projected yields and summing.

Results:

In 2019, an estimated 0.745 Mlb of halibut were taken by the sport fishery in Area 2C prior to July 11, and an estimated 1.324 Mlb were taken in Area 3A prior to July 1 (Table 6).

Table 1. Final estimates of the 2019 sport halibut harvest (numbers of fish), average net weight (pounds), and yield (millions of pounds net weight) in Areas 2C, 3A, 3B, and 4. "NA" indicates no estimate is available.

IPHC Area	Sector	Harvest (no. fish)	Average Net Wt. (lb)	Yield (Mlb)	95% CI for Yield (Mlb)
Area 2C	Charter	70,600	9.38	0.662	0.622 – 0.702
	Unguided	60,810	19.22	1.169	1.022 – 1.315
	Total	131,410	13.93	1.831	1.679 – 1.982
Area 3A	Charter	139,082	14.64	2.036	1.901 – 2.170
	Unguided	107,722	15.62	1.682	1.489 – 1.875
	Total	246,804	15.06	3.718	3.483 – 3.953
Area 3B	Total	712	16.92[a]	0.012	NA
Area 4	Total	983	16.92[a]	0.017	NA

[a] – No size data were available from Areas 3B and 4, so the unguided average weight from Kodiak was substituted.

Table 2. Preliminary estimates of the 2020 sport halibut harvest (numbers of fish), average net weight (pounds), and yield (millions of pounds net weight) in Areas 2C, 3A, 3B, and 4. "NA" indicates no estimate is available.

IPHC Area	Sector	Harvest (no. fish)	Average Net Wt. (lb)	Yield (Mlb)	95% CI for Yield (Mlb)
Area 2C	Charter	37,415	12.75	0.477	0.455 – 0.499
	Unguided	61,960	18.47	1.144	0.901 – 1.387
	Total	99,375	16.32	1.622	1.378 – 1.865
Area 3A	Charter	108,379	14.60	1.583	1.493 – 1.673
	Unguided	109,298	15.32	1.674	1.363 – 1.986
	Total	217,677	14.96	3.257	2.933 – 3.581
Area 3B	Total	595	18.40[a]	0.011	NA
Area 4	Total	870	18.40[a]	0.016	NA

[a] – No size data were available from Areas 3B and 4, so the unguided average weight from Kodiak was substituted.

Table 3. Final estimates of release mortality for sport fisheries in Areas 2C, 3A, 3B, and 4 in 2019. Some columns may not appear to add correctly due to rounding.

IPHC Area	Sector	Estimated No. Halibut Released	Assumed Mortality Rate	Number Released that Died	Estimated Average Net Weight (lb)	Release Mortality (Mlb)
Area 2C	Charter	33,908	6.0%	2,034	17.26	0.035
	Unguided	30,003	7.0%	2,100	7.07	0.015
	Total	63,911		4,135	12.08	0.050
Area 3A	Charter	55,963	5.0%	2,798	6.68	0.019
	Unguided	57,814	6.0%	3,469	6.59	0.023
	Total	113,777		6,267	6.63	0.042
Area 3B	Total	1,021	6.0%	61	9.08	0.001
Area 4	Total	624	6.0%	37	6.58	0.000

Table 4. Breakdown of Area 2C estimates of charter release mortality by size class for 2019 (final) and 2020 (preliminary). Some columns may not appear to add correctly due to rounding.

Year	Size Class (inches)	Estimated No. Halibut Released	Assumed Mortality Rate	Number Released that Died	Estimated Average Net Weight (lb)	Release Mortality (Mlb)
2019	U38	26,361	6.0%	1,582	6.69	0.011
	O38U80	7,297	6.0%	438	47.66	0.021
	O80	249	6.0%	15	244.70	0.004
	Total	33,908	6.0%	2,034	17.26	0.035
2020	U45	17,803	6.0%	1,068	8.46	0.009
	O45U80	2,775	6.0%	166	62.63	0.010
	O80	195	6.0%	12	244.70	0.003
	Total	20,772	6.0%	1,246	17.91	0.022

Table 5. Preliminary estimates of release mortality for sport fisheries in Areas 2C, 3A, 3B, and 4 in 2020. Some columns may not appear to add correctly due to rounding.

IPHC Area	Sector	Estimated No. Halibut Released	Assumed Mortality Rate	Number Released that Died	Estimated Average Net Weight (lb)	Release Mortality (Mlb)
Area 2C	Charter	20,772	6.0%	1,246	17.91	0.022
	Unguided	30,950	7.0%	2,166	6.99	0.015
	Total	51,722		3,413	10.98	0.037
Area 3A	Charter	38,028	5.0%	1,901	7.28	0.014
	Unguided	65,732	6.0%	3944	6.53	0.026
	Total	103,760	5.6%	5845	6.77	0.040
Area 3B	Total	754	6.0%	45	9.53	0.000
Area 4	Total	564	6.0%	34	6.74	0.000

Table 6. Final estimated sport harvest prior to the mean IPHC survey dates in 2019 in Areas 2C and 3A.

		Charter		Unguided		Total	
Area	Mean Survey Date	Percent	Harvest (Mlb)	Percent	Harvest (Mlb)	Percent	Harvest (Mlb)
2C	July 11	36.3%	0.241	43.2%	0.504	40.7%	0.745
3A	July 1	31.4%	0.638	40.8%	0.686	35.6%	1.324

Attachment 2

SUBSISTENCE HARVESTS OF PACIFIC HALIBUT IN ALASKA, 2018

Division of Subsistence, Alaska Department of Fish and Game
333 Raspberry Road, Anchorage, AK 99518
January 2020

Through a grant from the National Marine Fisheries Service (NMFS) (NA18NMF4370086), the Alaska Department of Fish and Game (ADF&G) Division of Subsistence conducted a study to estimate the subsistence harvests of Pacific halibut in Alaska in 2018. The full results of the study appear in the division's Technical Paper No. 456, "Subsistence Harvests of Pacific Halibut in Alaska, 2018" (January 2020). Key points in the report include the following:

- In May 2003, the NMFS published final federal regulations for a subsistence halibut fishery in Alaska. Residents of 118 rural communities and designated rural areas, and members of 123 tribes are eligible to participate. Fishers must obtain a subsistence halibut registration certificate (SHARC) from NMFS before fishing (www.fakr.noaa.gov/ram/subsistence/halibut.htm; 800-304-4846).
- 2018 was the 16th year in which subsistence halibut fishing took place under these regulations, with harvest estimates available for every year but 2013, 2015, and 2017. Information about subsistence halibut harvests in prior study years is reported in Division of Subsistence Technical Papers 288, 304, 320, 333, 342, 348, 357, 367, 378, 388, 414, and 436.
- To estimate the 2018 harvests, a one-page survey form was mailed to SHARC holders in early 2019 or administered in person in four communities. After three mailings and community visits, 5,852 of 8,576 potential subsistence halibut fishers (68%) responded. Participation in the survey was voluntary.
- An estimated 4,094 individuals subsistence fished for halibut in 2018 (Table 5; Figure 8).
- The estimated subsistence harvest was 29,963 halibut for 615,789 pounds net weight (Table 5).
- Of this total, 78% was harvested with setline (stationary) gear (longline or skate) and 22% was harvested with hand-operated gear (handline or rod and reel) (Table 5).
- The largest subsistence harvests occurred in Southeast Alaska (Halibut Regulatory Area 2C), at 59% of the total, followed by Southcentral Alaska (Area 3A) at 30%, and East Bering Sea Coast (Area 4E) at 4%. Table 5 and Figure 16 from the final report give more details on harvests by gear type and area.
- Based on place of residence of SHARC holders, communities with the largest subsistence halibut harvests in 2018 were Kodiak and Sitka (the largest eligible communities) (Figure 21).
- Based on data from the International Pacific Halibut Commission and this study, the estimated halibut removal in Alaska in 2018 was 30.151 million pounds, net weight. Subsistence harvests accounted for 2.1% of this total (Figure 29).
- In response to a new question, 53% of survey respondents said they had met their needs for halibut in 2018, and 47% said they had not. Lack of effort, inoperative equipment, and time constraints were the most-cited reasons for not meeting needs.
- The report concludes that the project was a success, with good response rates and a reliable estimate of subsistence halibut harvests. Outreach is necessary to maximize enrollment of fishers in the SHARC program, as is additional research to understand trends in the fishery.
- Due to budget constraints, a survey to estimate subsistence halibut harvests in Alaska in 2019 will not take place. The report recommends that monitoring of the Alaska subsistence halibut harvest resume in the future to evaluate trends in the fishery.

For a copy of the full report, go to http://www.adfg.alaska.gov/sf/publications/, or call the Division of Subsistence of ADF&G at 907-267-2353 (Anchorage) or 907-465-3617 (Douglas).

Table 5.–Estimated subsistence harvests of halibut in Alaska in number of fish and pounds net (dressed, head off) weight, by regulatory area and subarea, 2018.

			Estimated subsistence harvest by gear type									Estimated sport harvest		
			Setline gear[a]			Hand-operated gear[a]			All gear					
Subarea	Regulatory area	Number of SHARCs subsistence fished[c]	Estimated number respondents fished[c]	Estimated number halibut harvested	Estimated pounds halibut harvested[b]	Estimated number respondents fished[c]	Estimated number halibut harvested	Estimated pounds halibut harvested[b]	Estimated number respondents fished[c]	Estimated number halibut harvested	Estimated pounds halibut harvested[b]	Estimated number respondents fished[c]	Estimated number halibut harvested	Estimated pounds halibut harvested[b]
Southern Southeast Alaska	2C	1,303	1,130	6,770	167,704	493	1,989	39,805	1,303	8,758	207,509	725	2,553	48,426
Sitka LAMP Area	2C	640	590	2,843	71,498	184	380	8,258	640	3,223	79,757	262	706	13,432
Northern Southeast Alaska	2C	558	507	2,904	66,991	181	667	11,958	558	3,570	78,948	248	707	14,918
	2C Total	**2,430**	**2,167**	**12,516**	**306,193**	**824**	**3,035**	**60,021**	**2,430**	**15,551**	**366,214**	**1,189**	**3,966**	**76,776**
Yakutat Area	3A	80	66	674	13,319	20	184	3,009	80	858	16,327	47	158	3,270
Prince William Sound	3A	248	215	1,211	25,029	82	314	6,115	248	1,525	31,143	108	280	6,395
Cook Inlet	3A	209	136	1,089	20,135	140	1,180	14,503	209	2,269	34,638	133	583	7,908
Kodiak Island road system	3A	457	416	2,880	55,201	156	413	7,214	457	3,293	62,415	279	760	14,639
Kodiak Island other	3A	400	344	1,880	32,853	176	552	10,321	400	2,432	43,174	226	590	11,376
	3A Total	**1,262**	**1,064**	**7,735**	**146,536**	**510**	**2,643**	**41,162**	**1,262**	**10,378**	**187,698**	**697**	**2,371**	**43,588**
Chignik Area	3B	18	18	68	1,083	4	7	100	18	75	1,183	0	0	0
Lower Alaska Peninsula	3B	136	75	350	6,055	105	441	9,406	136	791	15,461	18	67	1,472
	3B Total	**154**	**93**	**417**	**7,138**	**109**	**448**	**9,506**	**154**	**865**	**16,644**	**18**	**67**	**1,472**
Eastern Aleutians–east	4A	78	58	273	7,981	55	155	4,457	78	428	12,438	50	162	3,084
Eastern Aleutians–west	4A	8	8	33	705	3	13	94	8	45	799	0	0	0
	4A Total	**81**	**61**	**306**	**8,687**	**55**	**168**	**4,551**	**81**	**474**	**13,237**	**50**	**162**	**3,084**
Western Aleutians–east	4B	8	5	51	1505	5	6	178	8	56	1684	5	8	261
	4B Total	**8**	**5**	**51**	**1,505**	**5**	**6**	**178**	**8**	**56**	**1,684**	**5**	**8**	**261**
St George Island	4C	7	4	9	131	3	8	270	7	16	401	0	0	0
St Paul Island	4C	26	14	321	3,896	12	36	855	26	357	4,751	0	0	0
	4C Total	**33**	**18**	**329**	**4,027**	**15**	**44**	**1,125**	**33**	**373**	**5,152**	**0**	**0**	**0**
	4D Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Bristol Bay	4E	23	22	85	1,844	17	28	778	23	113	2,622	6	0	0
Yukon-Kuskokwim Delta	4E	139	19	294	4,331	127	1,839	17,737	139	2,133	22,088	4	196	324
Norton Sound	4E	6	6	19	450	0	0	0	6	19	450	0	0	0
	4E Total	**168**	**46**	**398**	**6,645**	**144**	**1,867**	**18,515**	**168**	**2,266**	**25,160**	**10**	**196**	**324**
Grand Total		**4,094**	**3,417**	**21,752**	**480,731**	**1,645**	**8,210**	**135,058**	**4,094**	**29,963**	**615,789**	**1,942**	**6,770**	**125,505**

Source Alaska Department of Fish and Game, Division of Subsistence, SHARC Survey, 2019

a. "Setline gear" = longline or skate; "hand-operated" gear = rod and reel or handline.

b. Weights given are "net weight" (dressed, head off) = .75 of round (whole) weight.

c. Because they may fish in more than one area, subtotals for estimated number of respondents who fished for regulatory areas and the state total might exceed the sum of the subarea values.

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Figure 8.–Estimated number of Alaska subsistence halibut fishers, by regulatory area fished, 2003–2012, 2014, 2016, & 2018.

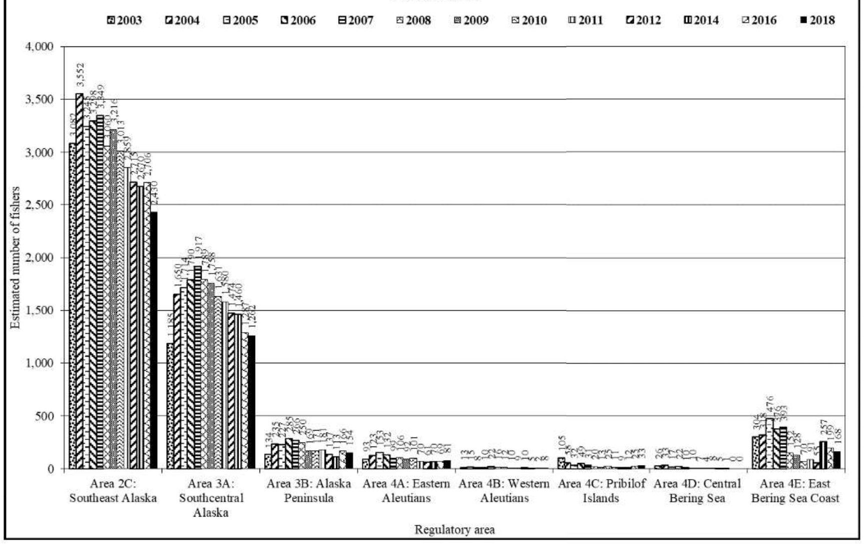

Figure 16.–Estimated subsistence halibut harvests, pounds net weight, by regulatory area fished, 2003–2012, 2014, 2016, and 2018.

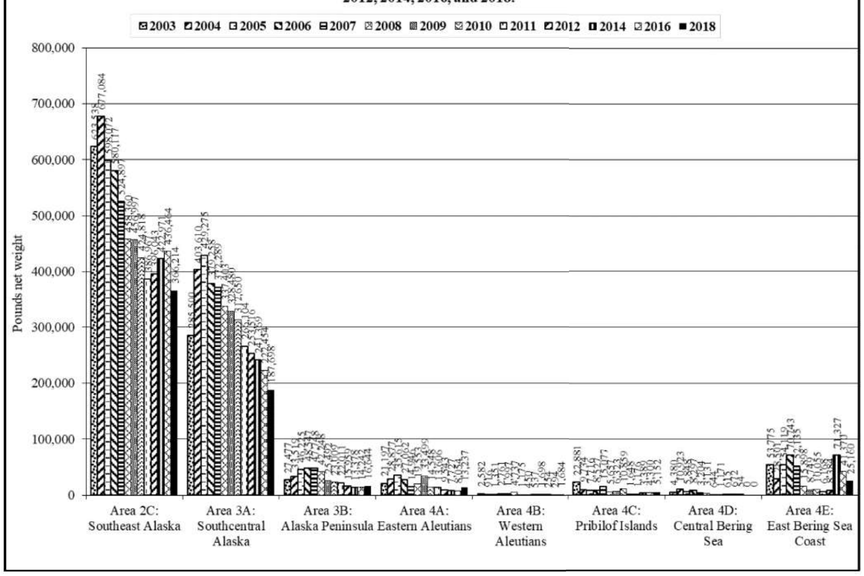

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Figure 21.–Alaska subsistence halibut harvests by place of residence, 2018.

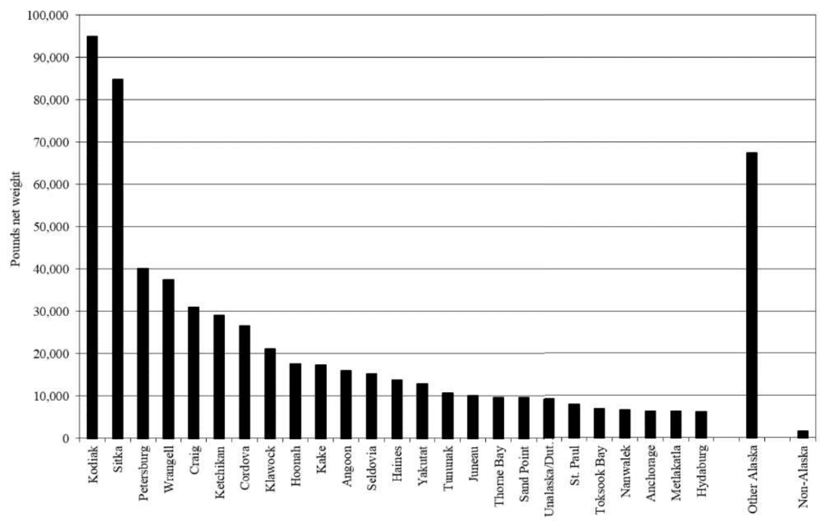
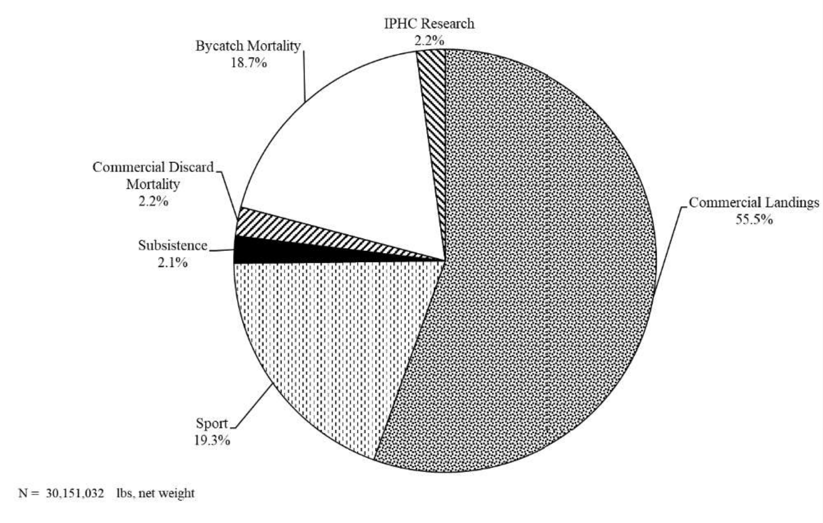


Figure 29.–Halibut removals, Alaska, 2018.



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APPENDIX IV

2019 and Final 2020 Halibut PSC Use by IPHC area and Gear type in the BSAI and GOA

Data through 01/04/21

Table 1: Total and Projected Halibut Mortality in the GOA and BSAI (nearest metric ton) by Area and Gear (Target)

2019 Total		2020 (Predicted 10/16)	2020 Actual	Difference (Actual – Predicted)
Area 2C				
Hook-and-line (non-sablefish)	2	3	3	0
Hook-and-Line (sablefish)	33	8	8	0
Pot	0	0	0	0
Total	**35**	**11**	**11**	**0**
Area 3A				
Trawl	894	673	561	-112
Hook-and-line (non-sablefish)	49	3	1	-2
Hook-and-Line (sablefish)	32	9	8	-1
Pot	0	0	0	0
Total	**975**	**685**	**570**	**-115**
Area 3B				
Trawl	197	245	223	-22
Hook-and-line (non-sablefish)	9	4	0	-4
Hook-and-Line (sablefish)	44	4	3	-1
Pot	1	0	0	0
Total	**251**	**253**	**226**	**-27**

2019 Total		2020 (1/1 to 10/16)	Projected (10/16 to 12/31)	2020 Total
Area 4A				
Trawl	169	130	20	150
Hook-and-line (non-sablefish)	18	3	3	6
Hook-and-Line (sablefish)	4	0	0	0
Pot	2	2	0	2
Total	**193**	**135**	**23**	**158**
Area 4B				
Trawl	83	38	14	52
Hook-and-line (non-sablefish)	7	3	3	6
Hook-and-Line (sablefish)	0	0	0	0
Pot	1	2	0	2
Total	**91**	**43**	**17**	**60**
Area 4 CDE				
Trawl	1,087	599	85	684
Hook-and-line (non-sablefish)	54	57	9	66
Hook-and-Line (sablefish)	0	0	0	0
Pot	0	0	0	0
Total	**1,141**	**656**	**94**	**750**
Area 4 Closed				
Trawl	934	661	45	706
Hook-and-line (non-sablefish)	17	3	2	5
Hook-and-Line (sablefish)	0	0	0	0
Pot	1	1	0	1
Total	**952**	**665**	**47**	**712**
TOTAL (All Areas)				
Trawl	3,364	2,151	361	2,512

Hook-and-line (non-sablefish)	157	69	23	92
Hook-and-Line (sablefish)	113	14	4	18
Pot	6	5	0	5
Total	**3,639**	**2,240**	**388**	**2,627**

Table 1 includes estimates of halibut mortality from groundfish fisheries managed by the State of Alaska, and halibut mortality from federally managed groundfish fisheries. Table 1 estimates the amount of halibut mortality by each gear type using a method of apportioning by IPHC area

Table 2. 2011 through 2020 BSAI and GOA Halibut PSC Use by Sector.

Halibut Mortality (Data through 12/18/2020)	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
BERING SEA AND ALEUTIAN ISLANDS									
Bering Sea and Aleutian Islands Trawl									
Non-Pelagic Trawl (Amendment 80 C/P)	1,944	2,166	2,178	1,633	1,405	1,167	1,343	1,458	1,047
Non-Pelagic Trawl (AFA C/P)	117	127	204	71	78	57	105	39	34
Non-Pelagic Trawl (Catcher Vessels)	497	382	305	310	410	337	309	499	262
Non-Pelagic Trawl (CDQ)	203	194	185	100	140	129	137	168	90
Pelagic Trawl (AFA C/P)	180	166	79	74	64	57	32	66	56
Pelagic Trawl (AFA catcher vessels)	165	33	57	30	19	17	10	16	19
Pelagic Trawl (CDQ)	13	12	21	8	9	6	7	17	10
Bering Sea and Aleutian Islands Hook-and-line and Pot gear									
Hook-and-Line	556	463	402	293	196	172	120	79	68
Hook-and-Line (CDQ Groundfish)	58	58	37	22	25	18	11	4	8
Hook-and-Line (IFQ/CDQ sablefish)	8	6	3	2	1	0	0	0	0
Pot Gear	6	5	4	3	3	3	2	5	5
Total BSAI	**3,747**	**3,611**	**3,476**	**2,546**	**2,350**	**1,963**	**2,075**	**2,351**	**1,599**
GULF OF ALASKA									
Gulf of Alaska Trawl									
Non-Pelagic Trawl (Central GOA C/Vs)	1,198	741	828	961	965	750	900	741	587

Non-Pelagic Trawl (Western GOA C/Vs)	111	93	70	47	107	18	32	18	0
Pelagic Trawl	5	20	1	13	12	14	39	15	32
Trawl (C/P)	388	377	502	375	246	433	217	328	171
Gulf of Alaska Hook-and-line and Pot gear									
Hook & Line (C/P)	53	35	76	68	77	69	10	20	0
Hook & Line (Catcher vessels)	147	130	117	153	165	105	42	55	2
Hook & Line - IFQ sablefish	37	31	29	34	29	40	75	111	21
Pot Gear	41	15	10	22	44	15	1	1	0
TOTAL GOA	**1,980**	**1,441**	**1,634**	**1,674**	**1,645**	**1,443**	**1,317**	**1,289**	**813**
TOTAL All Areas	**5,727**	**5,052**	**5,110**	**4,220**	**3,995**	**3,406**	**3,392**	**3,640**	**2,412**

Figure 1. 2019 and 2020BSAI Trawl Halibut PSC Use by Groundfish Fishery.

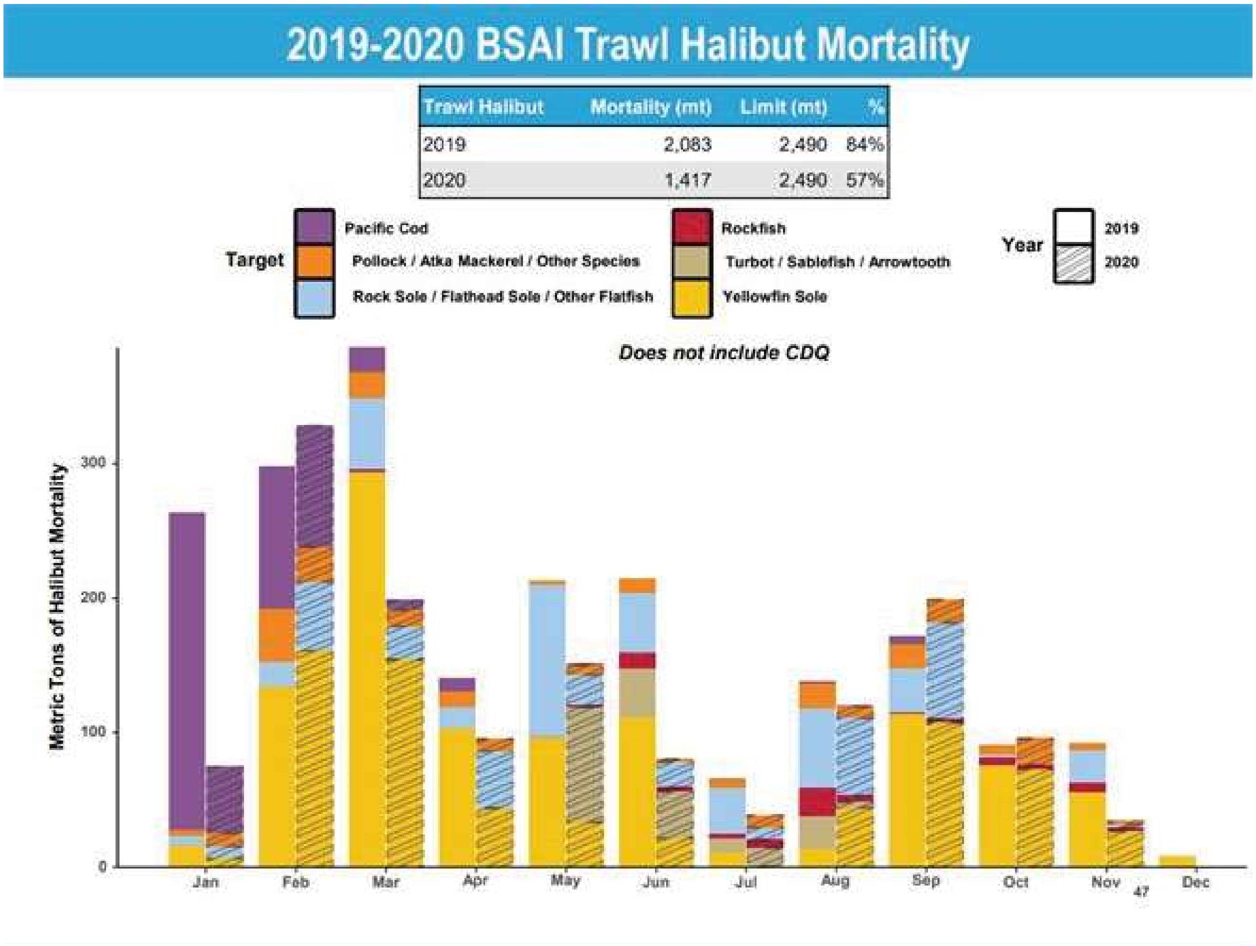
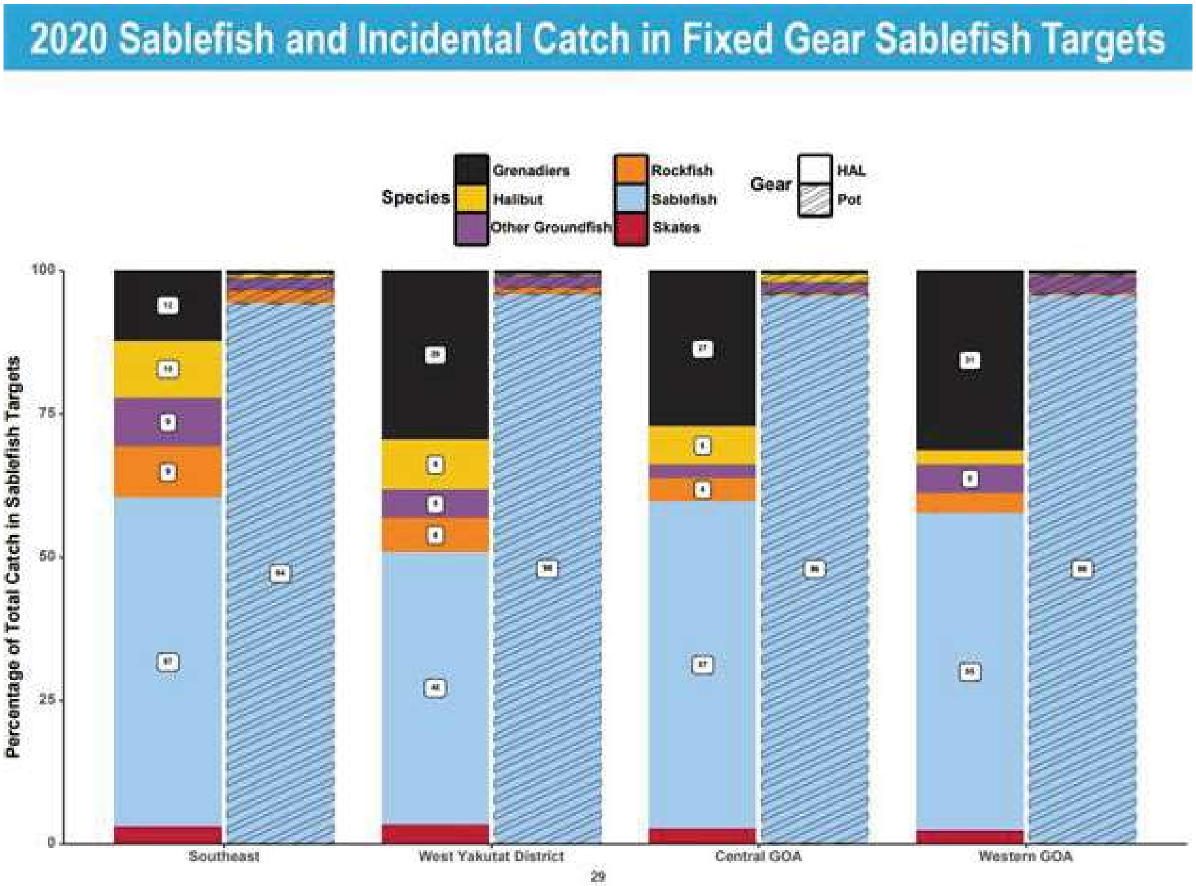


Table 3. 2020 GOA Sablefish IFQ Fishery by Gear Type

2020 Sablefish	Hook-and-Line			Pot		
	Unique Vessels	Sablefish (mt)	% of IFQ Sablefish	Unique Vessels	Sablefish (mt)	% of IFQ Sablefish
Southeast	135	2,472	84%	42	471	16%
West Yakutat	59	1,081	68%	35	516	32%
Central GOA	70	1,205	32%	71	2,563	68%
Western GOA	18	172	14%	26	1,085	86%
GOA Wide	**190**	**4,929**	**52%**	**102**	**4,636**	**48%**

Figure 2. 2020 Sablefish and Other Species Incidental Catch in GOA Fixed Gear Sablefish Target=



IPHC Fishery Regulations:

Mortality and Fishery Limits (Sect. 5)

PREPARED BY: IPHC SECRETARIAT (15 DECEMBER 2020)

PURPOSE

To provide the mortality and fishery limits framework within the IPHC Fishery Regulations: *Mortality and Fishery Limits* (Sect. 5), for reference and population at AM097.

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 updates the IPHC Fishery Regulations Section 5, '*Mortality and Fishery Limits,'* to reflect TCEY values adopted by the IPHC at AM097, and the applicable fishery sector limits resulting from those TCEY values according to existing Contracting Party catch sharing arrangements.

DISCUSSION

IPHC Fishery Regulations Section 5, '*Mortality and Fishery Limits,'* was adopted in 2020 in order to provide clear documentation of the limits for fishery sectors within defined Contracting Party 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 97th Session of the IPHC Annual Meeting (AM097) in January 2021.

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 responsibility of the Contracting Parties. The intention is to reinforce that distinction by clarifying

[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.

which decisions are made by the Commission.

Sectors Affected: This proposal affects all sectors of the Pacific halibut fishery.

ADDITIONAL DOCUMENTATION / REFERENCES

None

RECOMMENDATIONS

That the Commission:

1) **NOTE** regulatory proposal IPHC-2021-AM097-PropA1, which provides the Commission with the mortality and fishery limits framework within the IPHC Fishery Regulations: *Mortality and Fishery Limits* (Sect. 5), for reference and population at AM097.

APPENDICES

Appendix A: Suggested IPHC Fishery Regulation 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/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/recreational)		
Commercial fishery		
Recreational fishery		

Area 2C (southeastern Alaska) (combined commercial/guided recreational)		
Commercial fishery (catch)		
Commercial fishery (X.XX Mlb catch and 0.XX Mlb incidental mortality)		
Guided recreational fishery (includes catch and incidental mortality)		
Area 3A (central Gulf of Alaska) (combined commercial/guided recreational)		
Commercial fishery (X.XX Mlb catch and 0.XX Mlb incidental mortality)		
Commercial fishery (incidental mortality)		
Guided recreational fishery (includes catch and incidental mortality)		
Area 3B (western Gulf of Alaska)		
Area 4A (eastern Aleutians)		
Area 4B (central/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 (15 DECEMBER 2020)

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. Weather patterns, predicted tides in some fishing areas, whale activity, and business considerations for both fishers and processors have also been factors in the discussions surrounding the setting of fishing period dates.

The IPHC's practice is to use the same overall commercial fishing period dates for all IPHC Regulatory Areas with the exception of IPHC Regulatory Area 2A. 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 for all IPHC Regulatory Areas with the exception of IPHC Regulatory Area 2A.

DISCUSSION

All IPHC Regulatory Areas except 2A

The IPHC Secretariat proposes that the commercial fishing periods for all IPHC Regulatory Areas be set at AM097.

We note that there are several stakeholder proposals that request a 'year-round' fishery. The IPHC Secretariat has no objection to a 'year-round' fishery.

IPHC Regulatory Area 2A

No change is recommended for IPHC Regulatory Area 2A for 2021.

Sectors Affected: Commercial Pacific halibut fisheries in each IPHC Regulatory Area.

RECOMMENDATIONS:

That the Commission:

1) **NOTE** fishery regulation proposal IPHC-2021-AM097-PropA2, which proposed the adoption of fishing periods for the commercial Pacific halibut fisheries within the IPHC Pacific Halibut Fishery Regulations: Commercial Fishing Periods (Sect. 9);

APPENDICES

Appendix A: Suggested IPHC Fishery Regulation language

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 ~~14 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 ~~15 November~~DD MMMM~~, with the exception of IPHC Regulatory Area 2B which shall cease at 1200 local time on 7 December 2020~~.

(4) The first fishing period in the IPHC Regulatory Area 2A non-tribal directed commercial fishery[2] shall begin at 0800 on the fourth Monday in June and terminate at 1800 local time on the subsequent Wednesday, 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 Monday two weeks after the first period, and, if necessary, a third fishing period of up to three fishing days to begin on Monday four weeks after the first period.

(5) Notwithstanding paragraph (4), 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), 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.

12. Application of Commercial Catch Limits

(1) …

(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.

IPHC Fishery Regulations: minor amendments

PREPARED BY: IPHC SECRETARIAT (16 DECEMBER 2020)

PURPOSE

To improve clarity and consistency in the IPHC Fishery Regulations.

BACKGROUND

This proposal would make minor amendments to the IPHC Regulations. These revisions to the regulations may include:

- Updating and clarifying existing fishery regulations;
- Reordering regulations for clarity and emphasis.

DISCUSSION

Periodically, regulations should be reviewed to ensure they are clear, concise, consistent, and current. These proposed revisions to the IPHC Fishery Regulations are a result of a holistic review. The revisions resulting from this review are described below in detail:

- Updating and clarifying fishery regulations
    1. Section 22, Supervision of Unloading and Weighing, would be expanded to include access for sampling or inspecting by an authorized representative of the Commission.
- Reordering fishery regulations for clarity and emphasis
    1. No reordering is necessary at this time.

Benefits/Drawbacks: The benefit is clearer and more consistent regulations that are easier to use. No known drawback.

Sectors Affected: This proposal affects all sectors of the Pacific halibut fishery.

RECOMMENDATIONS:

That the Commission:

1) **NOTE** regulatory proposal IPHC-2021-AM097-PropA3, which recommends changes to improve the clarity and transparency of the IPHC Fishery Regulations.
2) **ADOPT** the recommended changes to the IPHC Fishery Regulations as provided in Appendix A.

ADDITIONAL DOCUMENTATION / REFERENCES

None

APPENDICES:

APPENDIX A: Suggest IPHC Fishery Regulation language

APPENDIX A
SUGGESTED REGULATORY LANGUAGE

1. Section 22, Supervision of Unloading and Weighing, would be expanded to include an authorized representative of the Commission for sampling or inspecting.

22. Supervision of Unloading and Weighing

(1) The unloading and weighing of Pacific halibut may be subject to the supervision of authorized officers to assure the fulfillment of the provisions of these Regulations.

(2) The unloading and weighing of Pacific halibut may be subject to inspection and sampling by an authorized representative of the Commission.

IPHC-2021-AM097-PropB1
Received: 18 December 2020

FISHERY REGULATION PROPOSAL 2021
TITLE: CHARTER MANAGEMENT MEASURES IN IPHC REGULATORY AREAS 2C AND 3A (SECT. 29)

SUBMITTED BY:
UNITED STATES OF AMERICA
NOAA-FISHERIES
AFFILIATION: NMFS, ALASKA REGION
USA

All Regulatory Areas ☐ All Alaska Regulatory Areas ☐ All U.S. Regulatory Areas ☐

2A ☐ 2B ☐ 2C ☒ 3A ☒ 3B ☐ 4A ☐ 4B ☐ 4C ☐ 4D ☐ 4E ☐

The North Pacific Fishery Management Council (NPFMC) recommended the following management measures for charter Pacific halibut fisheries in IPHC Regulatory Areas 2C and 3A for application in 2021, in order to achieve the charter Pacific halibut allocation under the NPFMC Halibut Catch Sharing Plan. These recommended management measures incorporate adjustments for an expected decline in charter fishing effort in the 2021 season.

Area 2C

Management measures for all allocations shown below include a daily bag limit of one Pacific halibut, combined with a progression of size limits in the following order:

1. If the charter catch limit is 0.650 million pounds or less: a reverse slot limit with an upper limit fixed at 80 inches or greater and a lower limit of 44 inches or less.

2. If the charter catch limit is from 0.651 million pounds to 0.786 million pounds: a reverse slot limit with upper length and lower length limits determined from the following table:

Minimum Charter Allocation (Mlb)	Reverse Slot Limit (inches)
0.667	<=45 >=80
0.681	<=46 >=80
0.700	<=47 >=80
0.713	<=48 >=80
0.735	<=49 >=80
0.751	<=50 >=80
0.758	<=50 >=78
0.759	<=50 >=76
0.768	<=50 >=74

0.786	<=50 >=72

Area 3A

All allocations shown below include management measures with a daily bag limit of two Pacific halibut; no annual limit on the number of retained Pacific halibut for charter anglers; Wednesdays closed to Pacific halibut retention all year; one trip per Pacific halibut charter vessel per day; and one trip per charter Pacific halibut permit (CHP) per day.

1. If the charter allocation is less than 1.85 Mlb:
    - A daily bag limit of two Pacific halibut, with one Pacific halibut of any size and a maximum size limit on the second retained Pacific halibut determined from the following table:

Minimum Charter Allocation (Mlb)	**Maximum Size Limit (inches)**
1.81	<= 31
1.78	<= 30

2. If the charter allocation is greater than or equal to 1.85 Mlb, but less than 1.93Mlb:
    - a daily bag limit of two Pacific halibut, with one Pacific halibut of any size and a maximum size limit on the second Pacific halibut of 32 inches;

The NPFMC selected these management measures at its December 2020 meeting, following review of the Alaska Department of Fish and Game (ADFG) analysis of proposed management measures for 2021, and after receiving input from the Charter Halibut Management Committee, which includes stakeholder representatives from both IPHC Regulatory Areas 2C and 3A. The management measures incorporate a COVID impact buffer as described in Appendix A-2, on page 59 in the ADFG analysis. Charter Pacific halibut removal estimates for 2021 in IPHC Regulatory Area 3A are based on a projected 25 percent reduction in fishing effort relative to the status quo (i.e. 2009-2019). Charter Pacific halibut removal estimates for 2021 in IPHC Regulatory Area 2C are based on a projected 35 percent reduction in fishing effort relative to the status quo.

The December ADFG analysis is available on the NPFMC website at:

https://meetings.npfmc.org/CommentReview/DownloadFile?p=623eb128-b772-44c4-9e17-05bae8cf6919.pdf&fileName=C1%20Charter%20Management%20Options%20Analysis%20.pdf

The December Charter Halibut Management Committee minutes are provided at Appendix I for reference.

The suggested modification to the IPHC Fishery Regulations are provided at Appendix II.

APPENDIX I
Charter Halibut Management Committee Report of 30 November 2020

North Pacific Fishery Management Council

Simon Kinneen, Chair | David Witherell, Executive Director
1007 W. 3rd Avenue, Suite 400, Anchorage, AK 99501
Phone 907-271-2809 | www.npfmc.org

Charter Halibut Management Committee

REPORT
1:00-4:00 PM | November 30, 2020 | via Online Meeting

The Charter Halibut Management Committee met at the time indicated above to develop their recommendations to the Council on 2021 charter halibut management measures in IPHC Regulatory Areas 2C and 3A.

Committee Members in attendance:

Andy Mezirow, Chairman	Stan Malcolm	Richard Yamada
Steve Zernia	Kent Huff	Forrest Braden
Matt Kopec	Seth Bone	Jim Armstrong (staff)
Daniel Donich	Mike Flores	

Members absent:
Denise May

Others in attendance:

Ben Jevons	Jim Martin	Sarah Webster*
Baine Etherton	John Jensen	Shannon Gleason
Brian Ritchie	Kurt Iverson	Tom Gemmell
Doug Duncan	Mel Erickson	Tom Taube
Jim Hasbrouck	Robert Powers	

**presenter*

2020 Preliminary Fishery Review

Sarah Webster of ADF&G began her presentation with a review of preliminary charter halibut fishery performance in 2020, using logbook data through August as well as dockside sampling. Area 2C charter removals were estimated to be 0.499 Mlb in 2020, which was 36% below the 0.780 Mlb allocation, and Area 3A charter removals were estimated to be 1.597 Mlb in 2020, which was 6.6% below the 1.710 Mlb allocation.

Sarah also provided annual counts for the past 10 years (2011-2020) of charter halibut businesses and vessels that reported actually harvesting halibut. This was in response to a request by the Committee for indicators of COVID impacts in 2020. Active charter business in Area 2C averaged about 250 through 2019, but were down to 191 in 2020, and vessels decreased from about 500-550 to 384. In Area 3A, businesses had been decreasing from over 300 in 2011 to 226 in 2019, and were down to 197 in 2020, while the more stable count of about 400 active vessels decreased to 337.

2021 Charter Halibut Management Measures

The majority of the presentation focused on information detailed in the ADF&G Analysis of Management Options for the Area 2C and 3A Charter Halibut Fisheries for 2021 (posted to the eAgenda as "C1 Charter Management Options Analysis"). That Analysis provides harvest estimates under a range of measures that the Committee identified at its October 2020 meeting. Following the presentation by Sarah Webster the Committee provided recommendations on harvest measures for Areas 2C and 3A in 2021. The Committee recommendations are intended to achieve, but not exceed the charter halibut allocations for 2C and 3A that will be finalized by the IPHC at its annual meeting in January 2021. Since the final allocations are not yet available, the Committee based its recommendations on allocations derived from the current IPHC stock assessment, a reference level of halibut fishing intensity, and estimated distributed halibut mortalities, as provided in the preliminary Pacific halibut stock assessment at the IPHC's November Interim 2020 meeting. For Area 2C, in 2021, the interim allocation would be 0.65 Mlb (down from 0.78 Mlb in 2020), and for Area 3A the interim allocation would be 1.93 Mlb (up from 1.71 Mlb in 2020).

Effort Adjustments

Importantly, rather than overcomplicating the analysis by attempting to integrate COVID impacts on effort at each step, 2021 harvest estimates in the ADF&G Analysis were generated using "normal", i.e., historical, effort inputs. Subsequently, expectations about reduced effort, i.e., "COVID buffers" could be considered which would scale estimated removals for comparison with potential area allocations. Committee recommendations, therefore, consider the likely magnitude of the buffers for each area based on expected continuation of reduced public participation in charter halibut fishing in 2021.

Committee recommendations on COVID buffers also considered changes in 2020 effort that were suggested by the ADF&G Analysis. Specifically, time series of angler days from charter logbook reporting, including preliminary 2020 data suggest an overall 42.5% decrease in effort may have occurred for the two areas in 2020 (Tables 3 and 4 in the Analysis). Additionally, Appendix II compares 2020 harvests under hypothetical 10% and 40% effort reductions and observed vs forecasted 2020 harvest. That comparison suggests potential effort reductions in 2020 close to 50% (54% in 2C and 47% in 3A).

Area 2C

The Charter Halibut Management Committee recommends the following management measures for IPHC Regulatory Area 2C.

1. Apply a 35% reduction in projected removals for 2021 under a reverse slot limit in Table 6, page 26, of the analysis and use this adjusted table (below) for determining reverse slot limit harvest measures.

2. One Fish Daily Bag Limit.

3. If the Area 2C catch limit is at .65 million pounds (Reference SPR 43), reverse slot limit must be ≤44" or ≥80".

4. If Area 2C catch limit is from .651 million pounds to .751 million pounds, maintain the upper reverse slot limit at ≥80" and adjust the lower reverse slot limit upward to keep the projected harvest within the allocation.

5. If Area 2C catch limit is higher than .751 million pounds, maintain the lower reverse slot limit of ≤50" and adjust the upper reverse slot limit downward to keep the projected harvest within the allocation.

Area 2C Reference Table

Reverse Slot	Removals from Table 6 in analysis (Mlb)	Removals adjusted for 35% buffer (Mlb)
U44O80	0.993	0.645
U45O80	1.026	0.667
U46O80	1.048	0.681
U47O80	1.077	0.700
U48O80	1.097	0.713
U49O80	1.131	0.735
U50O80	1.155	0.751
U50O78	1.166	0.758

U50O76	1.168	0.759
U50O74	1.182	0.768
U50O72	1.209	0.786

Area 3A

The Committee recommends that the Council approve and send on to the International Pacific Halibut Commission (IPHC) the following management measures for IPHC regulatory Area 3A.

All allocations shown below include, unless otherwise specified:

- a daily bag limit of 2 halibut;
- no annual limit per charter angler;
- Wednesdays closed to halibut retention all year;
- 1 trip per halibut charter vessel per day; and
- 1 trip per charter halibut permit per day.

If the allocation is less than 1.93Mlb (Status Quo FCEY) but greater than or equal to 1.85 Mlb:

- One fish of any size, and one fish less than or equal to 32 inches;
- All Wednesdays closed to retention of halibut, with a second fish of 32" or less, according to Table 24 in ADF&G analysis of proposed harvest regulations for 2021 to bring the projected harvest within the Area 3A allocation. Table 22 on page 45 of the ADF&G Analysis: Yield 2.470 Mlb
- Apply a 25% COVID Impact Buffer as described in Appendix A-2, 2 on page 59 in the ADF&G Analysis to achieve a yield of 2.470 x .75 = 1.85 Million pounds is the projected removal.

If the allocation is less than 1.85 Mlb but greater than 1.74 Mlb

- Adjust the size of the second fish, down to a minimum of 30 inches to keep the charter harvest within their allocation. Table 24B on Page 47 of the ADF&G analysis.

Summary

In providing their recommendations, the Committee discussed a wide range of issues that would affect the magnitude of COVID buffers for scaling harvest in 2021. These factors included recent increases in COVID counts, continued constraints on travel to Alaska, financial distress among potential clients, uncertain rollovers of 2020 bookings to 2021, health liability precautions, vaccine nonparticipation, and other considerations. The Committee felt that the COVID buffer reductions they are recommending (35% for Area 2C, and 25% for Area 3A) are more likely to be underestimated than overestimated, and that 2021 is more likely to resemble 2020 that a "normal" year for their businesses.

The relaxation of management measures through the emergency action in 2020 represented significant increases in potential harvest, however, realized harvest was still very low. Nevertheless, the Committee wished to express their gratitude to the Council and Agencies involved in facilitating that emergency response.

Public Comment

The Committee received public comment from Mel Erickson.

Adjourn

The meeting was adjourned at 3:59PM.

APPENDIX II

Suggested Regulatory Language

29. Sport Fishing for Pacific Halibut—IPHC Regulatory Areas 2C, 3A, 3B, 4A, 4B, 4C, 4D, 4E

(1) …

(2) For guided recreational (sport) fishing (as referred to in 50 CFR 300.65) in IPHC Regulatory Area 2C:

(a) No person on board a charter vessel (as referred to in 50 CFR 300.65) shall catch and retain more than one Pacific halibut per calendar day.

(b) No person on board a charter vessel (as referred to in 50 CFR 300.65) shall catch and retain any Pacific halibut that with head on is greater than 44 inches (111.8 cm) and less than 80 inches (203.2 cm) [as described above, size limits may be adjusted to meet the 2021 Area 2C charter harvest allocation] as measured in a straight line, passing over the pectoral fin from the tip of the lower jaw with mouth closed, to the extreme end of the middle of the tail.

(3) For guided recreational (sport) fishing (as referred to in 50 CFR 300.65) in IPHC Regulatory Area 3A:

(a) No person on board a charter vessel (as referred to in 50 CFR 300.65) shall catch and retain more than two Pacific halibut per calendar day.

(b) At least one of the retained Pacific halibut must have a head-on length of no more than 32 inches (71.1 cm) [as described above, the size limit may be adjusted, down to a minimum of 30 inches, to meet the 2021 harvest allocation in Area 3A] as measured in a straight line, passing over the pectoral fin from the tip of the lower jaw with mouth closed, to the extreme end of the middle of the tail. If a person sport fishing on a charter vessel in IPHC Regulatory Area 3A retains only one Pacific halibut in a calendar day, that Pacific halibut may be of any length.

(c) A "charter halibut permit" (as referred to in 50 CFR 300.67) may only be used for one charter vessel fishing trip in which Pacific halibut are caught and retained per calendar day. A charter vessel fishing trip is defined at 50 CFR 300.61 as the time period between the first deployment of fishing gear into the water by a charter vessel angler (as defined at 50 CFR 300.61) and the offloading of one or more charter vessel anglers or any Pacific halibut from that vessel. For purposes of this trip limit, a charter vessel fishing trip ends at 2359 (Alaska local time) on the same calendar day that the fishing trip began, or when any anglers or Pacific halibut are offloaded, whichever comes first.

(d) A charter vessel on which one or more anglers catch and retain Pacific halibut may only make one charter vessel fishing trip per calendar day. A charter vessel fishing trip is defined at 50 CFR 300.61 as the time period between the first deployment of fishing gear into the water by a charter vessel angler (as defined at 50 CFR 300.61) and the offloading of one or more charter vessel anglers or any Pacific halibut from that vessel. For purposes of this trip limit, a charter vessel fishing trip ends at 2359 (Alaska local time) on the same calendar day that the fishing trip began, or when any anglers or Pacific halibut are offloaded, whichever comes first.

(e) No person on board a charter vessel may catch and retain Pacific halibut on any Wednesday.

IPHC Fishery Regulation Proposal:

Commercial Fishing Period (Sect. 9)

SUBMITTED BY: WILLIAM CONNOR, F/V CAPE RELIANT AND ROBERT HAUKNES, F/V MYSTIC ERA (23 DECEMBER 2020 AND 15 JANUARY 2021)

PURPOSE

To propose an extension of the directed commercial Pacific halibut season to year round.

BACKGROUND

William Connor has been fishing for 47 years.

Robert Hauknes has been fishing Pacific halibut for 23 years.

DISCUSSION

The Pacific halibut fishing season should have an extended season to year round. This will enable our fishermen to compete with the other fisheries (e.g. East Coast Pacific halibut) and farmed product that is driving our prices down and market exposure down. Additionally, as presented during the 8th Special Session of the IPHC (SS08) in paper IPHC-2020-SS08-PropA1, there is no biological or management reason for having a closed season. If one Contracting Party is not able or not willing to implement this, the request is to at least implement this change for the other Contracting Party.

Benefits/Drawbacks: The benefit is this will enable our fishermen to compete with the other fisheries and farmed product that is driving our prices down and market exposure down. Additionally, this would allow fishermen in Canada to retain Pacific halibut within other fisheries they are participating for which they are charged a discard mortality (quota to offset) during the closed period. This would also allow for dock sales year round. No known drawbacks.

Sectors Affected: This proposal affects the directed commercial sector of the Pacific halibut fishery in all IPHC Regulatory Areas.

ADDITIONAL DOCUMENTATION / REFERENCES

IPHC Secretariat. 2020. IPHC Pacific Halibut Fishery Regulations: Commercial Fishing Periods (Sect. 9). IPHC-2020-SS08-PropA1. 5 p.

RECOMMENDATIONS

That the Commission:

1) **NOTE** fishery regulation proposal IPHC-2021-AM097-PropC1 Rev_1, which provides for a year-round directed commercial fishery in all IPHC Regulatory Areas, *Commercial Fishing Periods* (Sect. 9), for consideration at AM097.

APPENDICES

Appendix A: Suggested IPHC Fishery Regulation Language

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 ~~12~~0800 local time on 14 ~~March~~January.

(3) All commercial fishing for Pacific halibut in all IPHC Regulatory Areas shall cease for the year at ~~1~~2000 local time on 31~~15 November~~December~~, with the exception of IPHC Regulatory Area 2B which shall cease at 1200 local time on 7 December 2020~~.

(4) The first fishing period in the IPHC Regulatory Area 2A non-tribal directed commercial fishery2 shall begin at 0800 on the fourth Monday in June and terminate at 1800 local time on the subsequent Wednesday, 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 Monday two weeks after the first period, and, if necessary, a third fishing period of up to three fishing days to begin on Monday four weeks after the first period.

(5) Notwithstanding paragraph (4), and paragraph (6) of section 12, an incidental catch fishery3 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), 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.

Stakeholder statements on regulatory proposals

PREPARED BY: IPHC SECRETARIAT (15 AND 25 JANUARY 2021)

PURPOSE

To provide the Commission with a consolidated document containing 'Statements' from stakeholders submitted to the Commission for its consideration at the 97th Session of the IPHC Annual Meeting (AM097).

BACKGROUND

During 2018 and 2019, the IPHC Secretariat made improvements to the Fishery Regulations portal on the IPHC website, which includes instructions for stakeholders to submit statements to the Commission for its consideration. Specifically:

> *"Informal Statements by stakeholders should be submitted as an email to the following address, secretariat@iphc.int, which will then be provided to the Commissioners as Stakeholder Statements at each Session.*

DISCUSSION

Table 1 provides a list of the Stakeholder Statements received by 1200 on 24 January 2021, which are provided in full in the Appendices. The IPHC Secretariat does not provide commentary on the Statements, but simply collates them in this document for the Commission's consideration.

Table 1. Statements received from stakeholders by received by 1200 on 24 January 2021.

Appendix No.	Title and author	Date received
Appendix I	Statement by James Kearns	24 November 2020
Appendix II	Statement by Linda Behnken	19 January 2021
Appendix III	Statement by Garrett Elwood	24 January 2021
Appendix IV	Statement by Josh Padgett	24 January 2021

APPENDICES

As listed in Table 1.

APPENDIX I

Statement by James Kearns

Requested By:	James Kearns
Requester E-mail	jim@fairweatheradventures.net
Date Requested	11/24/2020
IPHC Regulatory Areas that may be affected	All AK
Fishery Sectors	(field not answered)
Explanatory Memorandum	The Pacific Halibut resource is a public resource that should be equally available to all the public sector users, commercial, recreational, and subsistence. It must be managed so that the resource is sustainable for future generations and each user group must participate in the management plan. I believe that the IPHC should institute a change in the catch sharing plan so that all public sector users of the pacific halibut resource have equal access to the resource. Therefore I propose that there be a recreational fishery allocation for pacific halibut that includes all recreational fishermen, guided and unguided. Additionally, I propose that the recreational allocation be at least 40% of the TAC annually. I also propose that the recreational allocation be managed for all recreational fishermen, guided or unguided, with a one fish of any size daily bag limit along with an annual limit. Further, I believe that the main management tool should be a halibut harvest ticket or punch card that must be completed when a halibut is retained and reported and turned in when it is filled or at the end of each year, whichever comes first. The harvest ticket/punch card should report the size in inches of each halibut retained, the waters from which the halibut was taken, and! the gender of the halibut retained. In addition, I propose that the guided angler fish program be discontinued and that there be no mixing of recreational and commercial allocations. It is inconsistent with recreational fishing purposes that a commercial use of the resource be available for recreational fishermen. In fact, the National Park Service does not allow GAF harvests because commercial fishing is not one of the established purposes of the service. I believe that these proposals will 1) provide a more equitable share of the pacific halibut resource for all public sector users, 2) provide for simplified enforcement of recreational halibut harvest regulations, 3) enhance the accuracy of recreational halibut harvest reporting, and 4) maintain a separation between commercial and recreational harvests of pacific halibut.

APPENDIX II

Statement by Linda Behnken

Alaska Longline FISHERMEN'S ASSOCIATION

Post Office Box 1229 / Sitka, Alaska 99835 907.747.3400 / FAX 907.747.3462

January 19, 2021

IPHC Commissioners
2320 West Commodore Way Ste 300
Seattle, WA 98119-1287

Subj: Annual Meeting Comments

Dear Commissioners and Halibut Stakeholders,

I am submitting these comments on the 2021 halibut season opening/closing dates and catch limits behalf of the Alaska Longline Fishermen's Association (ALFA). ALFA members fish for halibut across all Gulf of Alaska management areas and some range into the Bering Sea/Aleutian Island. Our members have significant investment in halibut quota share and depend on the halibut resource for their livelihood.

Season Opening/Closing Dates:
ALFA members support a March 7th opening date and a closing date as late in the Fall as possible. The tides are favorable on March 7th, and from a commercial fishing operational and marketing perspective, the longest possible fishing season is desirable.

Coastwide Target Harvest Rate:
ALFA members support using the F43 coastwide harvest rate and the resultant 39 mlbs TCEY for 2021. The F43 target harvest rate was fully evaluated by the recent management strategy evaluation (MSE) and shown to be robust. Section 3.1 of the IPHC Management Strategy Evaluation report (IPHC-2021-AM097-11) notes that slightly more aggressive harvest rates of F42 or F41 may better meet the B36 target biomass objective of the MSE process under the new multi-area model. However, given the current low level of halibut spawning biomass, ALFA members recommend the more conservative F43 target harvest rate.

Regulatory Area TCEY Distribution:
ALFA members acknowledge that the Interim Agreement defines 2A and 2B apportionments for 2021, **HOWEVER**, new information resulting from the MSE establishes that the 70/30 apportionment formula for Area 2B causes significant negative long-term impacts on all US IPHC regulatory areas. These impacts include:

- The ongoing transfer of yield generated by halibut residing in US waters to Canada. This transfer of yield is caused by including a percentage of coastwide TCEY in Area 2B's apportionment formula which is greater than the relative abundance of the halibut resource in 2B, and results in TCEY reductions in all Alaska IPHC regulatory areas. The reductions in Alaska TCEYs will become more pronounced as halibut abundance shifts back to more historical patterns with relative increases in Region 3. For example, in 2020 the TCEY was reduced in Alaskan IPHC areas by 1.76 mlbs to fund the Area 2B Interim Agreement bonus. In 2021, the magnitude of the reduction will increase to 2.46 mlbs because relative halibut abundance in Region 3 has increased.

- Increased fishing pressure in Area 2B under the Interim Agreement drives a significant decrease in Region 2 spawning biomass. MSE results establish a 17% relative decrease in the Region 2 long-term spawning biomass metric under the Interim Agreement (MP B) vs. a FISS based distribution approach (MP J), which more closely follows local abundance trends. Since spawning biomass is closely related to O32 biomass distribution, Area 2C receives a reduced base share of the overall TCEY plus an additional TCEY deduction driven by the Area 2B apportionment bonus.

- ALFA notes that the MSE model results for MP E establish that the Area 2A Interim Agreement fixed apportionment alone does not cause a significant reduction in spawning biomass in Region 2.

Based on this new information, ALFA members request US and Canadian IPHC Commissioners initiate discussions to re-balance distributions to more closely track Regional/ IPHC Regulatory Area abundance trends and the available yield of the halibut resource surveyed within each contracting parties' waters. The MSAB noted that the FISS survey is currently the best scientific method for estimating stock distribution among biological regions and IPHC regulatory areas. (IPHC-2020-MSAB016 Para 37) Future distribution agreements should be based on the FISS modeled abundance in each IPHC regulatory area and must be fair to each contracting party.

The MSE also found that incorporating a rolling average of FISS O32 abundance minimizes variability at the IPHC regulatory area level while still maintaining long-term fishery yield. **ALFA members support implementing a 3-year rolling average of FISS O32 data for apportionment in Alaska in 2021 as a long-term procedure to improve stability.** While a 3-year rolling average was not explicitly evaluated by the MSE, it falls within the range of distributing TCEY based on the current year of modeled FISS data (MP G) and the 5-year rolling average (MP J) that were evaluated. The table below provides our recommendation for 2021 TCEY distribution incorporating the Interim Agreement and a 3-year rolling average.

I would close by reminding IPHC Commissioners that the US is currently paying 80% to 90% of the cost of operating the IPHC on an annual basis. Of that, five hundred thousand dollars is paid directly by US commercial fishermen through IFQ cost recovery fees. US fishermen are further subsidizing Canada's apportionment bonus through reduced TCEY in all US IPHC Areas—a TCEY reduction of 2.5 mlbs (worth $15 to $20 million dollars ex-vessel) in 2021 under the Interim Agreement. This is not an equitable sharing of the management and conservation burden for the halibut resource. ALFA strongly recommends Commissioners develop an equitable agreement between the contracting parties by 2022, if not sooner.

Sincerely,

Linda Behnken

Linda Behnken
Executive Director

	2A	2B	2C	3A	3B	4A	4B	4CDE	TOTAL
2020 Adopted TCEY	1.65	6.83	5.85	12.2	3.12	1.75	1.31	3.9	36.6
2021 Reference TCEY (Current Yr. FISS)	1.65	7.00	5.16	14.11	3.12	2.51	1.47	3.98	39.00
2021 with 3 yr. FISS Ave	1.65	7.00	5.64	13.41	3.14	2.59	1.58	4	39.00

APPENDIX III

Statement by Garrett Elwood

Next Generation Fishermen's Association
Comments on 2021 Catch Limits

US IPHC Commissioners,

The members of NGFA are second and third generation IFQ stakeholders primarily invested in the halibut and sablefish IFQ fisheries in the Western GOA. Our members strongly support area TCEY's derived from a consistent harvest policy based on biological distribution and survey abundance of O32 Halibut. We support 3 year smoothing to help account for natural fluctuations in survey performance.

4A Comments:
The decision to implement 4A catch limits dramatically below (22.5%) the reference TCEY in 2020 was a financial blow to the stakeholders invested in the area. Harvesting in area 4A during the COVID-19 pandemic was challenging in 2020. A combination of limited air travel to Dutch Harbor and reduced processor capacity contributed to the 4A quota not fully being utilized. This should not be used as a reason to shift biological fish away from the participants who are catching their IFQ in 4A. It is very disheartening when stakeholders to the West are given second tier consideration to the areas in the East. We all have bills to pay and families to feed. Our members invested in 4A expecting fair access to the biological distribution residing in the area.

3B Comments:
Our members wish to express continued concern regarding the discrepancy in harvest rates between Areas 3B and 3A. It is our firm belief that there is no scientific basis for different harvest rates between regulatory areas in Region 3. Stakeholders can't help but feel that political pressure is the primary factor reducing our access to the fish residing in the area we have invested in. The inequity is best expressed using our primary metrics of the stock assessment.
Comparing 3B and 2B, the spatial extent is nearly identical. 2020 FISS shows a higher CPUE of O32 Halibut in 3B and a greater percentage of biological distribution. However, reference TCEYs for 2021 suggest total removals in 2B would be 124% greater than area 3B at 7M and 3.12M respectively.

Harvest Policy Comments:
The need to fill the vacuum created by the interim harvest policy (70/30) agreement with Canada puts the US commissioners in a challenging position. The unprecedented harvest intensity in area 2B is surely having a negative impact on the 2C FISS performance. Please

consider using a percentage of estimated distribution across all US regulatory areas in Alaska to meet the socio-economic needs of 2C. This approach is the most equitable and shows our resolve in supporting 2C as they cope with the ramifications of the interim harvest agreement. We anxiously await a renegotiation of the harvest agreement with Canada that better reflects the accepted international standards of fishery management.

Thank you for your consideration,
Garrett Elwood
NGFA

APPENDIX IV

Statement by Josh Padgett

Josh Padgett, 4A Stakeholder
Comments on 2021 Catch Limits

US IPHC Commissioners,

Please follow the suggested reference TCEY totals and don't shift fish that should be caught in 4A into other areas. It's simply not fair. Uphold the rights of all stakeholders, utilize the biomass equitably. It happened in 2020, with the adopted TCEY being less than the reference TCEY. It has been discussed that this should happen again in 2021, and it should not be allowed to happen. Extenuating circumstances of 2020 should not be used as a reason to allow fish to be stolen from the stakeholders in the 4A area.

The survey data and reference TCEY show that 4A should be increased this year. Please follow the science and right the ship. All stakeholders should be treated fairly.

Thank you for considering,

Josh Padgett
4A Stakeholder

The IPHC mortality projection tool for 2021 (and 2022) mortality limits

PREPARED BY: IPHC SECRETARIAT (I. STEWART; 15 DECEMBER 2020)

PURPOSE

This document provides an updated description of the IPHC's web-based mortality projection tool (https://www.iphc.int/data/projection-tool) for setting mortality limits in 2021 (and 2022).

BACKGROUND

To support the IPHC's process for setting the 2019 mortality limits, IPHC Secretariat developed an interactive tool for the evaluation of alternative Pacific halibut mortality levels based on the coastwide TCEY and the distribution of that mortality among IPHC Regulatory Areas. The tool was updated for use in developing mortality limits for 2020; however, agreements made during AM095 and IM095 led to additional complexity that rendered simple use of the tool challenging.

For the evaluation of 2021 mortality limits, the existing web-based tool has been updated to again provide all participants in the process the ability to create alternative projection tables as is necessary for decision making, without having to rely directly on the IPHC Secretariat. Specifically, agreements in place for 2021 and 2022 have been included by default in the calculations.

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, noting all key features and changes from previously available versions.

Inputs

The first section of the tool provides the user with inputs primary information (Figure 1):

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.

The default values loaded into the tool reflect the IPHC's interim management procedure, adjusted for current agreements for 2021 (and 2022) mortality limits and TCEY distribution, as well as an intersessional decision during 2020. The total TCEY is based on the value that

[1] Net pounds refer to the weight with the head and entrails removed; this is approximately 75% of the round (wet) weight.

produces a projected level of fishing intensity equal to $F_{43\%}$, or the fishing intensity that reduces the spawning output of the stock per recruit to 43% of its unfished level (SPR=43%) given recent recruitment, and current biology (weight at age, maturity, fecundity), allocation among fisheries and selectivity within fisheries. This level of fishing intensity reflects an adjustment made intersessionally (after AM096; IPHC 2020a) to the previous $F_{46\%}$ handrail adopted in 2016, in response to the results from the IPHC's ongoing Management Strategy Evaluation (MSE) process. The MSE results, presented at AM096 (IPHC-2020-AM096-12), found that a management procedure utilizing an $F_{43\%}$ target level of fishing intensity, and a control rule reducing that level of fishing intensity linearly if the relative spawning biomass drops below 30%, to a target value of $F_{100\%}$ (no fishing) if the spawning biomass reaches 20% successfully met the coastwide conservation and fishery objectives.

Inputs

Enter 2021 coastwide distributed mortality limit (TCEY) **50.00**

	2A	2B	2C	3A	3B	4A	4B	4CDE	Total
Enter 2021 distributed mortality limit %	3.3%	18.6%	14.0%	35.1%	9.0%	5.0%	5.0%	10.0%	100.0%

Select non-directed discard option: **Three-year average discards**
Select weight units: **Millions of net pounds**

Figure 1: Example of the "Inputs" section of the mortality projection tool. Cells in yellow are intended to be modified by the user. Note that specific values are for illustration only and do **NOT** correspond to default values for 2021 (or 2022).

The IPHC's interim management procedure also includes a method for distributing the coastwide TCEY among IPHC Regulatory Areas. The distribution method consists of the following steps:

1) Determine the current stock distribution of Pacific halibut greater than 32-inches (82.5 cm, O32) from the modeled survey WPUE and geographic extent of each IPHC Regulatory Area.
2) Assign relative harvest rates of 1.0 to IPHC Regulatory Areas 2A-3A and 0.75 to IPHC Regulatory Areas 3B-4CDE.
3) Generate a target TCEY distribution, as the normalized product (sums to 100%) of steps 1 and 2.

During AM095 (para. 69) two additional steps were adopted by the Commission, to apply to mortality limits for 2019-2022:

4) Set the IPHC Regulatory Area 2A TCEY to a value of 1.65.
5) Set the IPHC Regulatory Area 2B target TCEY percentage to a weighted average of 20% (weight = 0.7) and the result of step 3 (weight = 0.3).
6) In order to satisfy the coastwide TCEY as well as steps 4-5, reduce the target TCEY percentages for IPHC Regulatory Areas 2C-4CDE in proportion to the result of step 3.

At IM095 (Req.03, para. 49) an additional adjustment was added:

7) Remove all non-directed commercial discard ('bycatch') mortality of Pacific halibut less than 26 inches in length (66 cm; U26) occurring in Alaska from the projections.
8) Recalculate the TCEY (using the stock assessment ensemble) that corresponds to the reference fishing intensity (coastwide) and the distribution percentages from step 6.
9) Compare the recalculated TCEYs to those from step 6 to determine the 'yield gained' in IPHC Regulatory Area 2B.

This adjustment was further modified during AM096 (para. 97):

10) Add 50% the yield gained for IPHC Regulatory Area 2B (step 9) to that from step 6.
11) In order to satisfy the coastwide TCEY as well as steps 6 and 10, reduce the target TCEY percentages for IPHC Regulatory Areas 2C-4CDE in proportion to the result of step 6 (also equivalent to step 3).

The mortality projection tool satisfies these constraints by using the input coastwide TCEY to determine the distributed components. This relies on the inputs described above, as well as a range of pre-calculated yield gained values for 2B due to accounting for U26 non-directed discard mortality (the yield gained depends on the overall level of fishing intensity). Therefore, the distribution percentages for 2A and 2B are shaded grey[2] in the mortality projection tool, and will update to the appropriate percentages if the coastwide TCEY is adjusted. The distribution percentages for IPHC Regulatory Areas 2C-4CDE can be adjusted manually. Although the percentages describing the distribution of the mortality limit are intended to sum to 100%, if they do not the total will be highlighted in red, and 2C-4CDE are automatically rescaled so that the sum of the distributed mortality limits across all IPHC Regulatory Area will exactly match the coastwide total input.

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).

[2] Note that the percentages for 2A and 2B can be adjusted manually for comparison of alternative distribution procedures, but the tool must be refreshed to return to automatic calculations that satisfy the Interim Management Procedure.

These two values are then used to project a harvest rate by 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 (‘handrail from 2016-2020) 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 IPHC Secretariat as needed to support all meetings and decision-making.

UPDATE SCHEDULE

The existing mortality projection tool will be updated in early January 2021, in order to include the final end-of-year 2020 mortality estimates from various fisheries, for use during the 97th Session of the IPHC Annual Meeting (AM097).

References

Hicks, A., Carpi, P., Berukoff, S., and Stewart, I. 2020. IPHC Management Strategy Evaluation (MSE): update.

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IPHC. 2019b. Report of the 95th Session of the IPHC Interim Meeting (IM095).

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The IPHC MSE Explorer tool

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PURPOSE

This document provides a description and tutorial of the IPHC's web-based MSE Explorer tool (http://shiny.westus.cloudapp.azure.com/shiny/sample-apps/MSE-Explorer/) used to examine current Management Strategy Evaluation (MSE) results.

BACKGROUND

To support the IPHC's MSE process, IPHC Secretariat developed an interactive tool that can be used to examine the MSE results (i.e. performance metrics) by comparing and ranking management procedures (MPs), plotting performance metrics, and investigating trade-offs. There are many different views in MSE Explorer with control over what is viewed. There is a table of performance metrics, a page with plots of performance metrics against the MPs, plots of trade-offs between performance metrics, plots of trade-offs between IPHC Regulatory Areas, and tables ranking the MPs against the primary objectives. Additionally, there are help pages defining commonly used terms and acronyms, describing the performance metrics, and explaining the MPs.

THE MSE EXPLORER

The MSE Explorer is a necessary tool to understand the outcomes of the IPHC MSE because it filters pre-calculated performance metrics and pre-defined MPs that resulted from simulations using the IPHC MSE framework. An MSE can simulate many MPs and have many performance metrics calculated for each MP. The table of results can become so large that it becomes onerous to interpret the results and compare MPs. The MSE Explorer assists with the evaluation by allowing the users to select exactly what they would like to focus on and make comparisons that are easier to interpret.

There are eleven general MPs defined by the MSAB and for each MP, different levels of fishing intensities (i.e. Spawning Potential Ratio, SPR) were included. Additional MPs were included to investigate additional components or specifications. Each management procedure has nearly 700 performance metrics calculated for it. The MSE explorer gives the user the freedom to view specified performance metrics for selected management procedures in tabular form or with various plots. The selected tables can be easily downloaded for further analysis and plots can be copied and pasted into a document.

There are eight pages in MSE Explorer:

1) **Description**: First page displayed by default showing a description, updates, and grids indicating available and chosen MPs.
2) **Table**: A table of the performance metrics for selected MPs. Useful to see the exact values of the performance metrics to make detailed comparisons.
3) **Plots**: Plots of each performance metric for all selected MPs. Useful to compare a lot of MPs for individual MPs.

4) **Trade-offs**: Two performance metrics plotted against each other for all selected MPs. Useful to examine trade-offs between two performance metrics.
5) **Regulatory Areas Trade-offs**: Plots of selected Regulatory Area performance metrics with all Regulatory Areas on each plot. Useful to examine trade-offs between IPHC Regulatory Areas.
6) **MPs Ranking**: Table ranking the MPs for performance metrics related to the primary objectives. Additional tables are provided that summarize over IPHC Regulatory Areas and measurable objectives. Useful to compare the performance of MPs and quickly identify MPs that perform well compared to others.
7) **MPs**: A description of all of the MPs that may be selected.
8) **Help**: Definitions of some terms and descriptions of the performance metrics.

The left portion of the MSE Explorer is where options are selected for the management procedures, time-period over which statistics are calculated, Biological Regions and IPHC Regulatory Areas to include, and performance metrics to display. Pages 2 to 6 show results based on these specific selections. The logo on the top right corner of each page will direct directly to the IPHC website. A tutorial on how to select options is provided first, followed by a brief description of each page. How to interpret outcomes is provided throughout.

SELECTING OPTIONS

The left portion of the MSE Explorer, with a black background, is where the page, the elements of the MP, the time-period, the Biological Regions, the IPHC Regulatory Areas, and the performance metrics to be displayed can be selected. This selection panel can be hidden or made visible by clicking on the three horizontal lines at the top, immediately to the right of the words "IPHC MSE Results". The performance metrics can be chosen by clicking on "Expert Mode".

Figure 1 shows the different sections of the selection panel. The current pages that can be displayed are discussed in detail below. The other components are described here.

MP Elements

This section of the selection panel allows the user to select the elements of the MPs that in combination will be displayed in the results pages.

Estimation Error indicates the method used to simulate estimation error, and **"Sim" is the recommended option to use when evaluating MPs**. The three types of estimation error are:

None: No estimation error is simulated, thus the quantities needed to determine total mortality (e.g., population abundance and age-structure) and to distribute the TCEY to IPHC Regulatory Areas (e.g., O32 stock distribution) are known without error. This is useful to understand the underlying variability in outcomes due to the simulated population variability. However, it is an unrealistic simulation of the management process and is not to be used to evaluate MPs.

Sim: Estimation error for the stock assessment is simulated through a simple approximation using unbiased random number generation. Estimation error for the survey data is simulated realistically as determined from previous observations. This is the same method used for the IPHC coastwide MSE and is currently the most complete and trusted method to evaluate these MSE results.

SS: Estimation error for the stock assessment is simulated using a stock synthesis (SS) model similar to one of the models used in the current stock assessment ensemble. This approach is the most realistic method to use in MSE simulations, but is currently incomplete in these MSE results. Additional work is being done to improve this method for future use. However, it is currently not ready for evaluation of MPs, but is included as a comparison.

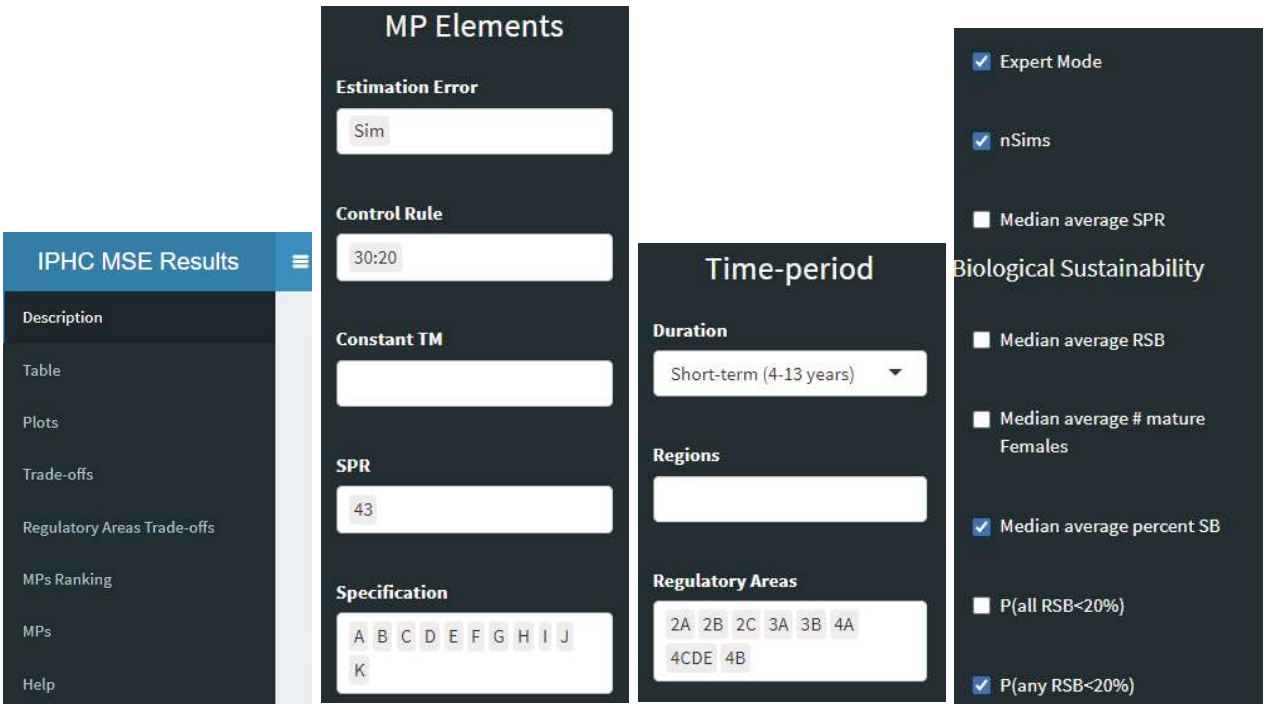


Figure 1: Four sections of the portion of MSE Explorer that allows you to select options. The four sections are located on the left of the screen and allow you to (from left to right) select the page, select the elements of the MPs, select the time-period, Biological Regions, and IPHC Regulatory Areas, and select the performance metrics once "Export Mode" is checked. The three horizontal bars next to the words "IPHC MSE Results" will hide or display the panel for these options.

Control Rule is the specification of the trigger and limit in a control rule, indicating the stock status at which the fishing intensity would begin to be reduced and where it would be theoretically set to zero, respectively. Currently, only a 30:20 control rule is available, thus is the only option.

Constant TM is a placeholder for results that project into the future under a constant total mortality. For example, a total mortality of zero (no fishing) or a specified value may be useful to understand the population and fishery dynamics. Currently, there are not simulations available for this element, but may be added in the future.

SPR is the spawning potential ratio which determines the fishing intensity. Lower SPR values correspond to higher fishing intensity and '43%' is the SPR currently used in the interim harvest strategy policy. The stock assessment (simulated in the MSE) uses the SPR to determine the coastwide total mortality. Most MPs have been tested for different SPR values.

Specification indicates the specifications of the MP as defined at MSAB015. Specifications were provided for eleven MPs and are described in Appendix V of IPHC-2020-MSAB015-R. Additional specifications, identified as 'Extra MPs' in the dropdown menu and prefixed with the number '16', were supplied to supplement the evaluation of the original eleven MPs. Descriptions of all specifications are available on the "MPs" page in MSE Explorer.

Results for an MP combining the selected elements for estimation error, SPR, and specification may not be available. In that case, that MP will not appear on any pages. For example, there are no results for an SPR of 36 and MP-I, but there is for an SPR of 36 and MP-A. The grids at the bottom of the Description page are useful to determine what combinations are available for evaluation.

Time-period

There are three time-periods to choose from in the drop-down box labeled "Duration". These are short-term (4-13 year projection), medium-term (14-23 year projection), and long-term (51-60 year projection). All three options cover ten-year periods so that statistics are comparable. Typically, sustainability objectives are evaluated in the long-term, representing equilibrium values, which is a common concept used in fisheries management. Any of the time-period may be considered for fishery objectives, and are useful to compare. Despite being provided, the MSE simulations are not purposefully designed for short-term predictions. MSE is, however, designed to represent long-term variability useful for strategic decision making.

Biological Regions and IPHC Regulatory Areas

Some performance metrics are calculated for Biological Regions and/or IPHC Regulatory Areas (Figure 2), but they are only displayed when a region or area is chosen in the drop-down boxes. Therefore, to view a performance metric for a region or area, a performance metric must be selected and the IPHC Regulatory Area or Biological Region must also be chosen.

Performance Metrics

When the box labeled "Expert Mode" is checked, the list of all available performance metrics is displayed with a check box next to each one. A set of default performance metrics associated with the current primary objectives are selected when the MSE Explorer is first visited or reloaded. Selecting the check box will display that performance metric along with other ones that are checked, although some performance metrics will also need to have an IPHC Regulatory Area or Biological Region chosen. The performance metrics are defined on the "Help" page and only those related to the primary objectives are defined in Appendix I.

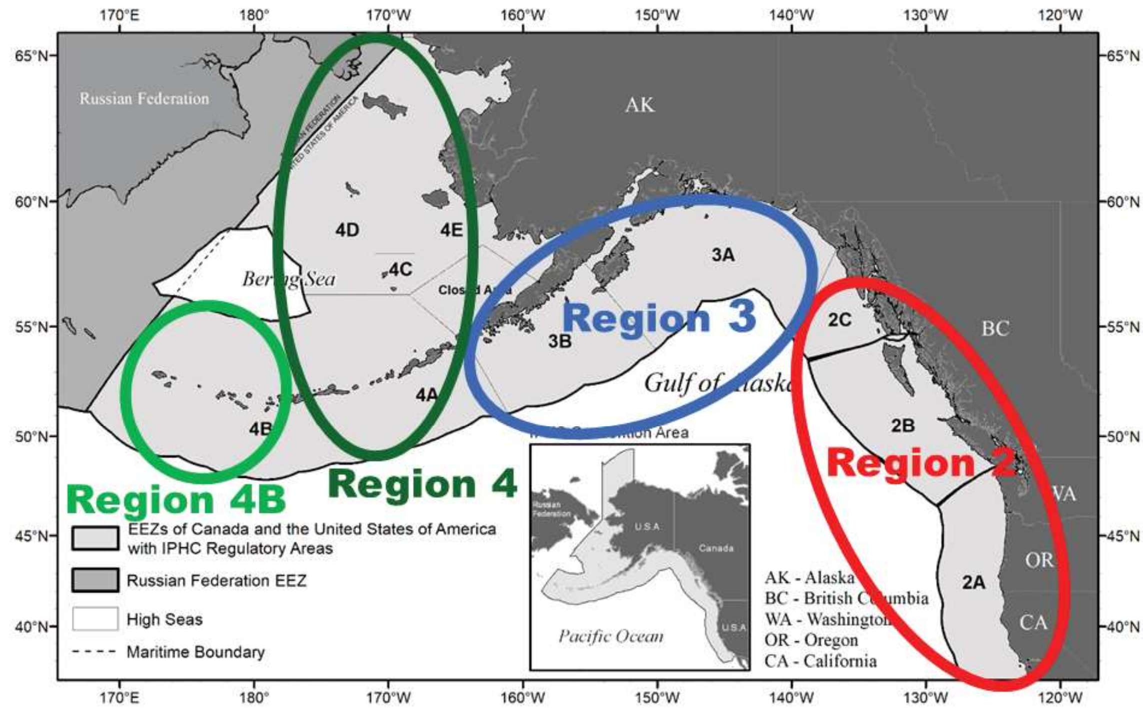


Figure 2: IPHC Regulatory Areas and Biological Regions. The Biological Region boundaries match IPHC Regulatory Area boundaries for practical purposes.

Pages of the MSE Explorer

Description

The Description page is the general landing page for the MSE Explorer and provides a description of the tool, a list of updates, and a display (grids) of the available and selected MPs. This page is displayed by default when first visiting the MSE Explorer or when refreshing the webpage. It is always a good idea to refresh the webpage (e.g., press the reload button on your browser or press F5) when you visit to make sure that you are viewing the most recent version.

The grids are presented separately for each type of estimation error. Each grid shows the SPR values on the vertical axis and the selected specification (i.e. Distribution Procedure) on the horizontal axis. Blue colored cells indicate that results are available for the combination of estimation error, SPR, and specification. Light-blue indicates that the elements are not selected and dark-blue indicates that they are selected and that results are displayed on other pages.

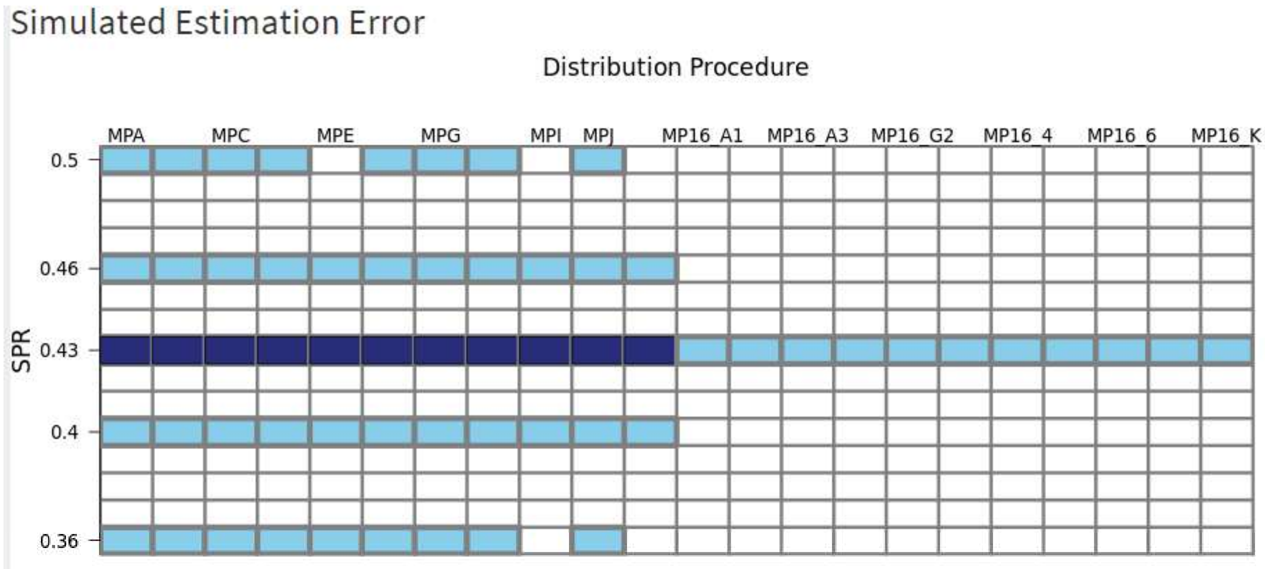


Figure 3: The grid for simulated estimation error showing the MPs available for combinations of SPR (vertical axis) and Specification (labeled Distribution Procedure) on the horizontal axis. The light-blue indicates that the combination is not selected for display and dark-blue indicates that the combination is displayed for evaluation on results pages. The grid is interactive and changes immediately upon a change in selection.

Table

The Table page presents the selected performance metrics as rows for the selected MPs across columns. The performance metrics are grouped by those related to the population and those related to the fisheries. The table expands based on the selections made and can be scrolled left and right as well as up and down. The values can be copied to a different program, such as a word processor or spreadsheet, by selecting rows and using copy commands. Alternatively, the table based on the selections can be downloaded as a csv file (comma delimited) with the “Download Table” button, making it easy to import into a spreadsheet for further analysis.

The Table page is useful because it reports the numeric values of each selected performance metrics. This allows the user to assess the actual difference between MPs, that could be difficult to determine in the pages with plots or ranks. In the plots, the difference between MPs might appear larger due to the scale used in the y axis, but looking at the Table page will allow one to evaluate if the difference is actually meaningful.

Plots

The Plots page is an extremely useful page to investigate the value of a single performance metric across all the selected MPs. This page shows an individual plot for each selected performance metric with the specification along the horizontal axis and the metric as the vertical axis. If multiple SPR values and/or estimation error types are chosen, they will be displayed as different colors in each plot (Figure 4).

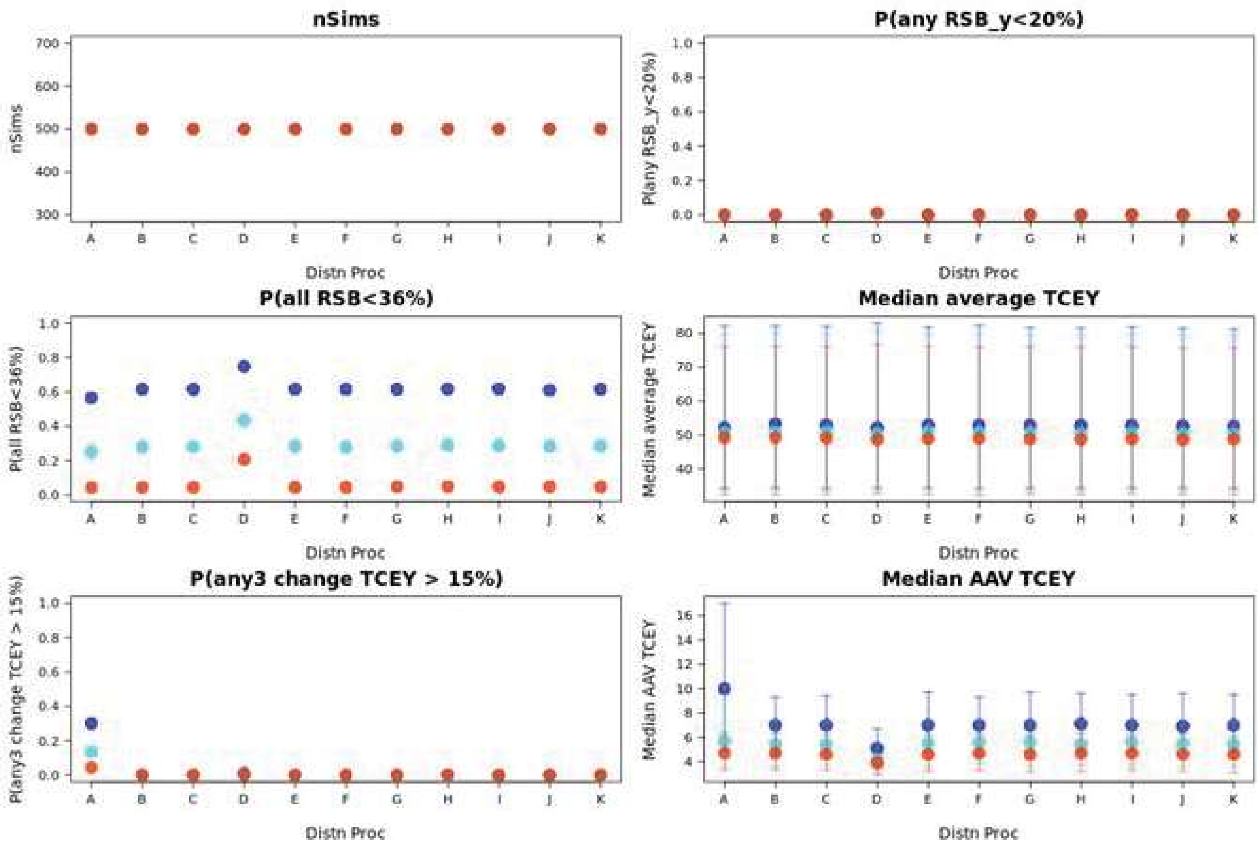


Figure 4: Plots of single performance metrics from the Plots page for the eleven MPs and three levels of SPR (40% in dark blue, 43% in light blue, and 46% in red). The 25th and 75th percentiles are shown for the median average TCEY and the median AAV of the TCEY. "nSims" is not a performance metric but is the number of simulations which is informative about the precision of performance metrics.

Some additional options are available on the Plots page. The height of the plot can be resized and the size of the plotting character (circle) can be changed. Performance metrics that are not probabilities are summarized by the median value average over a 10-year period. These also have the 5th, 25th, 75th, and 95th percentiles calculated and can be plotted by checking the appropriate box in the upper right. A percentile indicates that the defined percentage of simulations were less than that percentile value. For example, a 25th percentile means that 25% of the simulations were less than that value. Note that the median is the 50th percentile.

The plots are useful to examine a single performance metric for a range of MPs. In Figure 4, the median AAV (average annual variability) of the coastwide TCEY is shown in the lower right, and highlights some important results. First, the dark blue circles for an SPR of 40% (i.e., higher fishing intensity) show more variability in the TCEY that higher SPR values (i.e., lower fishing intensities). Furthermore, the variability tends to be highest for MP-A and lowest for MP-D.

Trade-offs

The Trade-offs page produces a plot showing the relationship between two performance metrics. The user chooses a metric (near the top of the page) to be plotted on the horizontal axis and a metric to be plotted on the vertical axis. Only performance metrics selected by the user are present in the drop-down boxes. The resulting plot is color coded by specification and shows different SPR values with different shapes (Figure 5). There is a drop-down box for Factor, which currently contains only one choice. The plot height and point size can be adjusted as with the Plots page.

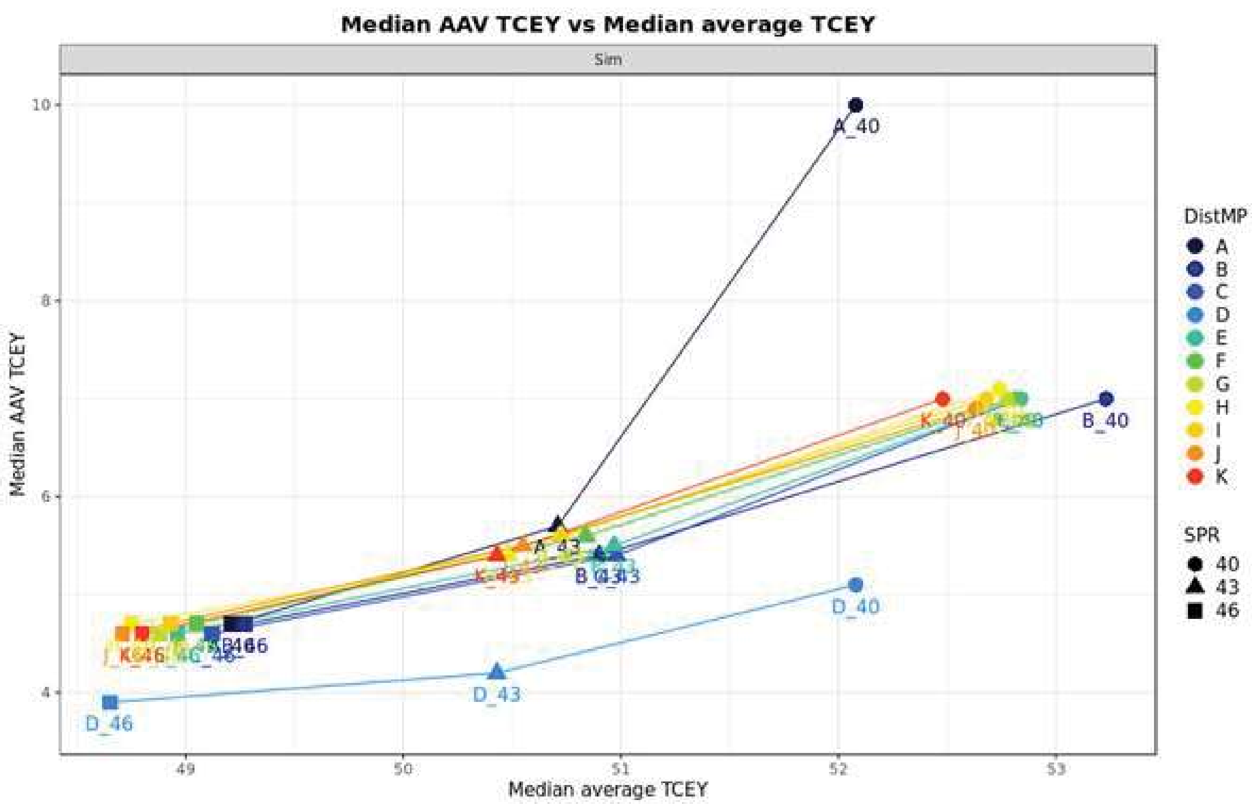


Figure 5: A trade-off plot from the Trade-offs page showing the relationship between the median AAV of the coastwide TCEY and the median average TCEY for the various specifications of the MPs (colors and letters) and three-levels of SPR (shapes connected by lines).

Trade-offs are an important concept to consider when evaluating MPs using MSE simulations. The performance metrics are typically related to objectives and it is important to determine the trade-offs between those objectives. For example, Figure 5 shows the trade-off between the median AAV of the coastwide TCEY and the median TCEY. As more fish are caught (horizontal axis) the variability also increases (vertical axis), indicating that two common objectives of reducing variability and increasing yield cannot be met simultaneously. Also in Figure 5, MP-A with an SPR of 40% stands out, and MP-D stands out as having lower variability, but also lower yield than the other specifications. Many insights can be gained from trade-off plots.

Regulatory Areas Trade-offs

The Regulatory Areas Trade-offs page contains plots for each performance metric showing the values organized by IPHC Regulatory Areas (Figure 6). The specification is shown along the horizontal axis and SPR levels are noted with different symbol shapes. Each IPHC Regulatory Area that is selected in the drop-down box on the selection panel is shown with a different color. The estimation error method selected is specified in the grey bar on top of each plot. Different plots are drawn for each of the estimation error methods, if desired. The user can use the dropdown menu for the ‘Horizontal (x) Axis’ to plot IPHC Regulatory Areas on the x-axis and display the different specification as different colors.

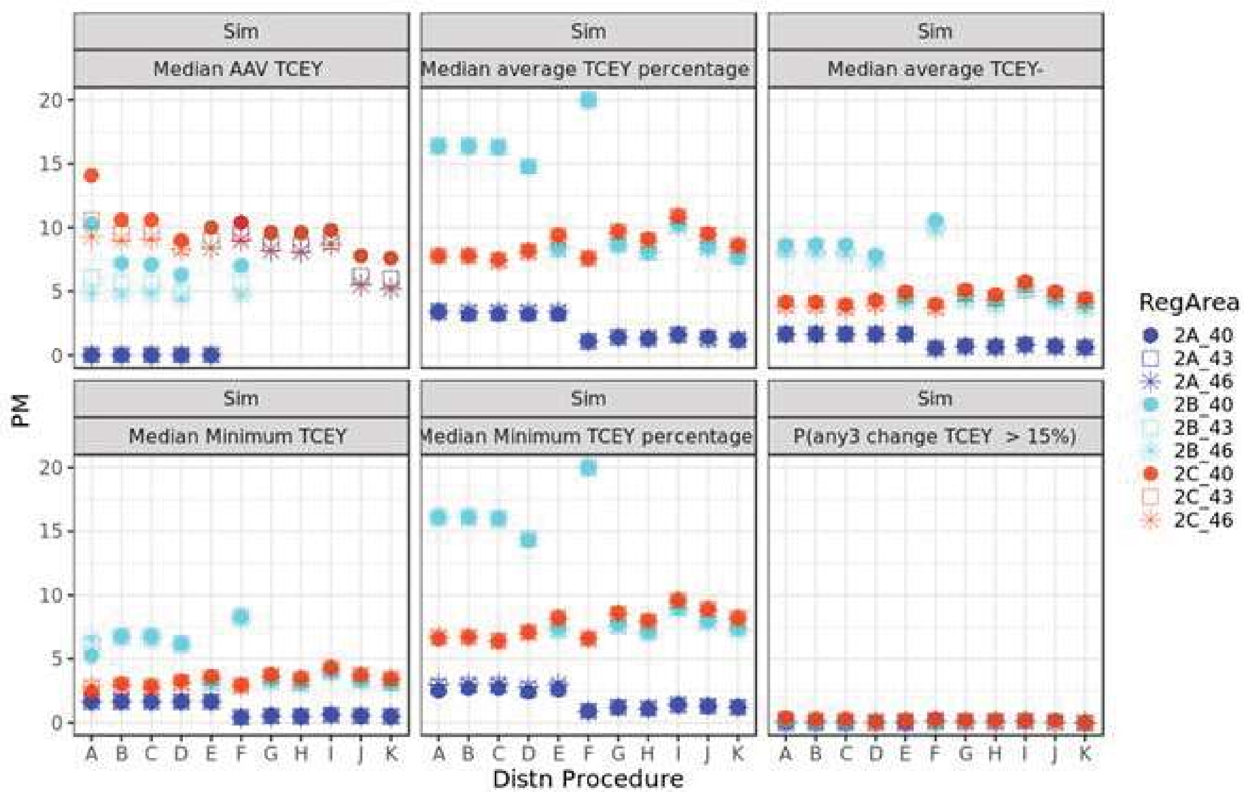


Figure 6: Plots from the Regulatory Areas Trade-offs page for simulated estimation error, various performance metrics, three SPR values, and IPHC Regulatory Areas 2A, 2B, and 2C.

This page allows for easier examination of the trade-offs between IPHC Regulatory Areas by plotting the areas on the same plot. In Figure 6, the SPR has a small effect on the performance metric for each IPHC Regulatory Area, while the specification of the MP has a much larger effect. The median AAV of the TCEY in IPHC Regulatory Areas 2A, 2B, and 2C (upper left of Figure 6) increases significantly for 2A while decreasing for 2C in the MP specifications to the right, which do not contain specific agreements for 2A and 2B.

MPs Ranking

A useful method to discern between multiple management procedures is to rank each MP based on the values of the performance metrics related to defined objectives, such as those currently defined by the Commission. Currently specified biological objectives and one of the fishery objectives are defined in a way such that it can be determined if they are met or not. In particular, the Biological sustainability objectives are stated as a probability of staying above a defined level with a specified tolerance. For example, a coastwide sustainability objective is to maintain the female spawning biomass above a biomass limit reference point 95% of the time. Using the outcomes of the MSE simulations, it can be determined if this objective is met, or not, by an MP. Most of the fishery objectives, on the other hand, do not have a tolerance defined. In this case, the scoring of the related performance metrics will identify a set of the best performing MPs relative to each objective.

The MPs Ranking page incorporates both of these concepts and summarizes the outcomes in a succinct way to assist with identifying robust MPs that perform well against the defined objectives. The page has different sections in accordance with the general objectives:

1.1: Biological Sustainability: Keep female spawning biomass above a limit to avoid critical stock sizes and conserve spatial population structure.

2.1: Fishery: Maintain female spawning biomass around a level that optimises fishing activities.

2.2: Fishery: Limit catch variability.

2.3: Fishery: Provide directed fishing yield.

At the top of each rank table is an option for the time-period (short-, medium-, or long-term): the default is set to the time-period specified by the MSAB when objectives were defined. The tables that rank the MPs provide rounding options to be applied before ranking. Rounding to different levels implies different levels of significance. Additional tables summarize the results over IPHC Regulatory Areas and then again for the three fishery goals (general objectives 2.1, 2.2, and 2.3). The dash on the top right corner of each table minimize the table itself, so to reduce the length of the page. The search box on top of each table allows filtering of the rows in each table using simple keywords.

The table for general objective 1.1. provides the actual value for that performance metric (a probability) and a color code to indicate if the objective is met (green to indicate it is met, red it is not). This table can be determined using short-term, medium-term, or long-term results, although long-term is recommended since these are Biological Sustainability objectives. There is a check box labelled “Include in Summary” which will color code columns in summary tables in red if any Biological Sustainability objectives are not met. Excluding the biological sustainability objective from the summary tables, allows for trade-offs in fishery objectives to be evaluated for all MPs regardless if they pass the Biological Sustainability objectives.

The tables for the fishery objectives contain ranks for individual performance metrics determined across the selected MPs. Cells are color coded with higher (better) ranked MPs given a light color and lower (worse) ranked MPs getting a dark blue color. MPs with the same value for a performance metric (i.e., a tie) are given the same rank and subsequent ranks continue from the total number of MPs ranked better than it. For example, if three MPs all tie for first rank, they are given a 1, and the fourth MP is given a rank of 4. There are alternative ranking methods, but they are not applied here.

The table for general objective 2.1. provides the ranks for a single performance metric: how close to 0.5 is the probability that the spawning biomass is less than a target of 36% of unfished spawning biomass. This ranking is done on the proximity to 0.5 because the objective is related to a target. The time-period defaults to long-term, but the user can select short- or medium-term. Additionally, the difference in the probability from 0.5 can be rounded to one or two decimals before ranking.

The ranks for many performance metrics are provided for the objective to limit catch variability (2.2). These include two coastwide metrics: the probability that the annual change is greater than 15% and the median AAV. Both performance metrics are also reported for each IPHC Regulatory Area, resulting in a total of 18 rows in the table. The probabilities can be rounded to one or two decimals and the AAV can be rounded to the nearest integer, 0.5, or one decimal. This table uses short-term by default but can also use medium- or long-term periods.

The final ranking table is for general objective 2.3: provide directed fishing yield. The median coastwide TCEY is the only coastwide performance metric used in this table. The median TCEY, minimum TCEY, median percentage of the coastwide TCEY, and the minimum % of the coastwide TCEY are ranked for each IPHC Regulatory Area. This results in 33 rows. The short-term time-period is the default with medium- and long-term options available. The TCEY metrics can be rounded to the nearest one million pound or the nearest 0.1 million pounds. The percentages can be rounded to the nearest integer, one decimal, or two decimals.

The three tables for the fishery objectives have a total of 52 rows due to performance metrics for each IPHC Regulatory Area, which can still be overwhelming to evaluate. Therefore, a summary table is provided that averages over the ranks for IPHC Regulatory Areas within each performance metric, with equal weighting by default, resulting in ten rows (Figure 7). Weights for each IPHC Regulatory Area can be entered for comparison purposes, but equal weighting is recommended because there is currently no reason to give more weight to objectives in any particular areas. The resulting averages are color coded with light colors indicating better performance and dark blues indicating worse performance.

The ranks are further summarized to the three primary general fishery objectives by averaging over the measurable objectives within each general objective (Figure 8). This results in three rows with an average rank for general objectives 2.1, 2.2, and 2.3, allowing the user to examine the overall ranking of a management procedure relative to the target spawning biomass, catch variability, and fishing yield. The table is color coded with shades of blue as with other tables. Different weights can be assigned to the measurable objectives within 2.2 and 2.3 if desired, but the current objectives definition doesn't prioritize any fishery objective over the others.

The ranking tables are presented as one method to quickly examine many MPs and how they perform relative to each other given the currently defined objectives. The evaluation may be different depending on the rounding choices and the MPs selected. The page defaults to the methods and MPs used at MSAB016 and presented in IPHC-2020-MSAB016-R.

MPs

The MPs page provides a description of each specification of a management procedure. Elements of the MP are described for coastwide components, regional components, and components specific to IPHC Regulatory Area. A priority is provided to indicate the priority assigned at MSAB015 in [IPHC-2020-MSAB015-R]() for initial analysis, but is less pertinent now that results are complete. The MPs with a label beginning with MP16 were created by IPHC secretariat staff based on elements of interest identified at MSAB015. They are meant to supplement the evaluation and examine additional elements such as a slow-up fast-down constraint on the coastwide TCEY.

Help

The Help page provides a brief overview of how to use MSE Explorer, various definitions, and a description of the performance metrics. Performance metrics related to the primary objectives are described in Appendix I.

Summary table by Measurable Objectives

Weight for average

2A	2B	2C	3A	3B	4A	4CDE	4B
1	1	1	1	1	1	1	1

Ranking average

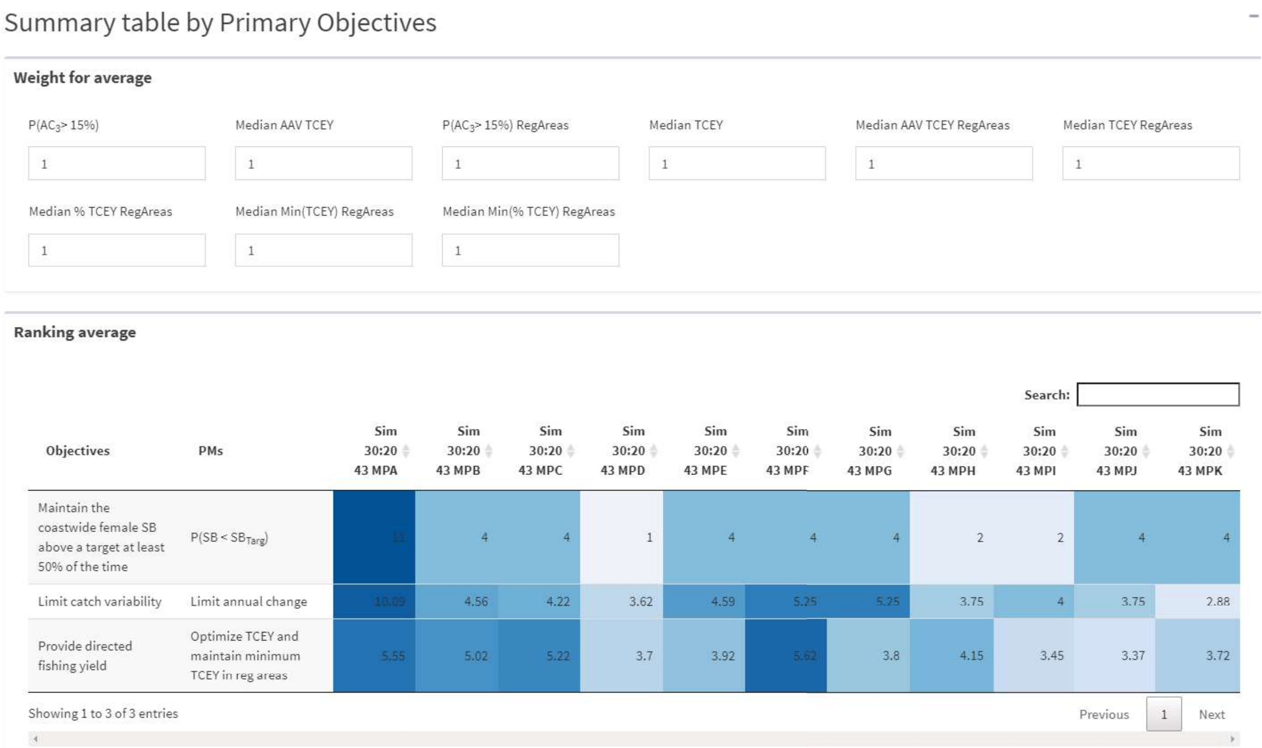
Search:

Objectives	PMs	Sim 30:20 43 MPA	Sim 30:20 43 MPB	Sim 30:20 43 MPC	Sim 30:20 43 MPD	Sim 30:20 43 MPE	Sim 30:20 43 MPF	Sim 30:20 43 MPG	Sim 30:20 43 MPH	Sim 30:20 43 MPI	Sim 30:20 43 MPJ	Sim 30:20 43 MPK
Maintain the coastwide female SB above a target at least 50% of the time	$P(SB < SB_{Targ})$	11	4	4	1	4	4	4	2	2	4	4
Limit AC in coastwide TCEY	$P(AC_3 > 15\%)$	11	1	1	10	1	1	1	1	1	1	1
Limit AC in coastwide TCEY	Median AAV TCEY	11	3	2	1	3	8	8	3	3	8	3
Limit AAV in Reg Areas TCEY	Median AAV TCEY RegAreas	9.75	7.25	6.75	1.75	7	5.62	6	5.88	5.75	2.5	3.5
Limit AC in Reg Areas TCEY	$P(AC_3 > 15\%)$ RegAreas	8.62	7	7.12	1.75	7.38	6.38	6	5.12	6.25	3.5	4
Optimize average coastwide TCEY	Median TCEY	1	3	3	1	3	3	3	3	3	3	3
Maintain minimum % TCEY by Reg Areas	Median Min(% TCEY) RegAreas	8.5	6.62	7.5	6.12	5.25	7.62	4.88	5.38	4.25	3.62	4.12
Maintain minimum TCEY by Reg Areas	Median Min(TCEY) RegAreas	6.38	4	3.75	1.75	2.62	4.5	3.25	3	2.88	2.5	3.12
Optimize Reg Areas TCEY	Median TCEY RegAreas	3.62	4.75	4.25	3.12	3.75	5.5	3.5	4.5	3.12	3.5	3.88
Optimize TCEY percentage among Reg Areas	Median % TCEY RegAreas	8.25	6.75	7.62	6.5	5	7.5	4.38	4.88	4	4.25	4.5

Showing 1 to 10 of 10 entries

Previous 1 Next

Figure 7: A screenshot of the summary table of ranks by measurable objectives. Columns are MPs and rows are coastwide measurable objectives or measurable objectives averaged over IPHC Regulatory Areas. The averaging is weighted by the assigned values at the top of this section, and equal weighting is the default and recommended. Lighter colors indicate higher ranks (i.e. better performance) and darker blues indicate lower ranks (i.e. worse performance).



Summary table by Primary Objectives

Weight for average

P(AC_3> 15%)	Median AAV TCEY	P(AC_3> 15%) RegAreas	Median TCEY	Median AAV TCEY RegAreas	Median TCEY RegAreas
1	1	1	1	1	1

Median % TCEY RegAreas	Median Min(TCEY) RegAreas	Median Min(% TCEY) RegAreas
1	1	1

Ranking average

Search:

Objectives	PMs	Sim 30:20 43 MPA	Sim 30:20 43 MPB	Sim 30:20 43 MPC	Sim 30:20 43 MPD	Sim 30:20 43 MPE	Sim 30:20 43 MPF	Sim 30:20 43 MPG	Sim 30:20 43 MPH	Sim 30:20 43 MPI	Sim 30:20 43 MPJ	Sim 30:20 43 MPK
Maintain the coastwide female SB above a target at least 50% of the time	P($SB < SB_{Targ}$)	11	4	4	1	4	4	4	2	2	4	4
Limit catch variability	Limit annual change	10.09	4.56	4.22	3.62	4.59	5.25	5.25	3.75	4	3.75	2.88
Provide directed fishing yield	Optimize TCEY and maintain minimum TCEY in reg areas	5.55	5.02	5.22	3.7	3.92	5.62	3.8	4.15	3.45	3.37	3.72

Showing 1 to 3 of 3 entries

Previous 1 Next

Figure 8: A screenshot of the summary table of ranks by general objectives. Columns are MPs and rows are general objectives averaged over measurable objectives within a general objective. The averaging is weighted by the assigned values at the top of this section, and equal weighting is the default and recommended. Lighter colors indicate higher ranks (i.e. better performance) and darker blues indicate lower ranks (i.e. worse performance).

Discussion

The MSE Explorer is a tool to assist in the evaluation of MPs, and other methods may be employed to further understand the simulation results. Performance metrics linked to the primary objectives are available along with many other performance metrics that may be useful. Additional metrics are being considered and may be added to the MSE Explorer in the future.

The MSE Explorer has evolved over time with different simulations, different performance metrics, and different pages. Archives of past MSE Explorers linked to MSAB meetings are available if desired. The following webpages refer to archives of the results used when writing reports for past MSAB meetings.

Coastwide MSE

http://shiny.westus.cloudapp.azure.com/shiny/sample-apps/IPHC-MSAB012/

http://shiny.westus.cloudapp.azure.com/shiny/sample-apps/IPHC-MSAB013/

Multi-Region MSE

http://shiny.westus.cloudapp.azure.com/shiny/sample-apps/IPHC-MSE-MSAB016/

The most recent version of MSE Explorer will also be at the following URL.

http://shiny.westus.cloudapp.azure.com/shiny/sample-apps/MSE-Explorer/

REFERENCES

IPHC-2020-IM096-11 Rev_1. Hicks A, Carpi P, Berukoff S, Stewart I. Management Strategy Evaluation results for distribution management procedures. 50 p. https://iphc.int/uploads/pdf/im/im096/iphc-2020-im096-11.pdf

IPHC-2020-MSAB015-R. Report of the 15th Session of the IPHC Management Strategy Advisory Board (MSAB015). 23 p. https://www.iphc.int/uploads/pdf/msab/msab015/iphc-2020-msab015-r.pdf

IPHC-2020-MSAB016-R. Report of the 16th Session of the IPHC Management Strategy Advisory Board (MSAB016). 25 p. https://iphc.int/uploads/pdf/msab/msab016/iphc-2020-msab016-r.pdf

APPENDICES

Appendix I: Performance metrics linked to primary objectives for the MSE

Appendix II: Description of management procedures proposed at MSAB015

APPENDIX I
PERFORMANCE METRICS LINKED TO PRIMARY OBJECTIVES FOR THE MSE

Below are descriptions of the performance metrics linked to the primary objectives. Additional performance metrics are available in the MSE Explorer with definitions provided on the Help page.

Metric	Description
BIOLOGICAL SUSTAINABILITY	
Median average RSB	The median dynamic relative spawning biomass (stock status), averaged over a ten-year period, that occurs over all simulations.
Median average percent SB	The median percentage of spawning biomass (averaged over a ten-year period) in each Biological Region. Available only when one or more Biological Regions are selected.
P(any RSB < 20%)	Probability that the dynamic relative spawning biomass (stock status) is less than 20% of the biomass if no fishing had occurred. 'Any' refers to the probability of this event occurring in a ten-year period (at least 1 of 10 years).
P(all RSB < 36%)	Probability that the dynamic relative spawning biomass (stock status) is less than 36% of the biomass if no fishing had occurred. 'All' refers to the chance that this event occurs in a given year.
P(all percSB<min)	Probability that the percent spawning biomass is less than a defined minimum for each Biological Region. Available only when one or more Biological Regions are selected. The defined minimums are 5%, 33%, 10%, and 2% for Biological Regions 2, 3, 4, and 4B, respectively.

Metric	Description
FISHERY SUSTAINABILITY	
Median Annual Change TCEY	Median annual change in TCEY (averaged over a ten-year period) that occurs over all simulations. The annual change in TCEY from year to year is greater than this value in half of the simulations. This metric is reported at a coastwide level and at an IPHC Regulatory Area level.
P(any3 change TCEY>15%)	Probability for any three years in a 10 year period that the change in TCEY limit is greater than 15%. This is one of the primary performance metrics for the stability objective. This metric is reported at a coastwide level and at a IPHC Regulatory Areas level. Also noted as $P(AC_3>15\%)$.
Median average TCEY	Median TCEY mortality limit (averaged over a ten-year period) that occurs over all simulations. The TCEY is greater than this value in half of the simulations. This metric is reported at a coastwide level and at the IPHC Regulatory Area level.
Median AAV TCEY	The Median Average Annual Variability (AAV) over a ten-year period for the TCEY, which can be thought of as the average change in the TCEY from year to year. The AAV is greater than this value in half of the simulations.
Median Minimum TCEY	Median minimum value of TCEY in each IPHC Regulatory Area over a ten-year period. Refers to the primary objective of maintain a minimum TCEY for each IPHC Regulatory Area. This metric is reported at the IPHC Regulatory Areas level.
Median Minimum TCEY percentage	Median minimum percentage of TCEY in each IPHC Regulatory Area over a ten-year period. Refers to the primary objective of maintain a percentage of the coastwide TCEY for each IPHC Regulatory Area. This metric is reported at the IPHC Regulatory Area level.
Median Average TCEY percentage	Median percentage of TCEY in each IPHC Regulatory Area (averaged over a ten-year period). Refers to the primary objective of optimize the percentage of the coastwide TCEY among Regulatory Areas. This metric is reported at the IPHC Regulatory Areas level.
PERCENTILES	
5^{th}	the 5th percentile over a ten-year period. Five percent of the simulated metrics are lower than this metric.
25^{th}	the 25th percentile over a ten-year period. Twenty-five percent of the simulated metrics are lower than this metric.
75^{th}	the 75th percentile over a ten-year period. Twenty-five percent of the simulated metrics are greater than this metric.
95^{th}	the 95th percentile over a ten-year period. Five percent of the simulated metrics are greater than this metric.

APPENDIX II
DESCRIPTION OF MANAGEMENT PROCEDURES PROPOSED AT MSAB015

The proposed management procedures from the 15th Session of the Management Strategy Advisory Board (MSAB015) are described here. Each management procedure has a coastwide component and a distribution component. The distribution component can distribute directly to IPHC Regulatory Areas or distribute to Biological Regions first.

For all the MPs considered, the coastwide component sees the application of a coastwide SPR and of a 30:20 control rule. The 30:20 harvest control rule adjusts the reference SPR if the estimated stock status falls below the 30% trigger value. Specifically, the fishing intensity is reduced linearly if the stock status falls below 30% of unfished spawning stock biomass to a value of zero at and below an estimated status of 20% of unfished spawning stock biomass.

MP15-A: this MP applies a coastwide SPR and the 30:20 harvest control rule to obtain a coastwide TCEY. The coastwide TCEY is then distributed to IPHC Regulatory Areas using the O32 stock distribution (i.e. biomass of fish over 32 inches) from FISS. A proportional relative harvest rate is applied to IPHC Regulatory Areas such that the relative harvest rate in the western areas (i.e. 3B, 4A, 4CDE, and 4B) is 0.75 and the relative harvest rate in eastern areas (i.e. 2A, 2B, 2C, 3A) is 1.0. Further adjustments are applied to the distributed TCEY, to assign a fixed 1.65 million pounds for IPHC Regulatory Area 2A (when possible) and a percentage allocation for IPHC Regulatory Area 2B calculated from a 30% weight on the current interim management procedure's target TCEY distribution (i.e., O32 stock distribution and relative harvest rates) and 70% weight to 20%.

MP15-B: this MP applies a coastwide SPR and the 30:20 harvest control rule to obtain a coastwide TCEY. A 15% constraint is then applied to not allow the coastwide TCEY to increase or decrease by more than 15% from the previous year's limit. The coastwide TCEY is then distributed to IPHC Regulatory Areas using the O32 stock distribution (i.e. biomass of fish over 32 inches) from the FISS. A proportional relative harvest rate is applied to IPHC Regulatory Areas such that the relative harvest rate in the western areas (i.e. 3B, 4A, 4CDE, and 4B) is 0.75 and the relative harvest rate in eastern areas (i.e. 2A, 2B, 2C, 3A) is 1.0. Further adjustments are applied to the distributed TCEY, to assign a fixed 1.65 million pounds for IPHC Regulatory Area 2A (when possible) and a percentage allocation for IPHC Regulatory Area 2B calculated from a 30% weight on the current interim management procedure's target TCEY distribution (i.e., O32 stock distribution and relative harvest rates) and 70% weight to 20%.

MP15-C: this MP applies a coastwide SPR and the 30:20 harvest control rule to obtain a coastwide TCEY. A 15% constraint is then applied to not allow the coastwide TCEY to increase or decrease by more than 15% from the previous year's limit. The coastwide TCEY is then distributed to Biological Regions using the O32 stock distribution (i.e. biomass of fish over 32 inches) from the FISS. A proportional relative harvest rate is applied to Biological Regions such that the relative harvest rate in Biological Regions 4 and 4B is 0.75 and the relative harvest rate in Biological Regions 2 and 3 is 1.0. The regional TCEY is then distributed to IPHC Regulatory Areas using the O32 stock distribution (i.e. biomass of fish over 32 inches) from the FISS. Further adjustments are applied to the distributed TCEY, to assign a fixed 1.65 million pounds for IPHC Regulatory Area 2A (when possible) and a percentage allocation for IPHC Regulatory Area 2B calculated from a 30% weight on the current interim management procedure's target TCEY distribution (i.e., O32 stock distribution and relative harvest rates) and 70% weight to 20%.

MP15-D this MP applies a coastwide SPR and the 30:20 harvest control rule to obtain a coastwide TCEY. A 15% constraint is then applied to not allow the coastwide TCEY to increase or decrease by more than 15% from the previous year's limit. The coastwide TCEY is then distributed to IPHC Regulatory Areas using the O32 stock distribution (i.e. biomass of fish over 32 inches) from the FISS. A proportional relative harvest rate is applied to IPHC Regulatory Areas such that the relative harvest rate in the western areas (i.e. 3B, 4A, 4CDE, and 4B) is 0.75 and the relative harvest rate in eastern areas (i.e. 2A, 2B, 2C, 3A) is 1.0. Further adjustments are applied to the distributed TCEY, to assign a fixed 1.65 million pounds for IPHC Regulatory Area 2A (when possible) and a percentage allocation for IPHC Regulatory Area 2B calculated from a 30% weight on the current interim management procedure's target TCEY distribution (i.e., O32 stock distribution and relative harvest rates) and 70% weight to 20%. These 2A and 2B adjustments are made by adding to the total coastwide TCEY, rather than reallocating among IPHC Regulatory Areas (as in other MPs). Once this last step is complete, the sum of the distributed TCEY is compared with the TCEY corresponding to a SPR value of 36% (maximum fishing intensity). If the sum of the distributed TCEY is higher than the TCEY corresponding to the maximum fishing intensity, IPHC Regulatory Areas 2A and 2B are adjusted so that the sum of the distributed TCEY is equal to the TCEY corresponding to the maximum fishing intensity. If the sum of the distributed TCEY is lower than the TCEY corresponding to the maximum fishing intensity, no further adjustments are made.

MP15-E: this MP applies a coastwide SPR and the 30:20 harvest control rule to obtain a coastwide TCEY. A 15% constraint is then applied to not allow the coastwide TCEY to increase or decrease by more than 15% from the previous year's limit. The coastwide TCEY is then distributed to IPHC Regulatory Areas using the O32 stock distribution (i.e. biomass of fish over 32 inches) from the FISS. A proportional relative harvest rate is applied to IPHC Regulatory Areas such that the relative harvest rate in the western areas (i.e. 3B, 4A, 4CDE, and 4B) is 0.75 and the relative harvest rate in eastern areas (i.e. 2A, 2B, 2C, 3A) is 1.0. Further adjustments are applied to the distributed TCEY, to assign a fixed 1.65 million pounds for IPHC Regulatory Area 2A (when possible).

MP15-F: this MP applies a coastwide SPR and the 30:20 harvest control rule to obtain a coastwide TCEY. A 15% constraint is then applied to not allow the coastwide TCEY to increase or decrease by more than 15% from the previous year's limit. A National Share of 20% is then applied to IPHC Regulatory Area 2B and the remaining 80% is then distributed to IPHC Regulatory Areas using the O32 stock distribution (i.e. biomass of fish over 32 inches) from the FISS. A proportional relative harvest rate is applied to IPHC Regulatory Areas such that the relative harvest rate in the western areas (i.e. 3B, 4A, 4CDE, and 4B) is 0.75 and the relative harvest rate in eastern areas (i.e. 2A, 2B, 2C, 3A) is 1.0.

MP15-G: this MP applies a coastwide SPR and the 30:20 harvest control rule to obtain a coastwide TCEY. A 15% constraint is then applied to not allow the coastwide TCEY to increase or decrease by more than 15% from the previous year's limit. The coastwide TCEY is then distributed to IPHC Regulatory Areas using the O32 stock distribution (i.e. biomass of fish over 32 inches) from the FISS. A proportional relative harvest rate is applied to IPHC Regulatory Areas such that the relative harvest rate in the western areas (i.e. 3B, 4A, 4CDE, and 4B) is 0.75 and the relative harvest rate in eastern areas (i.e. 2A, 2B, 2C, 3A) is 1.0.

MP15-H: this MP applies a coastwide SPR and the 30:20 harvest control rule to obtain a coastwide TCEY. A 15% constraint is then applied to not allow the coastwide TCEY to increase or decrease by more than 15% from the previous year's limit. The coastwide TCEY is then distributed to IPHC Regulatory Areas using the O32 stock distribution (i.e. biomass of fish over 32 inches) from the FISS. A proportional relative harvest rate is applied to IPHC Regulatory Areas such that the relative harvest rate in IPHC Regulatory Area 4B is 0.75 and the relative harvest rate in all other IPHC Regulatory Areas is 1.0.

MP15-I: this MP applies a coastwide SPR and the 30:20 harvest control rule to obtain a coastwide TCEY. A 15% constraint is then applied to not allow the coastwide TCEY to increase or decrease by more than 15% from the previous year's limit. The coastwide TCEY is then distributed to IPHC Regulatory Areas using the 'all-sizes' stock distribution, which is determined from the biomass of all sizes of Pacific halibut caught in the FISS. A proportional relative harvest rate is applied to IPHC Regulatory Areas such that the relative harvest rate in the western areas (i.e. 3B, 4A, 4CDE, and 4B) is 0.75 and the relative harvest rate in eastern areas (i.e. 2A, 2B, 2C, 3A) is 1.0.

MP15-J: this MP applies a coastwide SPR and the 30:20 harvest control rule to obtain a coastwide TCEY. A 15% constraint is then applied to not allow the coastwide TCEY to increase or decrease by more than 15% from the previous year's limit. The coastwide TCEY is then distributed to IPHC Regulatory Areas using a 5-year moving average of the O32 stock distribution (i.e. biomass of fish over 32 inches) from the FISS. A proportional relative harvest rate is applied to IPHC Regulatory Areas such that the relative harvest rate in the western areas (i.e. 3B, 4A, 4CDE, and 4B) is 0.75 and the relative harvest rate in eastern areas (i.e. 2A, 2B, 2C, 3A) is 1.0.

MP15-K: this MP applies a coastwide SPR and the 30:20 harvest control rule to obtain a coastwide TCEY. A 15% constraint is then applied to not allow the coastwide TCEY to increase or decrease by more than 15% from the previous year's limit. The coastwide TCEY is then distributed to IPHC Regulatory Areas using the previous 5-year average of the O32 stock distribution (i.e. biomass of fish over 32 inches) from the FISS, calculated only every 5th year.

Table A.II.1: Identification of main elements incorporated in each of the management procedures (MP) proposed at MSAB015. Colors indicate groups of elements of similar concepts: in blue are coastwide fishing intensity options, in yellow are estimation methods for stock distribution from survey data, in red are relative harvest rates between IPHC Regulatory Areas, and in green are agreements for IPHC Regulatory Areas 2A and 2B.

Element	MP-A	MP-B	MP-C	MP-D	MP-E	MP-F	MP-G	MP-H	MP-I	MP-J	MP-K
TCEY constraint of 15%											
Max Fishing Intensity buffer 36%											
O32 stock distribution											
O32 stock distribution (5-year moving average)											
All sizes stock distribution											
Fixed shares updated in 5th year from O32 stock distribution											
Relative harvest rates of 1.0 for 2-3A, and 0.75 for 3B-4											
Relative harvest rates of 1.0 for 2-3, 4A, 4CDE, and 0.75 for 4B											
Relative harvest rates by Region: R2=1, R3=1, R4=0.75, R4B=0.75											
1.65 Mlbs fixed TCEY in 2A											
Formula percentage for 2B											
National Shares (2B=20%)											

APPENDIX III
LIST OF ACRONYMS USED IN THE IPHC MANAGEMENT STRATEGY EVALUATION

AAV	Average Annual Variation
AC	Annual Change
ADFG	Alaska Department of Fish and Game
CSP	Catch Sharing Plan
CR	Control Rule
DFO	Fisheries and Ocean Canada
$F_{xx\%}$	Fishing Intensity
FISS	Fishery-Independent Setline Survey
IPHC	International Pacific Halibut Commission
MP	Management Procedure
MSAB	Management Strategy Advisory Board
MSE	Management Strategy Evaluation
NMFS	National Marine Fisheries Service, NOAA
NPFMC	North Pacific Fishery Management Council
O26	Over 26 inches (66.0 cm)
O32	Over 32 inches (81.3 cm)
PMFC	Pacific Fishery Management Council
RSB	Relative Spawning Biomass
SB	Spawning Biomass
SRB	Scientific Review Board
SPR	Spawning Potential Ratio
SS	Stock Synthesis
TCEY	Total Constant Exploitation Yield
TM	Total Mortality

A set of working definitions are provided in the IPHC Glossary of Terms and abbreviations: https://www.iphc.int/the-commission/glossary-of-terms-and-abbreviations. Definitions and abbreviations are also provided on the help page of the MSE Explorer.

APPENDIX IV
DESCRIPTION OF PERFORMANCE METRICS USED IN THE IPHC MSE

Table A.IV.1: Table of performance metrics with descriptions and equations. Note that subscripts are as follows: *R* represents region, *A* represents IPHC Regulatory Area, *y* represents year, *yrs* represents all 10 years in the time period, *i* represents simulation, and *C* represents any type of fishery mortality limit (e.g., TCEY, directed commercial, recreational, etc.). A capital 'I' indicates an 'indicator' function which is given a value of 1 if the statement is true, or 0 if the statement is false.

Metric	Description	Equation
nSims	The number of simulated 60-year periods. More simulations result in better accuracy of the performance metrics and statistics of interest.	
Median realized SPR	The realized SPR over the time-period selected after application of the control rule and realized fishing mortality. The SPR will always be greater than or equal to the procedural (input) SPR. It is greater than this value in half of the simulations.	$\text{Median}_i(\overline{SPR})$
BIOLOGICAL SUSTAINABILITY		
Median average RSB	The median relative spawning biomass (averaged over a ten-year period) that occurs over all simulations.	$\text{Median}_i(\overline{RSB})$
Median # females	The median number of females expected for the defined period (short-, medium-, or long-term).	$\text{Median}_i(\overline{N_F})$
Median average percent SB	The median percentage of Spawning Biomass (averaged over a ten-year period) in each Biological Region.	$\text{Median}_i\left(\overline{SB_R/_{SB}}\right)$
P(all RSB < *XX*%)	Probability that the relative spawning biomass (stock status) is less than 20% of the biomass if no fishing had occurred. 'All' refers to the chance that this event occurs in a given year across all simulations. Values available for comparison (XX) are 20%, 25%, 30%, 36%, and 40%.	$\frac{\sum_{i=1}^{nSims}\sum_y \text{I}\left(RSB_{i,y} < XX\%\right)}{nSims \times nYrs}$
P(any RSB < *XX*%)	Probability that the relative spawning biomass (stock status) is less than 20% of the biomass if no fishing had occurred. 'Any' refers to the probability of this event occurring in a ten-year period (at least 1 of 10 years).	$\frac{\sum_{i=1}^{nSims} \text{I}(\text{any } RSB_{i,yrs} < XX\%)}{nSims}$
P(increase SB|RSB 20-30%)	Probability that the spawning biomass increases when relative spawning biomass is between 20% and 30% of its dynamic unfished equilibrium value.	$\frac{\sum_{i=1}^{nSims}\sum_y \text{I}\left(SB_{i,y+1} > S \mid 20\% < RSB_{i,y} < 30\%\right)}{nSims \times nYrs \mid 20\% < RSB_{i,y} < 30\%}$

FISHERY SUSTAINABILITY		
P(all AAV > *XX*%)	Probability that the average annual variability (AAV) of the TCEY over a ten-year period is greater than 15%. AAV can be thought of as the average change in the Total Mortality limit from year to year. Thresholds available (*XX*) are 15%, 20%, and 25%.	$\frac{\sum_{i=1}^{nSims}\left[\left(\sum_y \lvert TCEY_{i,y}-TCEY_{i,y-1}\rvert / \sum_y \lvert TCEY_{i,y}\rvert\right) > XX\%\right]}{nSims}$
Median Annual Change (AC) TCEY/Commercial /Recreational	The median absolute annual change in TCEY, directed commercial, or recreational mortality limit (averaged over a ten-year period) that occurs over all simulations. This metric is reported at a coastwide level and at an IPHC Regulatory Area level.	$\text{Median}_{i,y}\left(\frac{\lvert C_y - C_{y-1}\rvert}{C_{y-1}}\right)$
P(any *Y* change TCEY>15%)	The probability for any *Y* years in a ten-year period that the change in the TCEY limit is greater than 15%. This metric is reported at a coastwide level and at a IPHC Regulatory Area level. The number of years in the calculation ranges from 1 to 5. Note that $AC_{i,y} = \frac{C_y - C_{y-1}}{C_{y-1}}$.	$\frac{\sum_{i=1}^{nSims} \mathrm{I}\left(\lvert AC\rvert_{i,yrs} > 15\% \text{ for } Y \text{ or more years}\right)}{nSims}$
P(all TM < 34 Mlbs)	The probability that the Total Mortality limit (TM) would be set below a minimum value. The minimum TM has not been determined, and is currently an ad hoc value of 34 Mlbs, which is the minimum TM observed since 1906.	$\frac{\sum_{i=1}^{nSims}\sum_y \mathrm{I}\left(TM_{i,y} < 34 \text{ Mlbs}\right)}{nSims \times nYrs}$
P(any TM < 34 Mlbs)	The probability that the Total Mortality limit (TM) would be set below a minimum value for at least one year of a ten-year period. The minimum TM has not been determined, and is currently an ad hoc value of 34 Mlbs, which is the minimum TM observed since 1906.	$\frac{\sum_{i=1}^{nSims} \mathrm{I}(\text{any } TM_{i,yrs} < 34 \text{ Mlbs})}{nSims}$
Median average TCEY/Commercial /Recreational/ Discards	The median TCEY, directed commercial, or recreational mortality limit, or simulated discards (averaged over a ten-year period) that occurs over all simulations. This metric is reported at a coastwide level and at a IPHC Regulatory Area level.	$\text{Median}_i(\bar{C})$
P(all Comm=0)	The probability that the directed commercial fishery mortality limit would be zero. This can occur if there is not enough TCEY for the directed commercial fishery after allocation to other fisheries, or if the fishery limit in the control rule closes the directed fisheries.	$\frac{\sum_{i=1}^{nSims}\sum_y \mathrm{I}\left(Comm_{i,y} = 0\right)}{nSims \times nYrs}$
P(any Comm=0)	The probability that the Commercial fishery limit would be zero in at least one year in a ten-year period. This can occur if there is not enough TCEY for the commercial fishery after allocation to other fisheries, or if the fishery limit in the control rule closes the directed fishery.	$\frac{\sum_{i=1}^{nSims} \mathrm{I}(\text{any } Comm_{i,yrs} = 0)}{nSims}$
P(all decrease TCEY > 15%)	The probability that the TCEY decreases by more than 15% from one year to the next. Note that $AC_{i,y} = \frac{C_y - C_{y-1}}{C_{y-1}}$.	$\frac{\sum_{i=1}^{nSims}\sum_y \mathrm{I}\left(AC_{i,y} < -15\%\right)}{nSims \times nYrs}$

P(any decrease TCEY > 15%)	The probability in at least one out of ten years the TCEY decreases by more than 15%. Note that $AC_{i,y} = \frac{C_y - C_{y-1}}{C_{y-1}}$.	$\frac{\sum_{i=1}^{nSims} \mathrm{I}\left(\text{any } AC_{i,y} < -15\%\right)}{nSims}$
P(all increase TCEY > 15%)	The probability in a given year that the TCEY increases by more than 15%. Note that $AC_{i,y} = \frac{C_y - C_{y-1}}{C_{y-1}}$.	$\frac{\sum_{i=1}^{nSims} \sum_y \mathrm{I}\left(AC_{i,y} > 15\%\right)}{nSims \times nYrs}$
P(any increase TCEY > 15%)	The probability in at one out of ten years the TCEY increases by more than 15%. Note that $AC_{i,y} = \frac{C_y - C_{y-1}}{C_{y-1}}$.	$\frac{\sum_{i=1}^{nSims} \mathrm{I}\left(\text{any } AC_{i,y} > 15\%\right)}{nSims}$
Median AAV TCEY/Commercial /Recreational	The Median Average Annual Variability (AAV) over a ten-year period for the TCEY, which can be thought of as the average change in the TCEY from year to year. The AAV is greater than this value in half of the simulations.	$\mathrm{Median}_i\left(\sum_y \lvert TCEY_{i,y} - TCEY_{i,y-1}\rvert \Big/ \sum_y \lvert TCEY_{i,y}\rvert\right)$
Median Minimum TCEY	The median minimum value of TCEY in each IPHC Regulatory Area over a ten-year period. Refers to the primary objective of maintain the TCEY above a minimum absolute level in each IPHC Regulatory Area. This metric is reported at the IPHC Regulatory Area level.	$\mathrm{Median}_i\left[\mathrm{Min}_y\left(TCEY_{A,i,y}\right)\right]$
Median Minimum TCEY percentage	The median minimum percentage of TCEY in each IPHC Regulatory Area over a ten-year period. Refers to the primary objective of maintain the TCEY above a minimum absolute level in each IPHC Regulatory Area. This metric is reported at the IPHC Regulatory Area level.	$\mathrm{Median}_i\left[\mathrm{Min}_y\left(TCEY_{A,i,y} \Big/ TCEY_{i,y}\right)\right]$
Median Average TCEY percentage	The median percentage of TCEY in each IPHC Regulatory Area (averaged over a ten-year period). Refers to the primary objective of maximize the average TCEY in each IPHC Regulatory Area. This metric is reported at the IPHC Regulatory Area level.	$\mathrm{Median}_i\left(\overline{TCEY_{A,i,y} \Big/ TCEY_{i,y}}\right)$
QUANTILES		
*Q*th%	The *Q*th percentile over a ten-year period. *Q* percent of the simulated values are lower than this metric. Values presented include 5th, 25th, 75th, and 95th%. Note that the median is the 50th percentile.	

INTERNATIONAL PACIFIC HALIBUT COMMISSION

IPHC Financial Regulations (2021) - Draft

PREPARED BY: IPHC SECRETARIAT (D. WILSON, K. JERNIGAN; 25, 26, 27 JANUARY 2021)

PURPOSE

To provide the Commission with an opportunity to consider proposed amendments to the IPHC Financial Regulations, including additional amendments proposed at the 97th Session of the IPHC Finance and Administration Committee (FAC097).

BACKGROUND

In accordance with Regulation 19, paragraph 1 of the IPHC Financial Regulations (2020), the IPHC Secretariat has revised and suggested edits to the IPHC Financial Regulations to align the regulations with best practice governance.

> Regulation 19 (para 1) "*These Financial Regulations should be reviewed for their consistency and appropriateness at least biennially*."

At the 6th Special Session of the IPHC (SS06) held on 3 March 2020, the Commission made the following request of the IPHC Secretariat:

> IPHC-2020-SS06-R (para 10) "***NOTING*** *that additional improvements were required to Appendix I (IPHC Funds and Investment policy) of the regulations to better reflect the needs, scope, and intent of the Commissions' funding by Contracting Parties, the Commission* ***REQUESTED*** *that the IPHC Secretariat further refine and simplify the policy intersessionally, and to propose amendments at the 2020 Work Meeting (WM2020).*"

DISCUSSION

Provided at **Appendix I** are proposed revisions to the IPHC Financial Regulations (2020). The revisions include the following:

IPHC-2021-FAC097-08 edits:

1) To align the Financial Regulations with the IPHC Rules of Procedure (2020);
2) To align the IPHC's financial reporting to become GAAP compliant;
3) To further refine and simply the IPHC Funds and Investment policy of the regulations to better reflect the needs, scope, and intent of the Commissions' funding by Contracting Parties;
4) Minor edits to ensure consistency in terminology used.

IPHC-2021-FAC097-08 Rev_1 edits: Regulation 13 and 14 were updated to reflect financial reporting of financial activities and financial position by fund. Specifically, assets, liabilities, equity, income, and expenses for the General, Research, Statistics, FISS, and Reserve funds.

FAC097 edits - IPHC-2021-AM097-INF04 Rev_1, Rev_2, and Rev_3*:* A number of additional minor edits were proposed at FAC097, and these are shown in Appendix I as yellow-highlighted text.

RECOMMENDATIONS

That the Commission:

a) **NOTE** paper IPHC-2021-AM097-INF04 Rev_3, which proposed revisions to the IPHC Financial Regulations;

b) **ENDORSE** and **ADOPT** the International Pacific Halibut Commission Financial Regulations (2021).

APPENDICES

Appendix I: DRAFT: International Pacific Halibut Commission Financial Regulations (2021)

INTERNATIONAL PACIFIC HALIBUT COMMISSION

FINANCIAL REGULATIONS

(2021~~0~~)

Commissioners

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

Executive Director

David T. Wilson, Ph.D.

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Regulation 1 – Definitions

For the purpose of these Financial Regulations, the following definitions apply:

Convention: the Convention between Canada and the United States of America and for the Preservation of the Halibut Fishery of the Northern Pacific Ocean and Bering Sea, signed at Ottawa, Canada on 2 March 1953, as amended by the Protocol Amending the Convention, signed at Washington 29 March 1979, and includes the regulations promulgated thereunder.

Commission: the International Pacific Halibut Commission provided for by Article III, paragraph 1 of the Convention.

Contracting Parties: Consisting of the two Members, Canada and the United States of America (3 Commissioners from each Party).

Executive Director: the Director of the Commission.

Pacific halibut: fish of the species *Hippoglossus stenolepis*.

Restricted / Unrestricted Funds: Funds that are received and set aside for a specific purpose are considered restricted. Restricted Funds may be designated as restricted by the Board of Commissioners or the grantor if monies were received through a grant.

Rules of Procedure: The Rules of Procedure (2020, or subsequent revision) of the Commission.

Session: Any meeting of the Commission or its subsidiary bodies

Regulation 2 – Authority, Purpose, and Scope

1. **Authority**: These Financial Regulations consist of regulations adopted by the International Pacific Halibut Commission, hereinafter referred to as "the Commission," pursuant to the *Convention between Canada and the United States of America for the Preservation of the Halibut Fishery of the Northern Pacific Ocean and Bering Sea*, hereinafter referred to as "the Convention," signed first in 1923 and revised several times since, most recently in 1953, as amended by the Protocol signed by both countries, hereinafter referred to as "the Contracting Parties," in 1979.

2. **Purpose**: The purpose of this document is to provide the regulations to govern the financial administration of the International Pacific Halibut Commission and its Secretariat, as established pursuant to the Commission's Rules of Procedure (2020, or any subsequent revision).

3. **Scope**: The IPHC Secretariat, Commission and all subsidiary bodies 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 Financial Regulations.

Regulation 3 – Finance and Administration Committee

1. The Commission shall designate a Finance and Administration Committee (FAC) derived from the current Commissioners, tasked with reviewing and making recommendations on financial matters. The FAC recommendations shall be considered and approved by the Commission subject to Article III, Paragraph 1 of the Convention.

2. In addition to general oversight of financial matters and other duties specified in these Regulations, the FAC shall carry out the following duties on behalf of the Commission:

   a) Overseeing the financial reporting style and methodology;

   b) Overseeing accounting policies and practices;

   c) Approving the hiring, performance, and independence of the external auditor;

   d) Discussing financial risk management policies and practices with the IPHC Secretariat.

Regulation 4 – Fiscal Year and Currency

1. The fiscal year shall be the period from 1 October to the following 30 September, both dates inclusive. Funds may be held in either U.S. (USD) or Canadian (CAD) dollars. All monetary figures in these Regulations are expressed in U.S. dollars, and all financial accounting of the Commission shall be in U.S. dollars.

Regulation 5 – Budget

1. Annual budget estimates shall cover income and expenditures for the fiscal year to which they relate.

2. Annual budget estimates shall be divided into categories by ~~funding source~~ the approved Chart of Accounts ~~funding source~~. Each category shall be accompanied by such information, annexes and explanatory statements as may be requested on behalf of the Commission, and such further annexes or statements as the Executive Director may deem necessary and useful.

3. The Executive Director shall prepare and submit to the FAC, Contracting Parties, and Commissioners, no later than **30 days before** the FAC meeting, budget estimates for the next three fiscal years.

4. The FAC shall review actual income and expenses for the prior fiscal year, and review and recommend changes to the budget estimates for the next three fiscal years. The FAC shall provide its recommendations to the Commission.

5. At its regular Annual Meeting, the Commission shall review the report of the FAC, including income and expense results for the prior fiscal year, proposed budgets for the next two fiscal years, and budget estimates for the third subsequent fiscal year. The FAC may recommend to the Commission to amend or adjust the budgets as necessary ~~prior to adoption~~ to reflect changing priorities or contingencies.

6. In preparing budget estimates for consideration of the FAC, the Executive Director shall fully take into account any surplus funds including funds in cash and investment accounts carried over from previous years' Contracting Party contributions, and any other income, which may be available for expenditure in the year for which the budget estimates are prepared.

7. The Executive Director shall notify Contracting Parties ~~on the basis~~ of their contribution ~~of the~~ based on the budget adopted by the Commission ~~and~~ in accordance with Article III, Paragraph 1 of the Convention.

8. Should either of the Contracting Parties not approve its invoiced contribution in whole or in part, the Executive Director shall forthwith notify the other Contracting Party and, after consulting with the Chairperson of the Commission, shall recommend revisions to the budget as may appear necessary.

9. Any revisions to a budget or supplementary estimates shall be prepared by the Executive Director and submitted to the Chairperson and Vice-Chairperson for approval. Subject to consultation with the other Commissioners, the Chairperson and Vice-Chairperson may approve the revisions, obtain the Commissioners' approval through the established procedures for Intersessional decision-making (Rule 11 – Decision making; IPHC Rules of Procedure (2020), or any subsequent revision), or call a special session, ~~meeting~~ to collect a vote. After approval, the estimates shall be acted upon in the same manner as regular budgets or estimates.

10. The Executive Director may, in any fiscal year, reallocate funds in an amount not exceeding 5% of total income between budget expense categories within the current fiscal year's

approved budget. The Chairperson of the Commission may, in any fiscal year, authorize the Executive Director to reallocate funds in an amount exceeding 5% to meet mission needs.

Regulation 6 – Publication of Budget

1. A summary of the budget of the Commission shall be available at the Commission's website and by other electronic communication means approved by the Commission.

Regulation 7 – Contracting Party Contributions

1. The receipt of contributions from the Contracting Parties shall constitute an authorization to the Executive Director to incur obligations and make payments for the benefit of the Commission.

2. The Executive Director may use existing funds to incur obligations before a budget is approved or before Contracting Party contributions are adopted by the Commission, when such obligations are necessary for the continued effective functioning of the Commission and provided such obligations do not exceed the most recent approved budget. The Executive Director must obtain approval ~~from this level of spending~~ from the Chairperson and Vice-Chairperson of the Commission for deviations greater than 5% of the approved budget ~~from this level of spending from the Chairperson and Vice-Chairperson of the Commission.~~

Regulation 8 – Provision of Funds

1. The Commission operations shall be financed by contributions in U.S. dollars made by the Contracting Parties, in accordance with Article III, Paragraph 1 of the Convention. Pending the receipt of such contributions, the operations may be financed from the General and ~~Supplementary~~ Reserve Funds as described in Regulation 10.

2. After the Commission has adopted a budget, revisions to a budget, or a supplementary budget, the Executive Director shall:

   a) Transmit to the Contracting Parties such documents and information as may be required by the government departments responsible for approving IPHC contributions and appropriating the funds;

   b) Request that the funds be remitted in accordance with procedures agreed upon by each of the Contracting Parties.

3. At the end of the twelve-month period, any obligation incurred in the prior year which remains unliquidated shall be cancelled, or where the obligation remains a valid charge, transferred as an obligation against current-year funds. Any balance in funds shall be accounted for in accordance with the provisions of Regulations 5.10 and 10.7.

Regulation 9 – Other Income

1. The Commission may receive revenue from the sales of fish harvested during the course of research or other scientific operations, pursuant to Article III, Paragraph 2 of the Convention. Revenue from the sale of fish related to the IPHC's Fishery-Independent Setline Survey (FISS) shall be credited to the ~~Supplemental~~ FISS Fund. Revenue from the sale of fish for Pacific halibut research or operations not related to the IPHC's FISS shall be credited to the General Fund.

2. The Commission may receive, on occasion, income in addition to those received from the Contracting Parties to fund the Commission's annual budget. Such funds may be from contracted or granted research agreements or from private organizations or other government agencies for the purpose of funding Pacific halibut research or operations.

Regulation 10 - Funds

1. All monetary holdings shall be subject to the Funds and Investment Policy of the Commission as follows: ~~(provided at **Appendix I**), which will include the approved purposes, limits, and specific rules of use for each.~~

   a. Cash accounts – Funds will be maintained in a checking account. Funds in excess of annual operating expenses will be held in the Savings Account or an Investment Account. Funds in the Investment Account shall be in a Money Market or Certificate of Deposit (CD). Certificates of Deposit shall not extend beyond 12-months. Cash account type requirements include:

      i. Checking Account – Federally insured (FDIC/NCUA) institutional interest-bearing checking account. Institution defined as state or federally chartered bank or credit union.
      ii. Savings Account – Federally insured (FDIC/NCUA) institutional interest-bearing saving account. Institution defined as state or federally chartered bank or credit union.

iii. Certificates of Deposit (CD) – Federally insured (FDIC/NCUA) institutional time deposit. Institution defined as state or federally chartered bank or credit union.

iv. Money Market Mutual Funds – Mutual Fund investing in short-term debt securities and U.S. treasury obligations for preservation of capital and maintaining liquidity.

~~a.~~b. Retirement accounts – Funds held in the Commission retirement accounts will be subject to the recommendations of the Financial Advisors and executed by the plan administrator. The Commission's goal is to achieve a total return of 6% after inflation over a 3-5 year period. Risk levels in the retirement accounts offer employees an option to choose aggressive, moderate, or conservative investments.

2. There shall be a ~~General~~checking, savings ~~Supplemental~~FISS, and ~~Reserve cash~~investment ~~fund~~ account for the purposes of holding all monetary funds received. Other ~~fund or funds~~accounts may be established by the Commission as necessary.~~.~~

~~2.~~3. Fund accounting will be established to track assets, liabilities, equity, income, and expenses called General, Research, Statistics, FISS, and Reserve.

~~3.~~4. The ~~General Fund~~ General Fund shall be a Contracting Party contributions fund and shall be used to support the general operations and ~~(~~administrative ~~), statistics, and research, and administrative~~ expenditures of the Commission.

~~4.~~5. The following funds shall be credited to the General Fund:

a) Contributions received from the Contracting Parties;

b) Receipts from the sale of surplus Commission property purchased from the General Fund;

c) Interest income earned by the ~~General Fund~~checking and savings cash accounts;

d) Receipts from the sale of fish related to Pacific halibut research or operations, and not related to FISS;

e) Salaries and benefits for secretariat staff related to the general administration of the IPHC.

~~f) Receipts from grants and contracts related to Pacific halibut research or operations.~~

6. The following funds shall be credited to the Research Fund:

a) Receipts from grants and contracts related to Pacific halibut research;

~~a)~~b) Contributions received from Contracting Parties as internal Fund transfers from the General fund;

c) Salaries and benefits for secretariat staff related to research.

7. The following funds shall be credited to the Statistics Fund:

a) Receipts from grants and contracts related to catch effort statistics of Pacific halibut;

~~a)~~b) Contributions received from Contracting Parties as internal Fund transfers from the General fund;

c) Salaries and benefits for secretariat staff related to catch effort statistics.

~~5.~~8. The following funds shall be credited to the ~~Supplemental~~ FISS Fund:

a) Receipts from the sale of fish related to the IPHC's ~~Fishery-Independent Setline Survey~~ FISS;

b) Receipts from the sales of surplus Commission property purchased from the ~~Supplemental~~ FISS Fund;

~~c) Interest income earned by the Reserve Fund;~~

~~d)~~c) Receipts from grants and contracts related to the IPHC's ~~Fishery-Independent Setline Survey~~ FISS;

~~e)~~d) Salaries and benefits for secretariat staff related to the FISS.

~~6.~~9. ~~The~~ The Reserve Fund is a~~n~~ ~~un~~restricted fund intended to stabilize the Commission's operations when expected or unexpected events occur. The Reserve Fund may be used when Contracting Party contributions are not received when invoiced. The Reserve Fund may also be used as working capital to ~~the working capital fund and shall be used to~~ support the IPHC's ~~Fishery-Independent Setline Survey (~~FISS~~)~~ and approved research. The goal of the Reserve fund is to carry a balance equivalent to 6 months' worth of expenses~~ for the FISS~~.

~~7.~~10. The Executive Director may authorize transfers ~~of funds~~ from the Reserve Fund to the ~~Supplemental FISS~~General Fund, Research Fund, Statistics Fund, or FISS Fund to the extent necessary to finance approved budgetary ~~expenditures~~ obligations and associated expenditures. ~~pending receipt of revenue generated from FISS fish sales.~~

~~8.~~11. The Executive Director may authorize transfers ~~funds~~ between funds as allowed by the approved budget and defined purposes, limits, and rules of use for each.

~~9.~~12. Previous year's surplus funds shall be retained in the General and ~~Supplemental~~ FISS Funds based on the stated policy in this section. Surplus funds shall be reviewed by the FAC, in conjunction with review of the previous year's expenses.

Regulation 11 – Custody of Funds

1. The Executive Director shall designate the bank or banks in which the funds of the Commission shall be kept and shall report the identity of the bank or banks so designated to the Commission.

Regulation 12 – Internal Controls

1. The Executive Director shall be accountable to the Commission for the proper management of the Commission's financial resources in accordance with the Commission's Rules of Procedure (2020, or any subsequent revision) and these Regulations.

2. No obligations shall be incurred until allotments or other appropriate authorizations have been made in writing under the authority of the Executive Director. In emergent situations the Executive Directory may give verbal approval to incur the obligation. In emergent situations the verbal authorization must be documented within 24-hours of the authorization.

3. The Executive Director shall:

    a) Establish detailed financial procedures to ensure effective financial administration and financial stability;

    b) Sign on behalf of the Commission for all financial and ordinary business matters of the Commission, up to authorization levels;

    c) Cause all payments to be made on the basis of supporting invoices and other documents and ensure that services or goods contracted for have been received;

    d) Designate in writing the Commission's Secretariat staff who may receive monies, incur obligations, sign on behalf of the Commission, and make payments on behalf of the Commission up to the threshold defined by the Executive Director, but not exceeding ~~his/her own~~ individual authorized levels.

4. The Executive Director may, after full investigation, authorize the writing off of losses of cash and other assets, provided that a statement explaining the losses shall be submitted to the FAC.

5. The Executive Director may, with the approval of the Chairperson of the Commission, authorize the transfer of unused or surplus equipment and/or supplies to charitable organizations or to scientific societies associated with the Commission. The record of all such transfers shall be available for the independent External Auditors.

6. For the issuance of purchase orders and contracts in excess of $250,000 and all vessel charter agreements the Executive Director shall obtain the approval of the Chairperson and~~or~~ Vice-Chairperson.

7. In the case of unforeseen conditions, the Executive Director may deviate from approved total budget levels at the discretion of the Chairperson and Vice-Chairperson.

Regulation 13 - Reporting

1. The Executive Director shall maintain such accounting records as are necessary for each fiscal year and shall submit to the Contracting Parties annual accounting records for the fiscal year to which they relate, including the following:

   a) Outstanding obligations and receivables at the beginning and end of the year;

   b) Changes in balances at the beginning and end of the year;

   ~~c) Income and expenditures of all funds;~~

   ~~d)~~c) The status of all funds, including:

      i. The ~~original~~ budgeted funding for the year;

      ii. The Contracting Party contributions as modified by any transfers;

      iii. Income Sources, if any, other than Contracting Party contributions;

      ~~iv. The amounts charged against those Contracting Party contributions and other income sources;~~

      v. The ~~status~~ income and expenditures for the ~~of the~~ General Fund, Research Fund, Statistics Fund and the ~~Supplemental~~ FISS Fund~~s~~, and of any other fund~~s~~ that has been be established;

      vi. The balance sheet for the Reserve Fund and a ~~S~~statement regarding working capital available to meet cash needs for expenditures ~~for~~ in the next fiscal year.

      vii. Such other information as may be appropriate to indicate the current financial position of the Commission.

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~~ contracted for a term of three (3) years, and may be ~~reappointed~~ extended to multiple terms.

2. The contents identified in the Auditors Provided By Client (PBC) list shall be ~~submitted~~ provided by the Executive Director to the Auditors contracted ~~appointed~~ by the Commission not later than sixty (60) days after the end of a fiscal year.

3. The Auditors shall perform such an audit as they deem necessary to determine:

   a) That the financial statements fairly present the financial activities and position of the Commission as of year-end;

   b) That the financial transactions reflected in the statements are in accordance with these Financial Regulations;

   c) That the monies on deposit and on hand are vouched for by the Commission's depositories or by actual count, with exception of petty cash.

   ~~d)~~ That assets, liabilities, equity, income, and expenses are tracked by fund (General, Research, Statistics, FISS, and Reserve). ~~Equity proportions for the Contracting Parties based on their contributions to the joint expenses shared by them under Article III, Paragraph 1 of the Convention.~~

4. The Auditors shall be sole judges as to the acceptance in whole or in part of such financial records provided by the Executive Director or ~~his/her~~their delegate, and they may proceed to detailed examination and verifications of such financial records as they choose.

5. The Auditors, in addition to certifying the correctness of the accounts, may make such observations as they deem desirable with respect to the efficiency of the financial procedures, the accounting system, the internal financial controls, and in general, the financial consequences of administrative practices.

6. The Auditors shall, if required, recommend changes or adjustments to the books and records to the Executive Director.

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.

8. The Commission may request the Auditors to perform certain specific examinations and issue separate reports regarding the books and records.

Regulation 15 – Bonding

1. The Executive Director and such other members of the IPHC Secretariat as may be deemed necessary shall be bonded in United States currency by a reputable bonding company in

amounts determined by the Commission. The cost of the premiums for bonding shall be assumed by the Commission.

Regulation 16 – Insurance

1. The Executive Director ~~may take out~~shall acquire suitable insurance policies with reputable financial institutions against normal risks to its assets, operations, and personnel. The cost of the premiums for insurance shall be assumed by the Commission.

Regulation 17 – Delegation of Authority

1. The Executive Director may delegate to other members of the IPHC Secretariat or the Commission such of ~~his/her~~their powers as ~~he/she~~they consider~~s~~ necessary for the effective implementation of these Regulations.

Regulation 18 – Interpretation

1. The Chairperson may rule, after such consultation with the Commissioner's as the Chairperson deems necessary, in cases of doubt as to the interpretation and application of any of these Regulations.

Regulation 19 – General Provisions

1. These Financial Regulations should be reviewed for their consistency and appropriateness at least biennially.
2. These Financial Regulations may be amended from time to time by vote of the Commission in accordance with the voting procedure noted in Rule 11 of the IPHC Rules of Procedure (~~2019~~2020, or any subsequent revision), provided such amendment is not inconsistent with the provisions of the Convention.
3. Copies of superseded Financial Regulations shall be archived by the Executive Director.
4. These Financial Regulations were adopted by consensus on DD January 2021~~3 March 2020~~, and supersede those previously adopted by the Commission on 3 March 2020~~1 February 2019~~.

~~APPENDIX I~~
~~IPHC INVESTMENT POLICY~~

~~I. Introduction~~

~~The investment policy was adopted by the International Pacific Halibut Commission (IPHC) on 3 March 2020, pursuant to the Commission's Financial Regulations, to define the various funds held by the Commission and issue guidelines for their management. These policies supersede any previous investment policies.~~

~~II. Responsibilities~~

~~Finance and Administration Committee (FAC).~~

~~As constituted by the Commission's Financial Regulations, the FAC is responsible for monitoring the management of the Commission's financial position.~~

~~The FAC shall review the Investment Policy (the Policy) annually to ensure it is consistent with the mission of the IPHC and accurately reflects current financial conditions. The FAC shall recommend any changes in this policy to the Commission.~~

~~Executive Director~~

~~The Executive Director is the Commission's fiduciary. As specified by the Commission's Financial Regulations, the Executive Director is accountable to the Commission for the proper management of the Commission's financial resources.~~

~~The Executive Director is authorized to delegate (in writing) certain responsibilities to other members of the IPHC Secretariat. With Commission approval, the Executive Director may also delegate certain responsibilities to professional financial experts in various fields. These professional financial services include, but are not limited to, investment management, investment custodian, and additional specialists. In particular, it is anticipated that the services of a registered investment manager may be engaged to manage portions of the Reserve and/or Supplemental Funds if the total combined funds exceed $10 million USD.~~

~~Professional Financial Services~~

~~The following procedure shall be used to engage or replace professional financial services, using the example of an investment manager:~~

1. ~~If the FAC deems it necessary, the Executive Director will recommend the hiring or replacing of an investment manager to the FAC.~~

~~2. The Executive Director will nominate prospective candidates and send a request for proposal to each candidate.~~
~~3. The Executive Director and his/her appointed selection Panel, will review proposals and interview candidates to determine the appropriate investment manager(s) and pass their findings to the FAC.~~
~~4. The FAC will make the hiring recommendation to the Commissioners, who shall have the final approval.~~

~~III. Suitable and Authorized Investments~~

~~For the purposes of managing investment risk the following investment vehicles will be permitted by this Policy:~~

- ~~**Interest-Bearing Savings Account** – Federally insured (FDIC/NCUA) institutional saving account. Institution defined as state or federally chartered bank or credit union.~~
- ~~**Certificate of Deposit (CD)** – Federally insured (FDIC/NCUA) institutional time deposit. Institution defined as state or federally chartered bank or credit union. Aggregate investments per entity must be at or below insurable limit.~~
- ~~**Money Market Mutual Funds** – Mutual Fund investing in short-term debt securities and U.S. treasury obligations for preservation of capital and maintaining liquidity.~~
- ~~**Interest Bearing Checking Account** – Federally insured (FDIC/NCUA) institutional checking account. Institution defined as state or federally chartered bank or credit union.~~
- ~~**U.S. Treasury Obligations** – Direct obligations of the United States Treasury whose payment is guaranteed by the United States. Direct obligations include, but are not limited to, U.S. Treasury Bills, U.S. Treasury Notes, U.S. Treasury Bonds, U.S. Treasury Inflation-Protected Securities (TIPS), and Zero Coupon Securities (STRIPS).~~
- ~~**U.S Agency Obligations** – U.S. Government Agencies, Government-Sponsored Enterprises (GSE's), Corporations, or Instrumentalities of the U.S. Government. U.S. Agency Obligations include, but are not limited to, Federal National Mortgage Association ((FNMA), Federal Home Loan Mortgage Corporation (FHLMC), Federal Home Loan Bank (FHLB), and Federal Farm Credit Bureau (FFCB). Agency obligations that have been securitized in collateralized mortgage trusts are prohibited.~~
- ~~**Mutual Funds (U.S. Government-Backed Only)** – Investments are limited to mutual funds consisting of 100% U.S. Government Obligations. .~~
- ~~**Corporate Paper** – Unsecured short-term promissory notes issues by corporations, municipalities, and sovereigns for a specific maturity at a stated rate of interest. To be eligible for purchase, the rating of the note must be at least P1 by Moody's Investor Service and/or A1 by Standard & Poor's Corporation.~~

~~IV. Authorized IPHC Funds~~

~~For the purposes of managing investment risk and to optimize investment returns within acceptable risk parameters, the following will be created and held separately with independent regulations and rules for each.~~

~~Funds~~

- ~~General Fund~~
- ~~Supplemental Fund~~
- ~~Reserve Fund~~

~~V. Funds~~

~~Purpose~~

~~**General and Supplemental**: The purpose of the General and Supplemental Funds are to provide sufficient cash to meet the day-to-day financial obligations of the IPHC in a timely manner. Requirements for credits to and expenditures from the two funds (General and Supplemental) are specified in the Financial Regulations.~~

~~**Reserve**: The purpose of the Reserve Fund is to meet the specific expense needs for each account and to improve the return on funds held for expenditure for up to five years. Unless otherwise stated all Reserve funds are reported as 'without donor restrictions' rather than 'temporarily restricted'.~~

~~Fund Descriptions and Rules~~

~~General Fund~~

~~The General Fund is a checking fund funded by Contracting Party contributions. The General Fund shall be used to support the general operations and administrative expenditures of the Commission.~~

~~Supplemental Fund~~

~~The Supplemental Fund is funded by the revenue generated from IPHC's Fishery-Independent Setline Survey (FISS). The Supplemental Fund shall be used to support FISS operations and associated research.~~

~~Reserve Fund~~

~~The Reserve Fund provides the funds to respond to unforeseen contingencies that cannot be met by the General or Supplemental Funds alone.~~

~~Investment Guidelines~~

~~Objectives~~

~~The investment objectives of the Reserve Fund are:~~

- ~~Preservation of capital~~
- ~~Liquidity~~

~~Allowable Investments~~

~~See Section III of this Investment Policy.~~

~~Maturity~~

~~Investments should be scheduled in such a way to ensure adequate cash flow.~~

- ~~The maturities on investments for the Reserve Fund shall be 18 months or less.~~

~~Reporting~~

~~The Executive Director shall prepare the following reports for presentation on at least an annual basis to the FAC including:~~

- ~~Schedule of investments~~
- ~~Interest income year to date~~

~~Fund Guidelines~~

- ~~No more than 75% of the Reserve Fund may be utilized within a fiscal year without approval of the Commission, in accordance with the IPHC Rules of Procedure (2020, or any subsequent revision).~~
- ~~The ordered priorities for use of surplus funds in the Reserve Fund will be 1) general operating FISS costs; 2) ongoing administrative and operations costs related to fishery monitoring and assessment; 3) research costs.~~
- ~~Subject to annual confirmation by the Commission, the Executive Director may expend funds from the Reserve Fund, up to, but not exceeding the limit of the Executive Director's discretionary spending authority.~~
- ~~Proposals for use of surplus funds in the Reserve Fund, beyond the Executive Director's authority, will be submitted to the Commission by the Executive Director. Such proposals must identify the circumstances that require funds from the Reserve Fund; measures or circumstances that will avoid additional requirements from the Reserve Fund; and, measures or circumstances that may result in replenishment of the Reserve Fund.~~
- ~~Proposals for use of surplus funds in the Reserve Fund will be reviewed by the FAC and recommendation for their approval forwarded to the Commission. Upon recommendation of the FAC, the Commission may approve the Executive Director's proposals for use of the Reserve Fund.~~

INTERNATIONAL PACIFIC HALIBUT COMMISSION

IPHC-2021-AM097-INF05

Received: 28 January 2021

FISHERY REGULATION PROPOSAL 2021
TITLE: DIRECTED COMMERCIAL

SUBMITTED BY:
UNITED STATES OF AMERICA
NOAA-FISHERIES
AFFILIATION: WEST COAST REGION
USA

All Regulatory Areas ☐ All Alaska Regulatory Areas ☐ All U.S. Regulatory Areas ☐

2A ☒ 2B ☐ 2C ☐ 3A ☐ 3B ☐ 4A ☐ 4B ☐ 4C ☐ 4D ☐ 4E ☐

At its November 2020 meeting, the Pacific Fishery Management Council (PFMC) adopted a recommendation for the 2021 season structure of the 2A non-tribal directed commercial Pacific halibut fishery. This recommendation for the 2021 season structure includes only a minor modification to what was implemented for the 2020 season. Specifically, it revises the season structure from 58-hour openings Monday through Wednesday, to 58-hour openings Tuesday through Thursday. This recommendation was adopted after the PFMC's extensive public process and following stakeholder input prior to and during the September and November Council meetings (attachments 1-4). This recommendation is therefore also a minor change to the Secretariat's regulatory proposal, however this adjustment to the season by one day is expected to greatly benefit stakeholders. Part of the stated rationale for this recommendation was that a Tuesday opening would allow fishery participants to acquire ice on a weekday, avoiding the challenges and price differentials that come from purchasing ice over the weekend. Additionally, this change is expected to provide a market opportunity for participants to sell directly to the public visiting port communities on Friday. The Council transmitted its recommendation to the International Pacific Halibut Commission on 5 January 2021.

Links to attachments 1-4
Attachment 1: https://www.pcouncil.org/documents/2020/09/i-3-a-supplemental-wdfw-report-1.pdf/
Attachment 2: https://www.pcouncil.org/documents/2020/09/i-3-a-supplemental-gap-report-1.pdf/
Attachment 3: https://www.pcouncil.org/documents/2020/11/e-3-a-supplemental-wdfw-report-1-wdfw-report-on-2021-non-indian-commercial-directed-fishery-recommendations.pdf/
Attachment 4: https://www.pcouncil.org/documents/2020/11/e-3-a-supplemental-gap-report-1.pdf/

Appendix A: Suggested IPHC Fishery Regulation language

APPENDIX I
SUGGESTED REGULATORY LANGUAGE

9. Commercial Fishing Periods

(4) The first fishing period in the IPHC Regulatory Area 2A non-tribal directed commercial fishery[2] shall begin at 0800 on the fourth ~~Monday~~ Tuesday in June and terminate at 1800 local time on the subsequent ~~Wednesday~~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 ~~Monday~~ Tuesday two weeks after the first period, and, if necessary, a third fishing period of up to three fishing days to begin on ~~Monday~~ Tuesday four weeks after the first period.

[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.