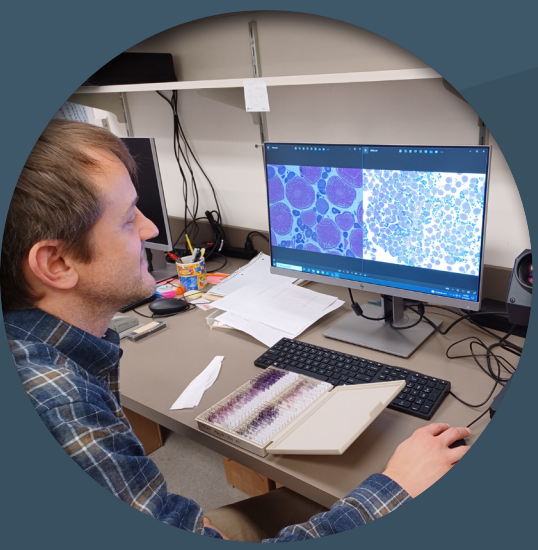
2024

Annual Report

INTERNATIONAL PACIFIC

HALIBUT COMMISSION



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Preface

The International Pacific Halibut Commission (IPHC) was established in 1924 by a Convention between Canada and the United States of America. The Convention was the first international agreement providing for the joint management of a marine fishery resource. The Commission's authority was expanded by several subsequent conventions, the most recent being signed in 1953 and amended by the Protocol of 1979.

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

Three (3) IPHC Commissioners are appointed by the Governor General of Canada and three (3) by the President of the United States of America. The Commissioners appoint the Executive Director, who supervises the scientific, technical, field, and administrative personnel at the Secretariat. The Secretariat collects and analyzes the statistical and biological data needed to inform the management of the Pacific halibut stock within Convention waters. The IPHC Secretariat headquarters is located in Seattle, Washington, U.S.A.

The Commission meets annually to review all regulatory proposals, including those made by the IPHC Secretariat, Contracting Parties, and by stakeholders. The measures adopted by the Commission are recommended to the two governments for approval and implementation. Upon approval the regulations are published in the Canada Gazette and U.S. Federal Register and are enforced by the appropriate domestic agencies of both governments.

Our shared vision is to deliver positive economic, environmental, and social outcomes for the Pacific halibut resource for Canada and the U.S.A. through the application of rigorous science, innovation, and the implementation of international best practice.

Data in this report have been updated using all information received by the IPHC through 31 December 2024 and reported at the 101st Session of the IPHC Annual Meeting (AM101) held in January 2025. Some data may have been subsequently updated and readers are encouraged to access the IPHC website for the latest information: **https://www.iphc.int/**. Unless otherwise indicated, all weights in this report are net weight (eviscerated, head-off, no ice and slime). Round (whole) weight may be calculated by dividing the net weight by 0.75.

About the Cover

The photographs featured on the cover of this report were taken by the Secretariat while engaged in field activities in Alaska, British Columbia, and the U.S.A. West Coast.

Acronyms commonly used

ADEC - Alaska Department of Environmental Conservation
ADF&G - Alaska Department of Fish and Game
BBEDC - Bristol Bay Economic Development Corporation
BSAI - Bering Sea and Aleutian Islands
CDFW - California Department of Fish and Wildlife
CDQ - Community Development Quota
CGOARP - Central Gulf of Alaska Rockfish Program
COAC - Clean Otolith Archive Collection
C&S - Ceremonial and Subsistence
CSP - Catch Sharing Plan
CVRF - Coastal Villages Regional Fund
DFO - Fisheries and Oceans Canada
DMR - Discard Mortality Rate
DO - Dissolved Oxygen
EBS - Eastern Bering Sea
EC - Electronic Monitoring
FISS - Fishery-independent setline survey
GAF - Guided Angler Fish
GOA – Gulf of Alaska
HCR - Harvest Control Rule
HARM - Halibut Angler Release Mortality
IFMP - Integrated Fisheries Management Plan
IFQ - United States Individual Fishing Quota
IPHC - International Pacific Halibut Commission
IQ - Individual Quota
IVQ - Canadian Individual Vessel Quota
MP - Management Procedure
MPR - Mortality Per Recruit
MSAB - Management Strategy Advisory Board
MSE - Management Strategy Evaluation
NBS – Northern Bering Sea
NMFS - National Marine Fisheries Service
NOAA - National Oceanic and Atmospheric Administration
NPFMC - North Pacific Fishery Management Council
NPUE - Numbers-Per-Unit-Effort
NSEDC - Norton Sound Economic Development Corporation
ODFW - Oregon Department of Fish and Wildlife
PAT - Pop-up Archival Transmitting
PDO - Pacific Decadal Oscillation
PFMC - Pacific Fishery Management Council
PHI - Prior Hook Injury
PSC - Prohibited Species Catch
PSMFC - Pacific States Marine Fisheries Commission
QS - Quota Share
RDE - Remote Data Entry
RI - Rockfish Index
RSL - Reverse Slot Limit
SRB - Scientific Review Board
SPR - Spawning Potential Ratio
WDFW - Washington Department of Fish and Wildlife
WPUE - Weight-Per-Unit-Effort
XRQ - Experimental Recreational [Pacific] Halibut

Executive Director's Message

On 21 October 2024 the IPHC marked its 100th Anniversary, though we began our 100th year celebrations in earnest in January 2024, during the 100th Session of the IPHC Annual Meeting (AM100) held in Anchorage, Alaska. The event brought together distinguished guests, including First Chief Aaron Leggett of the Native Village of Eklutna, Anchorage Mayor Dave Bronson, Dr. Kelly Kryc, Deputy Assistant Secretary for International Fisheries at NOAA, and Mr Mark Waddell, Director General of Fisheries Policy for Fisheries and Oceans Canada.

As the oldest Regional Fisheries Management Organisation (RFMO) in existence, the IPHC has blazed a path for others to follow, with world class scientists providing robust advice to inform its management decision-making processes. The IPHC Secretariat remains strongly committed to the development and communication of the best possible scientific advice, to ensure that the Commission is equipped with the information it needs to make informed, timely, and scientifically-based management decisions. The overall aim of course, being to take a precautionary-based approach to fishery management, thereby ensuring a sustainable resource for associated fisheries.

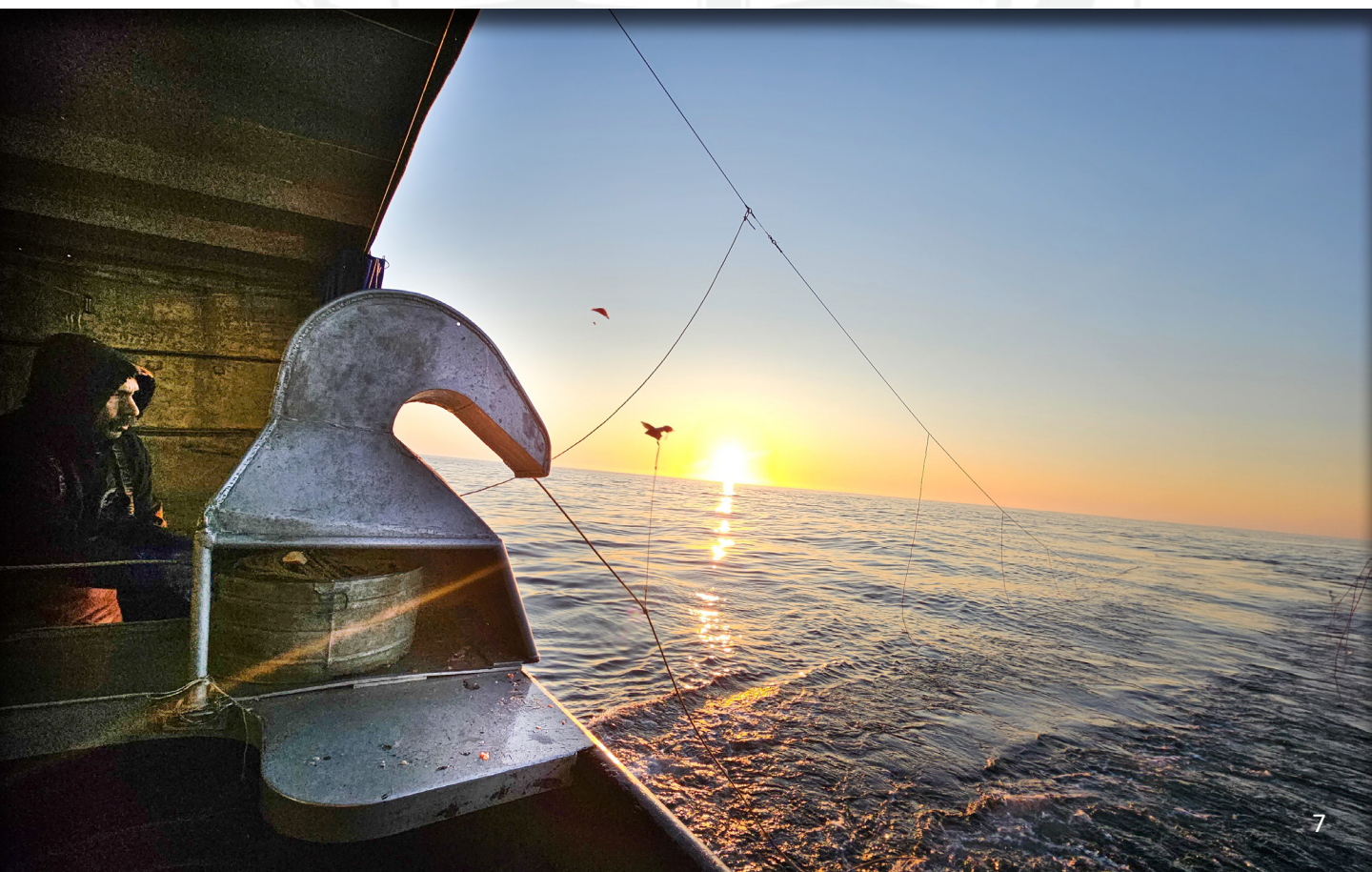
From a fishery perspective, the 2024 TCEY (35.28 million pounds; 16,003 t) represented a 4.6% decrease over that set for 2023 (36.97 million pounds; 16,769 t). This decrease was projected to correspond to $F_{52\%}$, a lower level of fishing intensity than the IPHC's 'reference' ($F_{43\%}$), tested through the Management Strategy Evaluation (MSE) process and found to meet long-term conservation and fishery objectives. Trends in primary stock abundance indices were mixed at the coastwide level and down in most IPHC Regulatory Areas: the IPHC Fishery-Independent Setline Survey (FISS) numbers-per-unit-effort were up 3% from 2023, the legal-sized weight-per-unit-effort (WPUE) was down 9%, and the directed commercial longline fishery WPUE decreased by 2% from 2023. The FISS and fishery declines in larger fish largely reflected the continued transition from older fish (born in 2005 and earlier) to the 2012 and the 2016 year-classes, which were 12 and 8 years old during the 2024 fishery.

The 2024 stock assessment (consistent with all recent assessments) estimated that the spawning biomass has declined by ~30% since 2016, and that this decline would continue with a high probability at mortality levels consistent with the reference fishing intensity. This continued trend of low productivity is a function of weak recruitments since 2006 and estimates for 2012 and 2016 only large enough to support yields near the status quo. The 2025 yield projected to maintain at least a 50% chance that the spawning biomass would decline no further was 37.2 million pounds (16,874 t), 5.4% above the status quo. Yields less than that level were projected to result in an increasing stock trend over the next three years.

We started the year with the female spawning biomass estimated to be at 37% (19-53%) of the level expected in the absence of fishing, and at the beginning of 2025 this estimate remained at almost the same level of 38% (18–53%). Such a level of relative biomass is widely considered to be close to a reasonable target level for sustaining optimal harvest rates of groundfish species, though biology and ecology play a large role in determining species-specific levels. For Pacific halibut, simulations have indicated that $SB_{30\%}$ is a reasonable proxy for SBMSY (the spawning biomass that produces the maximum sustainable fishery yield), and $SB_{36\%}$ is likely near SBMEY (the biomass that produces the maximum economic yield). However, due to poor recruitment since 2006, the stock remains near historically low spawning biomass and fishery yields.

I look forward to engaging with all of you over the coming year, either through the Commission's subsidiary bodies, or in person at our landing ports and communities that so heavily rely on Pacific halibut as a source of income, food, and cultural identity. Wishing you all a safe and healthy 2025.

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



Activities of the Commission

The Commission is composed of six (6) members (Commissioners) who are appointed by the Contracting Parties. They meet several times a year, in both formal and informal capacities, to consider matters relevant to the Pacific halibut stock, the fisheries, and governance. All meeting documents, presentations, and reports as well as more information on the structure of the Commission can be found on the IPHC website (**https://www.iphc.int**).

100th Session of the IPHC Annual Meeting (AM100; 2024)

The 100th Session of the International Pacific Halibut Commission (IPHC) Annual Meeting (AM100) was held in Anchorage, Alaska, USA, from 22-26 January 2024. A total of 20 participants (6 Commissioners: Members; 14 advisors/experts) attended the Session from the two (2) Contracting Parties, as well as 221 members of the public (124 in-person and 97 remote). The meeting was opened by the Chairperson, Mr Jon Kurland (U.S.A.), and the Vice-Chairperson, Mr Paul Ryall (Canada), who welcomed participants. The Commission heard reports from the IPHC Secretariat about the status of the Pacific halibut (*Hippoglossus stenolepis*) population, reviewed financial and administrative matters, discussed stakeholder concerns, considered the suggestions of its subsidiary bodies, and solicited public comment before adopting fishery regulations and making other decisions.

Mortality and fishery limits, and fishing periods for 2024

The Commission recommended to the governments of Canada and the United States of America a total mortality limit for 2024 of 16,003 metric tonnes (35.28 million pounds) net weight, and adopted the mortality limits for each IPHC Regulatory Area as described in Table 1.

The area and sector fishery limits resulting from the IPHC-adopted total mortality limits and the application of the existing Contracting Party catch sharing arrangements were as described in Table 2.

The total fishery limit (FCEY) for 2024 was set at 13,091 metric tonnes (28.86 million pounds), representing a 3.3 percent decrease from the fishery limits of 13,535 tonnes (29.84 million pounds) implemented by the Commission for 2023.

Other decisions made at the meeting

The Commission made a range of other decisions at the 100th Session of the IPHC Annual Meeting (AM100), including recommendations concerning the following:

- The Commission agreed on four coastwide objectives to be used in the development of a harvest strategy policy
  - Maintain the long-term coastwide

female spawning stock biomass above a biomass limit reference point ($B_{20\%}$) at least 95% of the time.
    - Maintain the long-term coastwide female spawning stock biomass at or above a biomass reference point ($B_{36\%}$) 50% or more of the time.
    - Optimise average coastwide TCEY.
    - Limit annual changes in the coastwide TCEY.
- After reviewing an evaluation of the size limits, the Commission agreed to not change the current 32-inch size limit.
- The Commission agreed that there is utility in continuing to explore multi-year stock assessment management procedures.

100th Session of the IPHC Interim Meeting (IM100; 2024)

The 100th Session of the IPHC Interim Meeting (IM100), held electronically from 25-26 November 2024 was an occasion to prepare for the 101st Session of the IPHC Annual Meeting (AM101) scheduled for 27-31 January 2025. The Commission and the public were able to hear the IPHC Secretariat present and discuss a variety of topics, including a review of the 2024 fisheries statistics and preliminary stock assessment results, and the preliminary 2025 harvest decision table.

Table 1. 2024 adopted mortality limits (net weight).

IPHC Regulatory Area	Distributed Mortality Limits (TCEY) (net weight)	
	Metric Tonnes (t)	Million Pounds (Mlb)
Area 2A (California, Oregon, and Washington)	748	1.65
Area 2B (British Columbia)	2,935	6.47
Area 2C (southeastern Alaska)	2,626	5.79
Area 3A (central Gulf of Alaska)	5,153	11.36
Area 3B (western Gulf of Alaska)	1,565	3.45
Area 4A (eastern Aleutians)	730	1.61
Area 4B (central and western Aleutians)	567	1.25
Areas 4CDE (Bering Sea)	1,678	3.70
Total	**16,003**	**35.28**

Table 2. 2024 fishery limits resulting from the IPHC-adopted distributed mortality limits and the existing Contracting Party catch sharing arrangements.

IPHC Regulatory Area	Fishery limits (net weight)	
	Metric Tonnes (t)	Million Pounds (Mlb)
Area 2A (California, Oregon, and Washington)	**667**	**1.47**
Non-treaty directed commercial (south of Pt. Chehalis)	113	249,338*
Non-treaty incidental catch in salmon troll fishery	20	44,001*
Non-treaty incidental catch in sablefish fishery (north of Pt. Chehalis)	23	50,000*
Treaty Indian commercial	224	494,280*
Treaty Indian ceremonial and subsistence (year-round)	9	20,220*
Recreational – Washington	132	290,158*
Recreational – Oregon	129	283,784*
Recreational – California	17	38,220*
Area 2B (British Columbia) (includes recreational catch allocation)	**2,522**	**5.56**
Commercial fishery	2,145	4.73
Recreational fishery	376	0.83
Area 2C (southeastern Alaska) (combined commercial/ guided recreational)	**2,005**	**4.42**
Commercial fishery (3.41 Mlb retained catch and 0.07 Mlb discard mortality)	1,637	3.61
Guided recreational fishery (includes retained catch and discard mortality)	367	0.81
Area 3A (central Gulf of Alaska) (combined commercial/ guided recreational)	**4,536**	**10.00**
Commercial fishery (7.05 Mlb retained catch and 0.29 Mlb discard mortality)	3,674	8.10
Guided recreational fishery (includes retained catch and discard mortality)	857	1.89
Area 3B (western Gulf of Alaska)	**1,352**	**2.98**
Area 4A (eastern Aleutians)	**581**	**1.28**
Area 4B (central/western Aleutians)	**494**	**1.09**
Areas 4CDE	**934**	**2.06**
Area 4C (Pribilof Islands)	417	0.92
Area 4D (northwestern Bering Sea)	417	0.92
Area 4E (Bering Sea flats)	100	0.22
Total	**13,091**	**28.86**

* Allocations resulting from the IPHC Regulatory Area 2A catch sharing arrangement are listed in pounds.
** In IPHC Regulatory Area 2A, the USA (NOAA Fisheries) may take in-season action to reallocate the recreational fishery limits between Washington, Oregon, and California after determining that such action will not result in exceeding the overall IPHC Regulatory Area 2A recreational fishery limit and that such action is consistent with any domestic catch sharing plan. Any such reallocation will be announced by the USA (NOAA Fisheries) and published in the Federal Register.

Commercial Fishery

The Pacific halibut directed commercial fishery, as managed by the IPHC, spans northern California to northern and western Alaska in U.S.A. and Canadian waters of the northeastern Pacific Ocean. The Pacific halibut commercial fishery remains a vital component of the maritime economy, engaging in harvest of fish for commercial profit. The commercial Pacific halibut mortality in 2024 totaled 9,496 tonnes or 20.93 million pounds (Table 3). All values in this section are provided as net weight unless otherwise noted. Net weight is defined as the weight of Pacific halibut without gills, entrails, head, ice, and slime. This chapter reflects data as of 23 January 2025. For updates on landings data, please refer to the IPHC website, see time series TSD-018.

Landings

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 fisheries, and the treaty Indian fisheries. Farther north, the directed commercial fisheries consisted of the Individual Vessel Quota (IVQ) fishery in IPHC Regulatory Area 2B in British Columbia, Canada; the Metlakatla fishery in IPHC Regulatory Area 2C; the Individual Fishing Quota (IFQ) system in Alaska, U.S.A.; and the CDQ fisheries in IPHC Regulatory Areas 4B and 4CDE. The summaries in the following sections are compiled using data from the IPHC, Fisheries and Oceans Canada (DFO), NOAA Fisheries, Metlakatla Indian Community, Washington Indian tribal fisheries management departments (including the Northwest Indian Fisheries Commission, Makah, Lummi, Lower Elwha Klallam, Jamestown S'Klallam, Swinomish, Port Gamble S'Klallam, Quileute, and Quinault Indian tribes), and state agencies including Alaska Department of Fish and Game (ADF&G), Washington Department of Fish and Wildlife (WDFW), Oregon Department of Fish and Wildlife (ODFW), and California Department of Fish and Wildlife (CDFW).

Landing patterns

In Canada (IPHC Regulatory Area 2B), Port Hardy (including Coal Harbour and Port McNeill) and Prince Rupert/Port Edward received the highest volume of the commercial halibut catch, accounting for 96 percent of the landings. The total landed catch was 2,008 tonnes (4.43 million pounds).

Table 3. Summary of 2024 Pacific halibut directed commercial landings, discard mortality, fishery limits and percent of fishery limit attained by IPHC Regulatory Area.

	Directed commercial fishery limits (FCEY)		Directed commercial landings		Directed commercial discard mortality		Directed commercial total mortality		Percent attained
	tonnes	pounds	tonnes	pounds	tonnes	pounds	tonnes	pounds	%
2A	380	837,619	357	787,705	26	57,335	383	845,404	94%
2B	2,145	4,730,000	2,008	4,427,154	89	196,324	2,097	4,623,478	94%
2C[1,2]	1,637	3,610,000	1,409	3,105,341	64	140,149	1,472	3,245,490	90%
3A[1]	3,674	8,100,000	3,116	6,869,106	272	599,025	3,387	7,468,131	92%
3B	1,352	2,980,000	1,194	2,632,077	110	242,556	1,304	2,874,633	88%
4A	581	1,280,000	321	706,622	17	37,790	338	744,412	55%
4B	494	1,090,000	130	286,784	2	3,488	132	290,272	26%
4CDE	934	2,060,000	368	811,769	14	30,834	382	842,603	39%
Total	**11,198**	**24,687,619**	**8,902**	**19,626,558**	**593**	**1,307,501**	**9,496**	**20,934,059**	**82%**

[1] Directed commercial limit includes discard mortality.

[2] IPHC Regulatory Area 2C includes the Metlakatla fishery landed catch.

In the U.S.A., the estimates of the commercial landings amounted to 6,894 tonnes (15.20 million pounds). IPHC Regulatory Area 3A accounted for the largest share of the commercial landings, representing 45 percent U.S.A. total. Homer received the largest portion of the U.S.A. commercial catch (23 percent), followed by Kodiak (11 percent). IPHC Regulatory Area 2A accounted for 5 percent of U.S.A. commercial landings.

Sampling of commercial landings

The collection of Pacific halibut commercial landing samples is crucial to the IPHC's annual stock assessment. This process involves the collection of otoliths for age determination, tissue samples for sex determination, measurements of individual fish lengths and weights, logbook information, final landing weights, and information on recovered IPHC tags. The data collection protocol facilitates the computation of seasonal length-weight ratios by area, determination of size-at-age, and estimation of the sex composition of the commercial landings. Logbook information provides weight-per-unit-effort data, fishing location for the landed weight, and data for research projects. Recovered tags along with corresponding biological data provide information on migration, growth, exploitation rates, and natural and discard mortality. More information on the annual stock assessment and research activities can be found later in this report.

Sampling protocols are designed to ensure that the sampled Pacific halibut are representative of the population of landed Pacific halibut throughout the Convention Area; sampling days, locations, and percentage of fish sampled are based on the previous year's landing patterns and are reviewed annually. The protocols vary from port to port to achieve the appropriate sampling representation.

Given the Pacific halibut commercial fishery's operations across multiple IPHC Regulatory Areas, the IPHC Secretariat maintained a presence in ports coastwide in 2024. In Canada, the IPHC Secretariat was stationed in Port Hardy and Prince Rupert. In IPHC Regulatory Area 2A, IPHC Secretariat

collected samples from Newport, Oregon, and Bellingham, Washington. In addition, samples were taken in several ports in Washington by staff from the treaty Indian fishery management offices. In Alaska, the IPHC Secretariat was stationed in the ports of Dutch Harbor, Homer, Juneau, Kodiak, Petersburg, Seward, Sitka, and St. Paul.

Otoliths

The annual coastwide otolith collection target included 1,500 from each of IPHC Regulatory Areas 2B-4B and 4CD (combined) and 1,000 from Area 2A. The target for IPHC Regulatory Area 2A is subdivided into a target of 650 otoliths from the treaty Indian fisheries and 350 otoliths from the IPHC Regulatory Area 2A non-tribal commercial fisheries. The 2024 coastwide collection resulted in 10,377 otoliths. Otolith collections were below target in IPHC Regulatory Areas 2A and 4A-D due to changes in landing patterns and budget constraints.

Logbooks

Alongside otolith samples, the IPHC Secretariat in the ports collected logbook information from harvesters. In total, 2,008 logbooks were collected in 2024. A total of 372 were collected from Canadian landings, and 1,636 were collected from U.S.A. landings.

Recovered tags

In 2024, a total of 81 tags of several types were recovered from tagged Pacific halibut. A total of 74 of these recoveries were from U32 wire tagging releases conducted between 2015 and 2024 in waters off Washington, British Columbia, the Gulf of Alaska, and the Bering Sea. These recoveries included subsets from tail pattern recognition studies and five tags from the recreational discard mortality study conducted out of Sitka and Seward, Alaska in 2021. Tag data collected dockside included fork lengths, individual fish weights, otoliths, fin clips, and capture location of the recovered tagged fish.

Electronic data collection

The IPHC has digitized data collection to reduce the need for post-collection data entry and enhance the efficiency of data editing. In Alaska, the IPHC Secretariat uses tablets to directly input data from paper logbooks into a remote data entry application. This initiative prioritizes the digitalization of as much log data as possible, within the constraints of time and operational duties at the ports. Ongoing updates and improvements to this application are part of the IPHC's commitment to technological advancement.

In British Columbia, Canada, the IPHC Secretariat utilizes a field version of the log entry program used at the IPHC Headquarters to enter as many Canadian logs as time permits. However, the priority is given to tasks such as biological sampling. In addition, Bluetooth-enabled tablets are provided for collection of electronic logs from vessels using Archipelago Marine Research's FLOAT - Fishing Log On A Tablet.

Electronic logbooks in Alaska

Since 2024, the IPHC has been conducting a trial of electronic equivalents of IPHC logbooks in Alaska. These logbooks, based on a system previously approved by NOAA Fisheries as an electronic replacement for the Catcher Vessel Longline and Pot Gear Daily Fishing Logbook (DFL), provide vessels with the option to record fishing activity in electronic format.

The tablets with logbook software are part of a fully operational system that enables direct tablet-to-tablet data transmission, eliminating the need for paper records. Data collected through the tablets are verified by IPHC field staff in ports using custom log verification software. This software is fully compatible with existing DFL logbooks, allowing seamless electronic verification of both IPHC and DFL data.

To support the trial, the IPHC procured eight tablets preloaded with the software and distributed them to participating vessels.

Pacific halibut directed commercial discard mortality

In the directed commercial Pacific halibut fishery, not all captured halibut are retained; some are released back into the ocean. While a portion of these released fish survive, others do not, resulting in mortality. This form of unintended loss is referred to as directed commercial discard mortality.

In 2024, estimates of directed commercial discard mortality amounted to 593 tonnes or 1.31 million pounds (Table 3). The IPHC monitors three primary sources of directed commercial discard mortality: (1) Pacific halibut caught but never retrieved due to lost or abandoned fishing gear; (2) undersized Pacific halibut, below the minimum legal size limit of 32 inches (U32; 81.3 cm), that are discarded; and (3) Pacific halibut that meet or exceed the legal size limit (O32; over 32 inches or 81.3 cm) but are discarded to comply with regulatory requirements, such trip limits, or quota share restrictions.

Directed commercial discard mortality due to lost or abandoned gear

During the 1980s and early 1990s in Alaska and British Columbia, 'derby' fisheries characterized by short fishing periods led harvesters to compete for Pacific halibut within a limited timeframe. This resulted in a considerable quantity of lost fishing gear, which continued to capture Pacific halibut and other species. Estimates of the volume of missing gear were derived from total catch values using available logbook catch and effort statistics. The introduction of quota-share fishery management in these areas have greatly reduced mortality due to lost or abandoned gear.

The rate of O32 Pacific halibut discard mortality from lost gear is determined by initially calculating the ratio of effective skates lost to effective skates hauled aboard the vessels for trips with log records. This ratio is then applied to the total landed catch. 'Effective skates' are defined as those with complete data (including skate length, hook spacing, and number of hooks per skate), and meeting the gear type standardization criteria. The calculation considers both snap gear and fixed-hook gear in all IPHC Convention waters. The U32 Pacific halibut discard mortality from lost gear is calculated in a similar manner, incorporating the U32 to O32 ratio for discarded U32 Pacific halibut outlined below. Pacific halibut mortality from lost or abandoned gear is assumed 100%.

Directed commercial discard mortality from discarded U32 Pacific halibut

The estimation of weight of discarded U32 Pacific halibut requires indirect methods where direct observation or electronic monitoring are not available. Within the IPHC Convention Area, the Canadian fishery in British Columbia (IPHC Regulatory Area 2B) offers the most accurate accounting due to direct observation. Harvesters in Regulatory Area 2B self-report their discards, and these reports are validated through video monitoring aboard the vessels. For the IPHC Regulatory Areas covering Alaska, the IPHC Fishery-independent setline survey (FISS), utilizing comparable fishing gear, serves as a

proxy measure for the expected encounter rates by area and year. This approach prioritizes FISS stations with higher catch rates (by weight) of O32 Pacific halibut, reflecting patterns observed in the directed commercial fishery. In IPHC Regulatory Area 2A, the non-tribal fishery discard estimates (legal and sublegal) from 2017 to the present are estimated by the West Coast Observer Program. Tribal fishery estimates are generated based on FISS as there is no observer coverage in that fishery.

A universal mortality rate of 16 percent is applied to all Pacific halibut discards from the quota fisheries in Canada and U.S.A. For derby fisheries in IPHC Regulatory Area 2A, a higher mortality rate of 25 percent is applied. The mortality of discarded U32 Pacific halibut in the directed commercial fishery is estimated by multiplying the ratio of U32 to O32 Pacific halibut by the total commercial catch, followed by application of the appropriate fishery mortality rate.

Directed commercial discard mortality for regulatory compliance

In IPHC Regulatory Area 2A, the directed commercial fishery operates under 'derby' fishing periods, where the amount of Pacific halibut that may be caught by each vessel is limited by a fishing period limit based on the vessel's size. This results in O32 Pacific halibut being discarded when catches exceed the vessel or trip limits. In quota share fisheries, regulatory discards occur due to damaged fish, or on the last trip of the season when catch may exceed remaining quota. Regulatory discards are based on the logbook-reported discards of legal (O32) Pacific halibut.

The amount of Pacific halibut retained by the IPHC Regulatory Area 2A non-treaty incidental to salmon and sablefish directed commercial fisheries is not included in these calculations. These removals are accounted for under commercial mortality estimates.

Pacific halibut subsistence harvest

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 (C&S) fishery in IPHC Regulatory Area 2A off northwest Washington State; the First Nations Food, Social, and Ceremonial (FSC) fishery in British Columbia; and the subsistence fishery by rural residents and federally recognized native tribes in Alaska documented via Subsistence [Pacific] Halibut Registration Certificates (SHARC). Subsistence harvest also includes U32 fish retained for personal consumption in the Community Development Quota (CDQ) fishery (excluded from commercial CDQ landings statistics), reported directly to the IPHC. The IPHC allows the retention of U32 Pacific halibut under the CDQ program due to its history of customary use in the area. The remote location makes it unlikely that these fish will be commercially traded. Table 4 provides a summary of subsistence removals by IPHC Regulatory Area. The coastwide subsistence estimate for 2024 was 373 tonnes or 821,619 pounds. Time series of the estimates is available on the IPHC website, see time series TSD-020.

Estimated harvests by IPHC Regulatory Area

U.S.A. (IPHC Regulatory Area 2A: California, Oregon, and Washington)

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 C&S fisheries. It is estimated that 7 tonnes or 14,800 pounds were retained as C&S in IPHC Regulatory Area 2A.

Canada (IPHC Regulatory Area 2B: British Columbia)

The subsistence harvest in British Columbia is represented by the FSC fishery. Fisheries and Oceans Canada (DFO) has maintained a consistent annual estimate of 184 tonnes or 405,000 pounds for this fishery since 2007.

U.S.A. (IPHC Regulatory Areas 2C, 3, 4A, 4B, 4CDE: Alaska)

The Alaska Pacific halibut subsistence fishery was formally recognized in 2003. The fishery allows the customary and traditional use of Pacific halibut by rural residents and members of federally recognized 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. Estimates for Alaska's subsistence Pacific halibut harvest rely on a biennial survey, with the most recent survey results available for 2022. Consequently, the estimates for 2024 were extrapolated from previous years' data.

Retention of U32 Pacific halibut in the CDQ fishery

The IPHC permits commercial Pacific halibut vessels fishing for certain Community Development Quota (CDQ) organizations in IPHC Regulatory Areas 4D and 4E (Bering Sea) to retain Pacific halibut less than 32 inches (81.3 cm; U32) in fork length under an exemption requested by the North Pacific Fishery Management Council. The CDQ harvest supplements the Alaskan subsistence catch. Unlike the subsistence fishery in other areas of Alaska, which depends on a biennial survey for estimates, this removal is reported directly to the IPHC, facilitating annual estimates. In 2024, retention of U32 Pacific halibut in the CDQ fishery was 0.1 tonnes or 191 pounds. Reports 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). The harvest in this fishery tends to reflect the effort by local fishing fleets and the availability of fish in their nearshore fisheries.

Table 4. Summary of 2024 subsistence Pacific halibut mortality by IPHC Regulatory Area.

IPHC Regulatory Area	Metric Tonnes (t)	Pounds (lbs)
2A	7	14,800
2B[1]	184	405,000
2C[2]	115	252,492
3A[2]	55	121,642
3B[2]	5	10,475
4A[2]	2	4,164
4B[2]	0	218
4CDE[2,3]	6	12,828

[1] British Columbia, Canada estimates from Fisheries and Oceans Canada have remained constant from 2007-2024.
[2] Alaska, USA estimates for 2024 were carried over from 2022, with the exception that 4D/4E subsistence harvest in the CDQ fishery updated annually.
[3] Includes U32 CDQ landings retained for personal consumption and not accounted as commercial CDQ landings in IPHC Regulatory Areas 4D and 4E.

Pacific halibut Recreational Fishery

The Pacific halibut recreational fishery encompasses guided (charter) and unguided (non-charter) sectors. In 2024, the coastwide recreational harvest of Pacific halibut, including discard mortality, was estimated at approximately 2,679 tonnes (5.91 million pounds), using data provided by state and federal agencies from each of the Contracting Parties (Table 5). Changes in harvests vary across areas, often in response to changes in bag limits, size restrictions, and season opening dates. Updates on the recreational mortality can be found on the IPHC website, see time series TSD-019.

IPHC Regulatory Area 2B – British Columbia (Canada)

The IPHC Regulatory Area 2B operated under a 126 cm (49.6 inch) maximum size limit and one Pacific halibut had to be between 90 and 126 cm (35.4 - 49.6 inches) or two under 90 cm (35.4 inch) when attaining the two fish possession limit, with an annual limit of ten per licence holder (FN0084). Effective 1 April, the maximum size limit remained unchanged; however, the daily possession limit was updated to allow either one fish between 85 and 126 cm (33.5 - 49.6 inch) or two fish under 85 cm (33.5 inch) (FN0238). The fishery closed on 9 October (FN1042). The IPHC Regulatory Area 2B recreational harvest was 1% over the recreational fishery limit of 376 tonnes or 830,000 pounds.

British Columbia, Canada has a program that allows recreational harvesters to land fish under quota leased from the directed commercial fishery. Approximately 9 tonnes (19,281 pounds) were landed under the Experimental Recreational Quota (XRQ) program.

IPHC Regulatory Area 2A – California, Oregon and Washington (U.S.A.)

IPHC Regulatory Area 2A's recreational allocation was based on the Pacific Fishery Management Council's Catch Sharing Plan formula, which divides the overall fishery limit among all sectors. The recreational allocation was further subdivided to seven subareas, after 23 tonnes or 50,000 pounds were allocated to the incidental Pacific halibut catch in the commercial sablefish fishery in Washington. This subdivision resulted in 132 tonnes or 290,158 pounds allocated to Washington subareas and 129 tonnes or 283,784 pounds to Oregon subareas. In addition, California received an allocation of 17 tonnes or 38,220 pounds. Recreational fishery harvest seasons varied by subarea and were managed in-season in coordination with the Contracting Party agencies. The IPHC Regulatory Area 2A recreational harvest totaled 233 tonnes or 514,604 pounds, 16% under the recreational allocation.

IPHC Regulatory Areas 2C to 4 – Alaska (U.S.A.)

In IPHC Regulatory Area 2C, charter anglers were permitted to retain one Pacific halibut per day. From 1 February to 14 July, retained Pacific halibut had to be either 40 inches or smaller, or 80 inches or larger. From

15 July to 31 December, retained Pacific halibut had to be 36 inches or smaller, or 80 inches or larger. Pacific halibut retention was not allowed on Fridays from 19 July to 13 September.

In IPHC Regulatory Area 3A, charter anglers were allowed to retain two Pacific halibut per day, with only one fish exceeding 28 inches. If only one Pacific halibut was retained, it could be any size. Charter vessels were limited to one fishing trip per day when retaining Pacific halibut, and Pacific halibut retention was prohibited on Wednesdays.

The non-guided recreational fishery season was open from 1 February to 31 December and the fishery operated under the daily bag limit of two Pacific halibut of any size per day per person.

In addition, a Guided Angler Fish (GAF) program allows recreational harvesters to land fish under quota leased from the commercial fishery. A total of 67 tonnes (147,739 pounds) in IPHC Regulatory Area 2C and 3 tonnes (5,509 pounds) in IPHC Regulatory Area 3A were leased from the directed commercial quota fisheries and subsequently landed as recreational harvest.

Table 5. Summary of 2023 recreational Pacific halibut allocations and landed catch by IPHC Regulatory Area.

Regulatory Area	Recreational fishery limits (FCEY)[1]		Recreational retained		Recreational discard mortality		Recreational total mortality		Limit-Percent attained
	tonnes	pounds	tonnes	pounds	tonnes	pounds	tonnes	pounds	%
2A	278	612,162	233	514,604	2	4,528	235	519,132	84%
2B - XRQ leased			9	19,281			9	19,281	
2B - non-XRQ	376	830,000	378	834,358	15	33,400	349	867,758	101%
2B			387	853,639		33,400	402	887,039	
2C - GAF leased			67	147,739			67	147,739	
2C - Charter[1]	367	810,000	367	809,978	15	32,422	382	842,400	104%
2C - Non-charter			450	992,463	8	17,113	458	1,009,577	
2C			885	1,950,181	22	49,535	907	1,999,715	
3A - GAF leased			2	5,509			2	5,509	
3A - Charter[2]	857	1,890,000	721	1,590,174	8	16,735	729	1,606,909	85%
3A - Non-charter			391	861,518	7	15,673	398	877,191	
3A			1,115	2,457,201	15	32,407	1,129	2,489,609	
3B			2	4,505		227	2	4,732	
4A			3	6,466		89	3	6,555	
Total	**1,879**	**4,142,162**	**2,625**	**5,786,596**	**55**	**120,187**	**2,679**	**5,906,783**	**92%**

[1] Set through existing Contracting Party catch sharing arrangements.
[2] Limit includes discard mortality

Pacific halibut discard mortality in non-directed commercial fisheries

Non-directed commercial discard mortality (ND-CDM), commonly referred to as bycatch, is the incidental catch of Pacific halibut in commercial fisheries targeting other species, where retention of Pacific halibut is not legally permitted. Estimates of ND-CDM are provided by Contracting Party agencies. The reported values are estimates, as direct counts are not available due to absence of 100% monitoring across all fisheries and because of varying survival rates. The IPHC relies upon information supplied by observer programs run by Contracting Party agencies for ND-CDM estimates in most fisheries. In 2024, the estimated ND-CDM of Pacific halibut was 1,989 tonnes or 4.39 million pounds (Table 6), representing a 1.5 percent increase from the 2023 estimates. Estimates for 2024 are preliminary and subject to change as new information becomes available. Updated values are available on the IPHC website, see time series TSD-025.

Sources of information for discard mortality in non-directed fisheries

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

In Canada, Fisheries and Oceans Canada (DFO) monitors fisheries off British Columbia (IPHC Regulatory Area 2B) where there is 100 percent fishery monitoring for the groundfish trawl and hook-and-line fisheries.

Groundfish fisheries in Alaska are managed by NOAA Fisheries, following advice and recommendations developed by the North Pacific Fishery Management Council. Pacific halibut bycatch in groundfish fisheries is managed with prohibited species catch (PSC) limits. The final rule to implement regulations that link the Pacific halibut PSC allowance of the Amendment 80 commercial groundfish trawl fleet (A80 fleet) to indices of Pacific halibut abundance became effective on 1 January 2024, reducing the A80 fleet PSC limit by 20% from 2023. There are varying levels of monitoring in non-trawl fisheries. The Annual Deployment Plan (ADP) describes how NOAA Fisheries intends to assign at-sea and shoreside fishery observers and electronic monitoring to vessels and processing plants engaged in Pacific halibut and groundfish fishing operations in the North Pacific.

Discard mortality rates

The discard mortality rate (DMR) for Pacific halibut represents the percentage of discarded Pacific halibut that do not survive after being caught. This rate varies across fisheries and geographic areas. In fisheries with observer coverage, DMRs are determined based on direct assessment

of Pacific halibut survival likelihood, using standardized criteria. In fisheries without observer coverage, DMRs are inferred from similar fisheries in other areas where data are available. This method ensures that estimates of discard mortality in non-directed commercial fisheries are informed by the best available data, even in the absence of direct observation.

U.S.A. (IPHC Regulatory Area 2A; California, Oregon, and Washington)

Pacific halibut are caught incidentally in several U.S.A. West Coast fisheries and must be discarded, with the exception of the salmon troll fishery and the sablefish fishery north of Pt. Chehalis, WA. As in prior years, the bottom trawl fishery and hook-and-line fishery for sablefish were responsible for the bulk of the non-directed commercial discard mortality in IPHC Regulatory Area 2A. NOAA Fisheries uses observer data to account for the mandatory discarding of Pacific halibut in the West Coast Groundfish Trawl Catch Share Program.

Canada (IPHC Regulatory Area 2B; British Columbia)

In Canada, Pacific halibut non-directed commercial discard mortality in trawl fisheries are monitored and capped at 454 tonnes round weight or 750,000 pounds net weight by DFO. Non-directed commercial discard mortality in non-trawl groundfish fisheries is largely handled under the quota system within the directed Pacific halibut fishery limit.

U.S.A. (IPHC Regulatory Area 2C; Southeast Alaska)

NOAA Fisheries reported non-directed commercial discard mortality by hook-and-line vessels fishing in the outside (federal) waters of IPHC Regulatory Area 2C. The vessels in this area are primarily targeting Pacific cod and rockfish in open access fisheries, and sablefish in the quota fishery. In state waters, fisheries that contribute to this removal include pot fisheries for red and golden king crab, and tanner crab. Information is provided periodically by Alaska Department of Fish and Game (ADF&G), and the estimate was again rolled forward from 2022 to 2024.

U.S.A. (IPHC Regulatory Areas 3A and 3B; Eastern, Central, and Western Gulf of Alaska)

Trawl vessels in the Gulf of Alaska non-pelagic trawl fisheries have a high likelihood of encountering Pacific halibut and are responsible for the majority of the Pacific halibut bycatch in IPHC Regulatory Areas 3A and 3B. There are three general categories for these trawl vessels, which receive varying rates of catch monitoring. In 2023 in the Gulf of Alaska, the non-pelagic catcher/processor catch was monitored at 100%; the non-pelagic catcher vessels in the Central Gulf Rockfish

Program at 100%; and the remaining catch of non-pelagic catcher vessels at 42%. Overall, 87% of the non-pelagic trawl catch in the Gulf of Alaska was monitored for bycatch in 2023. In July 2024, NMFS adopted rules to implement an electronic monitoring (EM) program for pelagic trawl pollock catcher vessels and tender vessels delivering to processors in the Gulf of Alaska (Amendment 114), improving non-directed discards accounting in the Western Gulf of Alaska pollock fishery.

Hook-and-line fisheries, as well as state-managed crab and scallop fisheries, also contribute to Pacific halibut non-directed commercial discard mortality.

U.S.A. (IPHC Regulatory Areas 4A, 4B, 4CDE; Bering Sea/Aleutian Islands)

IPHC Regulatory Areas 4A, 4B and 4CDE non-directed commercial discard mortality estimates are the highest due to groundfish fisheries which target flatfish in the Bering Sea. The estimated ND-CDM of Pacific halibut in the groundfish trawl sector accounts for 88% of the total in this region (1,342 tonnes or 2.96 million pounds).

Table 6. Summary of 2024 non-directed commercial fisheries discard mortality estimates of Pacific halibut by IPHC Regulatory Area and fishery.[1]

pounds	2A	2B	2C	3A	3B	4A	4B	4CDE+ Closed Area
Dredge (Scallop & Sea Cucumber)	--	--	--	24,000	13,000	n/a	--	n/a
Hook & Line	15,000	n/a	35,000	36,000	17,000	45,000	3,000	236,000
Pot (Groundfish)	1,000	--	7,000	8,000	7,000	17,000	0	2,000
Pot (Shellfish)	--	n/a	0	--	50,000	26,000	2,000	37,000
Trawl (Groundfish)	45,000	338,000	0	613,000	217,000	286,000	116,000	2,189,000
Trawl (Shrimp)	0	n/a	--	--	--	--	--	--
Trawl (Salmon)	n/a	n/a	0	n/a	n/a	--	--	--
TOTAL	**61,000**	**338,000**	**42,000**	**681,000**	**304,000**	**374,000**	**121,000**	**2,464,000**

tonnes	2A	2B	2C	3A	3B	4A	4B	4CDE+ Closed Area
Dredge (Scallop & Sea Cucumber)	--	--	--	11	6	n/a	--	n/a
Hook & Line	8	n/a	16	16	8	20	1	107
Pot (Groundfish)	<1	--	3	4	3	8	0	<1
Pot (Shellfish)	--	n/a	0	--	23	12	<1	17
Trawl (Groundfish)	20	153	0	278	98	130	53	993
Trawl (Shrimp)	0	n/a	--	--	--	--	--	--
Trawl (Salmon)	n/a	n/a	0	n/a	n/a	--	--	--
TOTAL	**28**	**153**	**19**	**309**	**138**	**170**	**55**	**1,118**

[1]In the table, n/a indicates value is not available, whereas -- indicates non-applicability.

FISHERY-INDEPENDENT SURVEYS

Each year the IIPHC conducts the FISS, collaborates with the NOAA (National Oceanic and Atmospheric Administration) Fisheries trawl surveys, and receives survey data from other organisations. These surveys collect biological and oceanographic data, facilitate fish tagging and release, and support other research projects.

IPHC Fishery-independent setline survey (FISS)

The IPHC FISS gathers catch rate information to monitor changes in biomass in the Pacific halibut population. The FISS uses standardised methods, including bait, gear, fishing locations, and time of year to gain a balanced picture that can be compared over a large area and from year to year.

When other species are caught on the FISS, their presence provides data about bait competition, commonly known as 'hook competition'. Other species catch data also provide an indication of their abundance over time, making them valuable for population assessments, management, and potential avoidance strategies.

Design and procedures

The 2024 FISS covered both nearshore and offshore waters of British Columbia, Canada, and Alaska, U.S.A., (Figure 1). Five commercial longline vessels were chartered for FISS operations completing a combined 29 trips over 193 charter days across nine charter regions. Each region required between 20 and 35 days to survey.

The FISS was conducted via stations arranged in a grid of 10x10 nautical miles with a depth range of 18 to 732 metres (10 to 400 fathoms). The 2024 FISS design consisted of a subset of 585 stations from the full 1,890-station design. The optimized revenue neutral design reduced spatial coverage compared to previous years, balancing financial constraints with data quality.

However, 60 planned stations were not sampled due to vessel recruitment challenges. These challenges were primarily driven by increased sablefish quota, which reduced vessel availability, and difficulties in securing vessels that met FISS tender specifications for deck space, communication capabilities, and safety equipment. As a result, 30 stations in Unalaska and 30 in Adak were not surveyed. Of the remaining 525 planned stations,

three were also not sampled. Two stations in Sitka were inaccessible due to Glacier Bay National Park restrictions, and one station in St. James was located within the Hecate Marine Protected Area. Additionally, fifteen stations were deemed ineffective coastwide, which included: Sperm whale depredation (n=9), Orca whale depredation (n=2), sand fleas (n=3) and gear issues (n=1). In total, 507 of the 525 chartered stations (97%) were effectively sampled.

Eight standard skates of gear were set at each station in IPHC Regulatory Areas 2B, 2C, 3A and 3B, and six standard skates in IPHC Regulatory Areas 4CDE. Each vessel conducting FISS work set from one to four stations every day, with boats setting gear as early as 0500 hours and allowing it to soak for at least five hours (but not overnight, if possible) before hauling. Data from gear soaked longer than 24 hours were discarded from the results, as were sets for which predetermined limits for lost gear, snarls, depredation, or displacement were exceeded. FISS gear consisted of fixed-hook gear, with skates measuring 549 metre (1,800-foot) skates with 100 size 16/0 circle hooks spaced 5.5 metres (18 feet) apart. The length of the gangions ranged from 61 to 122 centimetres (24 to 48 inches). Each hook contained 0.11 to 0.15 kilograms (1/4 to 1/3 pounds) of bait. In 2024, 50% of sets used pink salmon as bait, with the remaining sets using the standard chum salmon bait to compare and calibrate relative bait success. Additionally, "vessel captain stations" were introduced this season, allowing vessels in IPHC Regulatory Areas 2B and 2C to select up to one-third of their sets at locations optimized for catch rates or efficiency.

Sampling protocols

Following protocols set out in the 2024 FISS Manual, Setline Survey Specialists (Field) (SSS(F)) on contracted vessels assessed and recorded the number of hooks set and baits lost per skate. During gear retrieval, hook status (hook occupancy data to species or whether the hook was pulled up empty) for the first 20 consecutive hooks of each skate was recorded.

SSS(F) recorded lengths and weights of all Pacific halibut caught along with the corresponding skate numbers, and assessed

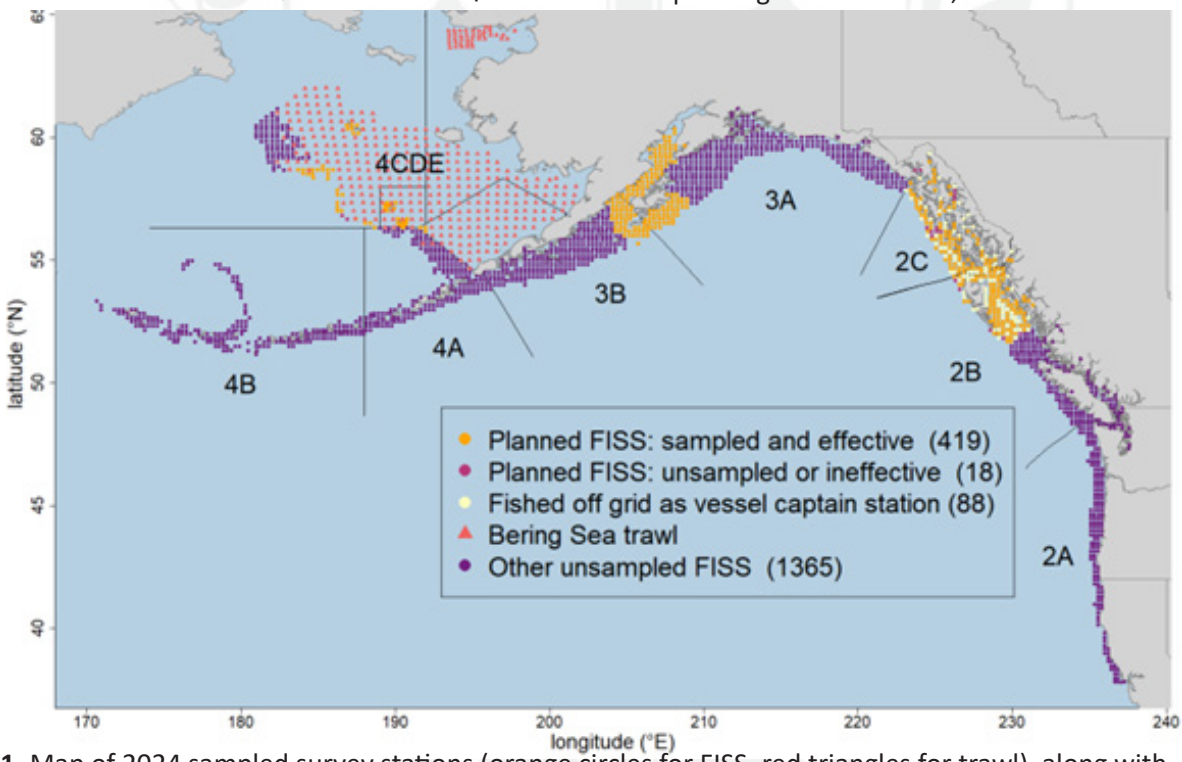


Figure 1. Map of 2024 sampled survey stations (orange circles for FISS, red triangles for trawl), along with planned but ineffective FISS stations, FISS grid stations fished off grid as vessel captain stations (see text) and other unsampled FISS stations

the sex and maturity, prior hooking injury (PHI) incidence and severity, and evidence of depredation for each fish captured. Also collected was a randomized subsample of otoliths from every captured Pacific halibut for later age determination.

The male fish were assessed as either mature or immature, and the females were categorized as immature, ripening, spawning, or spent/resting. The sex and maturity level of U32 (fork length < 81.3 cm or 32 inches) Pacific halibut was recorded only if that fish was randomly selected for otolith removal or was already dead upon hauling. All U32 Pacific halibut not selected for otolith collection were measured and released alive.

Bait purchases

To maintain consistency across years, the FISS has always used No. 2 semi-bright or better chum salmon (*Oncorhynchus keta*), graded A through E by the Alaska Seafood Marketing Institute, headed and gutted, and individually quick-frozen. In 2024, the FISS experimented with pink salmon as well (*Oncorhynchus gorbuscha*), adhering to the same quality standards. In August 2023, the IPHC Secretariat arranged bait purchases for the 2024 FISS, securing 61 tonnes (134,400 pounds) of pink and chum salmon from a single supplier. Bait usage was calculated at 0.17 kilograms (0.37 pounds) per hook, averaging 136 kilograms (300 pounds) per eight-skate station. Bait quality was monitored and documented throughout the season, consistently meeting the established standards.

Fish sales

O32 (fork length > 81.3 cm or 32 inches) Pacific halibut caught during the FISS have historically been kept and sold to offset the cost of the FISS work with a goal of revenue neutrality. In 2024, U32 (fork length < 81.3 cm or 32 inches) Pacific halibut that were randomly selected for otolith sampling were also kept and sold. All vessel contracts contained a lump sum payment along with a 10 percent share of all Pacific halibut proceeds.

During the 2024 FISS, IPHC's chartered vessels delivered a total of 153 tonnes (337,674 pounds) of Pacific halibut to 9 different ports. The coastwide average price per kilogram was $13.71 USD or $6.22 USD per pound, amounting to sales totaling $2,099,722.34 USD.

Field personnel

The 2024 FISS was fielded by a team of 10 (SSS(F)), with two specialists assigned to each vessel. These highly trained personnel played a critical role in data collection and sample processing. One SSS(F) worked on deck, handling fish, recording measurements, and collecting biological samples, while the other operated from a portable shelter, logging data, making observations, and managing sample storage. In addition to their technical expertise, field staff navigated the demanding conditions of at-sea research, adapting to dynamic weather, long working hours, and the physical challenges of conducting scientific operations aboard chartered commercial longline vessels.

Oceanographic monitoring

No oceanographic monitoring was conducted during the 2024 FISS due to cost-efficiency considerations.

IPHC Fishery-Independent Setline Survey (FISS) results

As is typical, the IPHC targeted the summer months—May, June, July, and August—for FISS work. In 2024, survey activities took place from 25 May through 15 August. Coastwide, FISS vessel activity peaked in mid-to-late July and gradually declined in early August as boats completed their assigned charter regions (Figure 1). All FISS operations concluded by mid-August.

Weight and number per unit effort (WPUE)

The inclusion of both commercial and non-commercial fishing grounds in the FISS

design resulted in an average weight per unit effort (WPUE) across all IPHC Regulatory Areas that was lower than that of the directed commercial Pacific halibut fleet (Table 7). While WPUE decreased overall compared to the 2023 FISS, coastwide aggregate numbers-per-unit-effort (NPUE) increased.

Non-Pacific halibut catch

In 2024, approximately 73 species of fish and invertebrates were captured as bycatch during the IPHC FISS (for more details on bycatch, visit **https://www.iphc.int/data/fiss-bycatch**). Coastwide, the predominant incidental catch was Pacific cod (*Gadus microcephalus*). However, there were regional variations: in IPHC Regulatory Area 2B, spiny dogfish (*Squalus suckleyi*) was the most frequent catch, while in Area 2C, Longnose skate (*Raja rhina*) was caught most often.

Size and age observations

Approximately 60% of Pacific halibut caught during the IPHC FISS were smaller than the current commercial legal-size limit (U32; < 81.3 cm or 32 inches) with a median fork length of 78 cm (31 inches). In 2024, median length decreased slightly in all surveyed IPHC Regulatory Areas when compared to 2023. IPHC Regulatory Area 2B, 3A, 3B and 4CDE had a median length below the legal-size limit. The largest median length was in IPHC Regulatory Area 2C (83 cm or 32.7 in). Sex composition of FISS-caught O32 (>81.3 cm or 32 inches) Pacific halibut showed little variation across IPHC Regulatory Areas, with females comprising 75% of the catch in Area 3A and 78% in Area 2C. Among all size classes, most female Pacific halibut caught during the FISS period (summer months) were in the mature stage (57%) and expected to spawn in the upcoming season.

NOAA Fisheries Trawl Surveys

The IPHC routinely collaborates with NOAA Fisheries to collect biological data from Pacific halibut caught during the groundfish trawl surveys conducted in Alaska. In 2024, NOAA personnel encountered and measured 2,371 Pacific halibut in the eastern Bering Sea survey and 585 in the Aleutian Islands survey. Weights and otoliths for aging were collected from 1,056 of the Pacific halibut encountered.

Table 7. The average raw all sizes WPUE for each of the IPHC Regulatory Areas during the 2024 FISS (vessel captain stations excluded).

Regulatory Area	kg/skate	lb/skate	Station Count
2B	30	66	100
2C	55	122	292
3A	23	50	113
3B	22	49	56
4CDE	6	13	58

Population Assessment

Since 1924, one of the IPHC's primary tasks has been to assess the population (or stock) of Pacific halibut in the Convention waters. In 2024, the IPHC conducted its annual coastwide stock assessment of Pacific halibut updating all data sources and using new information from the 2024 fishing period. This section covers three main topics that have bearing on the population assessment process: (1) the data sources available for the Pacific halibut stock assessment and related analyses, (2) the results of the stock assessment, and (3) the outlook for the stock, scientific advice, and future research directions.

Data sources

The data for the stock assessment is based on both fishery-dependent and fishery-independent data, as well as auxiliary data from research studies and other sources. The rich historical data sources include information going as far back as the late 1800s, which allow scientists to better identify trends over time that may be of import to the understanding of the current population. However, historical data was often collected differently and may be incomplete, limiting the conclusions that can be drawn for years past.

2024 fishery-dependent and fishery-independent survey data

Fishery-dependent data includes mortality estimates from directed commercial, recreational, subsistence, and non-directed commercial fisheries. Pacific halibut landings data from the commercial fishery are reported to IPHC by way of commercial fish tickets. Discards in the directed fishery are estimated by the IPHC using a combination of logbook, observer, and fishery-independent data. Annual recreational mortality estimates are provided to the IPHC by state agencies (U.S.A. waters) and Fisheries and Oceans

Canada (DFO). Since 1991, DFO and National Oceanic and Atmospheric Administration (NOAA) Fisheries have provided estimates of subsistence (or personal use) harvests. Non-directed fishery discard mortality estimates are based on observer programs in both the U.S.A. and Canada; annual estimates are reported to the IPHC by fishery.

Known Pacific halibut mortality consists of target/directed commercial fishery landings and discard mortality (including research), recreational fisheries, subsistence, and non-targeted/directed discard mortality ('bycatch') in fisheries targeting other species where Pacific halibut retention is prohibited. Over the period 1888-2024, mortality from all sources has totaled 7.4 billion pounds (~3.4 million metric tons, t). Since 1925, the fishery has ranged annually from 33 to 100 million pounds (15,000-45,000 t) with an annual average of 63 million pounds (~28,000 t; Figure 2). Annual mortality was above this 100-year average from 1985 through 2010 and has averaged 35.7 million pounds (~16,200 t) from 2020-24.

Fishery-dependent and fishery-independent data also include: 1) weight-per-unit-effort (WPUE), numbers-per-unit-effort (NPUE), 2) age distributions, and 3) weight-at-age. The primary source of trend information is the IPHC Fishery-Independent Setline Survey (FISS); however, IPHC considers the commercial fishery WPUE to be another indicator for the stock, and so its estimates are also treated as an index of abundance, while accounting for possible changes in fishery practices and locations from year to year.

The 2024 modelled FISS results detailed an estimated coastwide aggregate Numbers-Per-Unit-Effort (NPUE) which increased by 3% from 2023 to 2024, remaining at a level similar to those observed in 2018-2020 (Figure 2). The modelled coastwide Weight-Per-Unit-Effort (WPUE) of legal (O32) Pacific halibut, the most comparable metric to observed commercial fishery catch rates, decreased by 9% from 2023 to 2024. Individual IPHC Regulatory Areas varied from an estimated 4% increase (Regulatory Area 4B) to a 21% decrease (Regulatory Area 3B) in O32 WPUE. Although IPHC Regulatory Areas 2B and 2C were sampled extensively, there was limited sampling in IPHC Regulatory Areas 3A, 3B, and 4CDE and no direct sampling in IPHC Regulatory Areas 2A, 4A, and 4B which resulted in broader credible intervals and therefore greater uncertainty about the actual trends at both the coastwide level and especially for those areas with reduced surveys.

Preliminary commercial fishery WPUE estimates from 2024 logbooks decreased by 2% at the coastwide level. The bias correction to account for additional logbooks compiled after the fishing season resulted in an estimate of -7% coastwide. Trends varied among IPHC Regulatory Areas and gears; however, all Areas showed decreased CPUE in one or more index, with the largest decreases occurring in IPHC Regulatory Area 3B, corresponding to those observed in the FISS.

Most information used in the 2024 stock assessment was finalized on 31 October 2024 in order to provide adequate time for analysis and modeling. Directed fishery landings and estimated discards were further updated in late-November in order to better reflect the low overall fishery harvest (relative to fishery limits), especially late in the year. As has been the case in all years, some data are incomplete, or include projections for the remainder of the year. These include commercial fishery WPUE, commercial fishery age composition data, and 2024 mortality estimates for all fisheries still operating. All preliminary data series in this analysis will be fully updated as part of the 2025 stock assessment.

Auxiliary inputs

The population assessment includes a number of additional information sources that are treated as data, even though they represent the products of analyses themselves. These are: 1) the weight-length

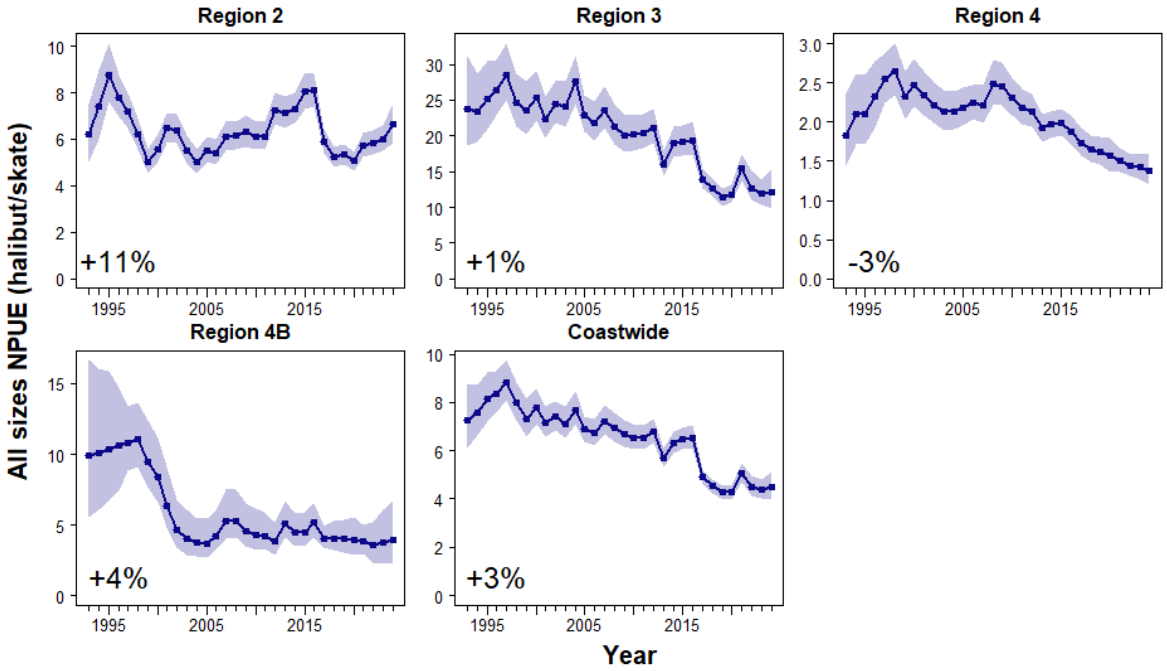


Figure 2. Trends in modelled FISS NPUE by Biological Region, 1993-2024. Percentages indicate the change from 2023 to 2024. Shaded zones indicate 95% credible intervals.

relationships, 2) the maturity schedule, 3) estimates of ageing bias and imprecision, and 4) the regimes of the Pacific Decadal Oscillation (PDO). Details of these data sources are as follows.

- The headed and gutted weight (net pounds) of a Pacific halibut has historically been estimated via a simple equation of weight based on fork length. As length increases, weight corresponds at a rate slightly greater than cubic increase. Due to the direct sampling of individual Pacific halibut weights in the port sampling program (beginning in 2015) and the FISS (beginning in 2019), weight-length relationships are used only for sources that do not directly sample individual fish weights (e.g., non-directed commercial discard mortality, recreational mortality). In 2021, the IPHC provided updated IPHC Regulatory Area specific L-W relationships based on the recent sampling. These are now applied to all data sources for which directly measured weights are unavailable.

- Female Pacific halibut are understood to become sexually mature on a set schedule that has been estimated to be stable through several historical investigations. Across all Regulatory Areas, half of all female Pacific halibut become sexually mature by 11.6 years, and nearly all fish are mature by age 17. Updating this maturity schedule based on modern histological methods is the ongoing focus of research based on data collection that began on the FISS in 2022 and is expected to occur as part of the 2025 stock assessment.
- The estimated ages of Pacific halibut are based on the counting of rings on their otoliths (ear bones), a method that is by nature subject to both bias and imprecision. However, it is relatively easy to estimate the age of Pacific halibut (compared to other groundfish), and analysis shows that the current aging method—referred to as "break-and-bake"—is remarkably precise. The assessment accounts for the small amount of variability in ring counts based on comparison of multiple readers and counts.

- The PDO is a general index of productivity and climate variability in

Table 8. Stock distribution estimates based on modelled FISS WPUE of all sizes of fish.

Year	Region 2 (2A, 2B, 2C)	Region 3 (3A, 3B)	Region 4 (4A, 4CDE)	Region 4B
2020	23.8%	49.7%	21.5%	5.0%
2021	22.2%	54.5%	18.5%	4.8%
2022	25.6%	47.2%	21.1%	6.1%
2023	26.3%	45.6%	21.5%	6.6%
2024	27.7%	44.3%	21.1%	7.0%

the Gulf of Alaska that has historically changed 'regime' about every 10-30 years. Research has shown that these environmental conditions are correlated with the average level of recruitment (young fish entering the population each year) of Pacific halibut. In "positive" phases of the PDO (before 1947, and 1977-2006), the stock saw a higher average recruitment of younger fish. The PDO's longest "negative" phase since the late 1970s occurred from 2006 through 2013. Positive values were observed over 2014-19; however, it is unclear if this represents a change of phase or a different set of environmental conditions altogether. Further, the correspondence between the PDO and other environmental observations seems to be weakening as previously rare extreme conditions become more common.

Stock distribution

Estimates of the biological distribution of the stock are achieved using the modelled FISS WPUE index of Pacific halibut density, weighted by the geographical extent of each IPHC Regulatory Area. To account for factors that are known to affect FISS catch rates, two adjustments to the raw WPUE prior to modelling are made: 1) accounting for FISS timing relative to the fishery and 2) 'hook competition'. The hook competition adjustment uses the number of baits returned at the end of a survey set to accounts for the level of competition from all species including other Pacific halibut for each hook – if a high proportion of hooks were recovered without bait, there was little power to detect additional fish present by the end of the set. Adjusting for the presence of such competition reduces potential bias in the observed WPUE index of density due to the finite number of hooks deployed and the observed catch rates at each station.

Modelled survey WPUE (representing the density of all sizes of Pacific halibut captured by the FISS; Figure 2) is used to produce the best available estimates of the stock distribution by Biological Region. The recent trend in estimated population distribution showed a continuation of the 20-year decrease in Biological Region 3 to the lowest proportion of the coastwide stock in the time-series (Table 8). Biological Region 2 increased to the highest proportion observed. Due to the lack of FISS sampling in Biological Region 4B and generally reduced designs in 2023-24, the credible intervals for stock distribution are wide. For Biological Region 4B, the credible stock distribution in 2024 ranges from 4 to 12%. It is unknown to what degree current stock distribution corresponds to historical distributions prior to 1993 or to the average distribution likely to occur in the absence of fishing mortality.

Population assessment at the end of 2024

Stock assessment

The methods for undertaking the population assessment for Pacific halibut have constantly improved over the last 30 years with the collection of more comprehensive and informative data, the development of better models and more sophisticated analytical approaches. For the last twelve years, a method called the "ensemble approach", drawing inference from multiple models to describe the stock, has been used as a way to make the process both stronger and more flexible to future model changes. Originating from the field of weather and hurricane forecasting, it recognizes that all assessment models are approximations, and that risk assessment based on multiple models provides a stronger basis for the estimation of management quantities (and the uncertainty about these quantities) than any single model alone.

The 2024 stock assessment represents a second update to the full stock assessment conducted in 2022. There were no structural changes to the assessment methods for 2024. Supporting analyses were reviewed by the IPHC's Scientific Review Board (SRB) through the IPHC's standard two-meeting (June and September) process.

The 2024 assessment continues to make use of the extensive historical time series of data, as well as integrating both structural and estimation uncertainty via an ensemble of four equally weighted individual models. Within-model uncertainty from each model was propagated through to the risk analysis and decision table (Table 9). Therefore, key quantities such as reference points and stock size are reported as distributions, such that the entire plausible range can be evaluated. Point estimates reported in this stock assessment correspond to median values from the ensemble. For the second year in a row, the most influential source of new information in this assessment was the directed commercial fishery logbook trend, including the updated (and lower) 2023 estimate as well as the estimate of the catch-rate in 2024. The addition this information resulted in nearly all of a 17% decrease in the 2024 spawning biomass estimate, compared to that in the 2023 stock assessment. This is partly a result of the decline in the 2024

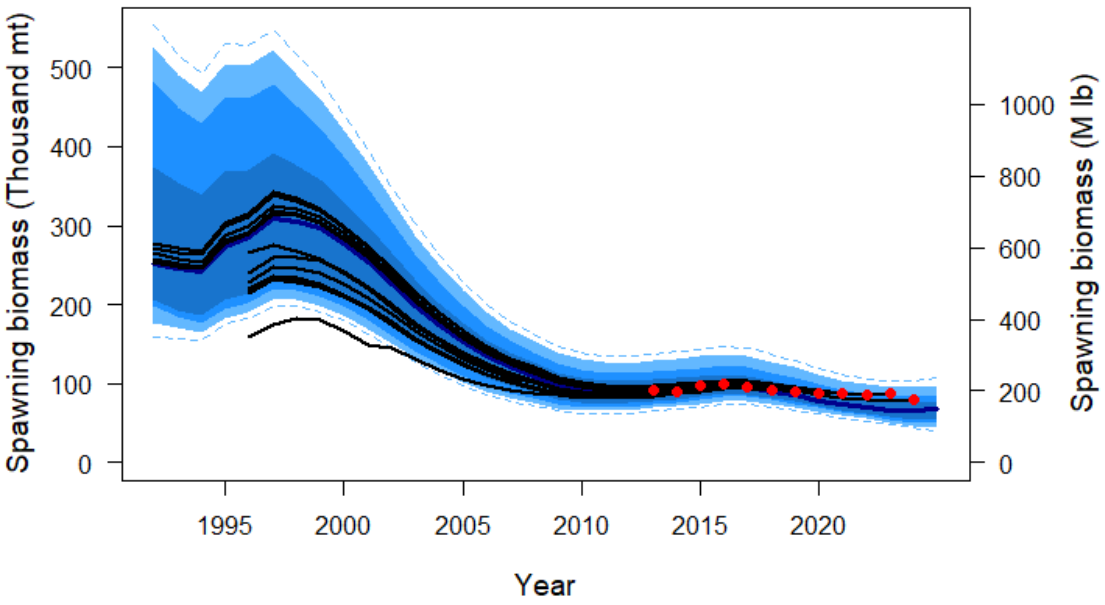


Figure 3. Retrospective comparison among recent IPHC stock assessments. Black lines indicate estimates of spawning biomass estimated by assessments conducted from 2012-2023 with the terminal estimate shown as a point, the shaded distribution denotes the 2024 ensemble: the dark blue line indicates the median (or "50:50 line") with an equal probability of the estimate falling above or below that level; colored bands moving away from the median indicate the intervals containing 50/100, 75/100, and 95/100 estimates; dashed lines indicate the 99/100 interval.

fishery WPUE and a lower 2023 fishery WPUE when adding additional logbooks to the analysis this year. Although differences in trend between the FISS and commercial fishery are not uncommon in the historical time-series, the sensitivity of this and last year's assessment to these data highlights the importance of both time-series in estimating the stock size and trend.

Spawning biomass and recruitment trends

The results of the 2024 stock assessment indicate that the Pacific halibut stock declined continuously from the late 1990s to around 2012. That trend is estimated to have been largely a result of decreasing size-at-age, as well as lower recruitment than observed during the 1980s. The spawning biomass (SB) is estimated to have increased gradually to 2016, and then decreased to an estimated 145 million pounds (~65,700 t) at the beginning of 2024. At the beginning of 2025 the spawning biomass is estimated to have increased slightly due to the continued maturation of the 2012 year-class and the onset of maturity of the 2016 year-class. The current spawning biomass estimate is 149 million pounds (67,500 t), with an approximate 95% credible interval ranging from 97 to 216 million pounds (~44,100-98,200 t; Figure 3). The recent spawning biomass estimates from the 2024 stock assessment are very consistent with previous assessments up 2019, and below subsequent estimates for 2020 to 2024 from more recent assessments.

Average Pacific halibut recruitment is estimated to be higher (59 and 53% for the coastwide and AAF models respectively) during favorable Pacific Decadal Oscillation (PDO) regimes. Pacific halibut recruitment estimates show the large cohorts in 1999 and 2005. Cohorts from 2006 through 2011 are estimated to be much smaller than those from 1999-2005 (Figure 4), which has resulted in a decline in both the stock and fishery yield as these low recruitments now comprise the majority of the spawning biomass. Based on age data through 2024, individual models in this assessment produced estimates of the 2012 year-classes that were similar to the average level observed over 1994-2005. Of

Table 9. Harvest decision table for the 2025 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.

2025 Alternative					*Status quo -25%*	*Status quo -15%*	*Status quo -10%*	*Status quo -5%*	*Status quo*	$F_{46\%}$	3-Year Surplus	*Status quo +10%*	*Reference* $F_{43\%}$	*MEY proxy*	*MSY proxy*	
Total mortality (M lb)			0.0	21.8	28.3	31.8	33.6	35.4	37.1	37.8	39.0	40.7	41.7	46.1	55.1	
TCEY (M lb)			0.0	20.0	26.5	30.0	31.8	33.5	35.3	35.9	37.2	38.8	39.8	44.3	53.2	
2025 fishing intensity			$F_{100\%}$	$F_{63\%}$	$F_{55\%}$	$F_{51\%}$	$F_{50\%}$	$F_{48\%}$	$F_{47\%}$	$F_{46\%}$	$F_{45\%}$	$F_{44\%}$	$F_{43\%}$	$F_{40\%}$	$F_{35\%}$	
Fishing intensity interval			--	41-75%	33-69%	30-66%	28-65%	27-63%	26-62%	25-62%	25-61%	24-60%	23-59%	21-56%	17-51%	
Stock Trend (spawning biomass)	in 2026	is less than 2025	<1	5	16	26	31	37	43	45	49	54	57	70	88	a
		is 5% less than 2025	<1	<1	2	4	6	8	11	12	14	17	19	29	50	b
	in 2027	is less than 2025	<1	7	21	30	35	40	45	47	50	55	58	69	86	c
		is 5% less than 2025	<1	2	8	14	18	22	26	27	30	34	37	48	70	d
	in 2028	is less than 2025	<1	8	20	30	35	40	45	47	50	55	58	70	87	e
		is 5% less than 2025	<1	3	11	18	22	26	30	32	36	40	43	55	77	f
Stock Status (Spawning biomass)	in 2026	is less than 30%	26	26	27	27	27	27	27	27	28	28	28	28	29	g
		is less than 20%	1	5	7	8	9	10	10	11	11	12	12	14	18	h
	in 2027	is less than 30%	25	25	26	26	26	26	26	26	26	26	26	27	28	i
		is less than 20%	<1	2	4	6	7	8	9	9	10	11	12	15	20	j
	in 2028	is less than 30%	17	25	25	25	25	26	26	26	26	26	26	27	28	k
		is less than 20%	<1	1	3	5	6	7	8	9	10	11	12	16	21	l
Fishery Trend (TCEY)	in 2026	is less than 2025	0	7	24	28	31	34	38	39	42	46	49	60	80	m
		is 10% less than 2025	0	4	22	26	27	29	32	33	35	38	39	48	67	n
	in 2027	is less than 2025	0	6	23	27	30	33	37	38	41	46	48	60	81	o
		is 10% less than 2025	0	4	20	25	27	29	31	32	34	37	39	49	69	p
	in 2028	is less than 2025	0	5	21	26	29	33	37	38	41	46	49	61	82	q
		is 10% less than 2025	0	3	18	23	26	28	31	32	34	37	40	50	71	r
Fishery Status (Fishing intensity)	in 2025	is above $F_{43\%}$	0	7	25	29	32	35	39	41	44	47	50	59	78	s

the fish comprising the 2012 year-class, 56% are estimated to be mature as of 2024 and the continued maturation of this cohort has a strong effect on the short-term projections. The 2024 data indicate a reduction in the 2014 year-class compared to earlier data, placing it on a similar scale to 2006-2008. The 2016 year-class (age-8 in 2024) may be of a similar magnitude to the 2012 cohort but remains very uncertain. There is little information on recruitments after 2016 in the data currently available.

Reference points

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 relative spawning biomass limit of 20%, directed fishing is halted due to the critically low biomass condition. This calculation is 'dynamic', based on recent biological conditions: current weight-at-age and the estimated recruitments influencing the stock. This calculation measures only the effect of fishing on the spawning biomass. The relative spawning biomass at the beginning of 2025 was estimated to be 38% (credible interval: 18-55%) slightly higher than the estimate for 2024 (37%). The probability that the stock is below the $SB_{30\%}$ level is estimated to be 30% at the beginning of 2025, with a 11% chance that the stock is below $SB_{20\%}$. The IPHC's 'reference' level of fishing intensity is a Spawning Potential Ratio (SPR) of $F_{43\%}$; 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. The 2024 fishing intensity is estimated to be $F_{49\%}$ (credible interval: 30-64%), below both the current and previous ($F_{46\%}$) reference levels and the value estimated for 2023 (47%). Recent lower fishing intensity corresponds both to reduced mortality limits and actual mortality consistently below those limits.

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 seven years (2017-23) of sex-ratio information from the directed commercial fishery landings. However, uncertainty in historical ratios remains unknown. Additional years of data are likely to further inform selectivity parameters and cumulatively reduce uncertainty in future stock size estimates. 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 in 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.

Additional important contributors to assessment uncertainty (and potential bias) include the lag in estimation of incoming recruitment between birth year and direct observation in the fishery and survey data (6-10 years). Like most stock assessments, there is no direct information on natural mortality, and increased uncertainty for some estimated components of the fishery mortality. Fishery mortality estimates are assumed to be accurate; therefore, uncertainty due to discard mortality estimation (observer sampling and representativeness), discard mortality rates, and any other documented mortality in either directed or non-directed fisheries (e.g., whale depredation) could create bias in this assessment. Maturation schedules and fecundity are currently under renewed investigation by the IPHC. Historical values are based on visual field assessments,

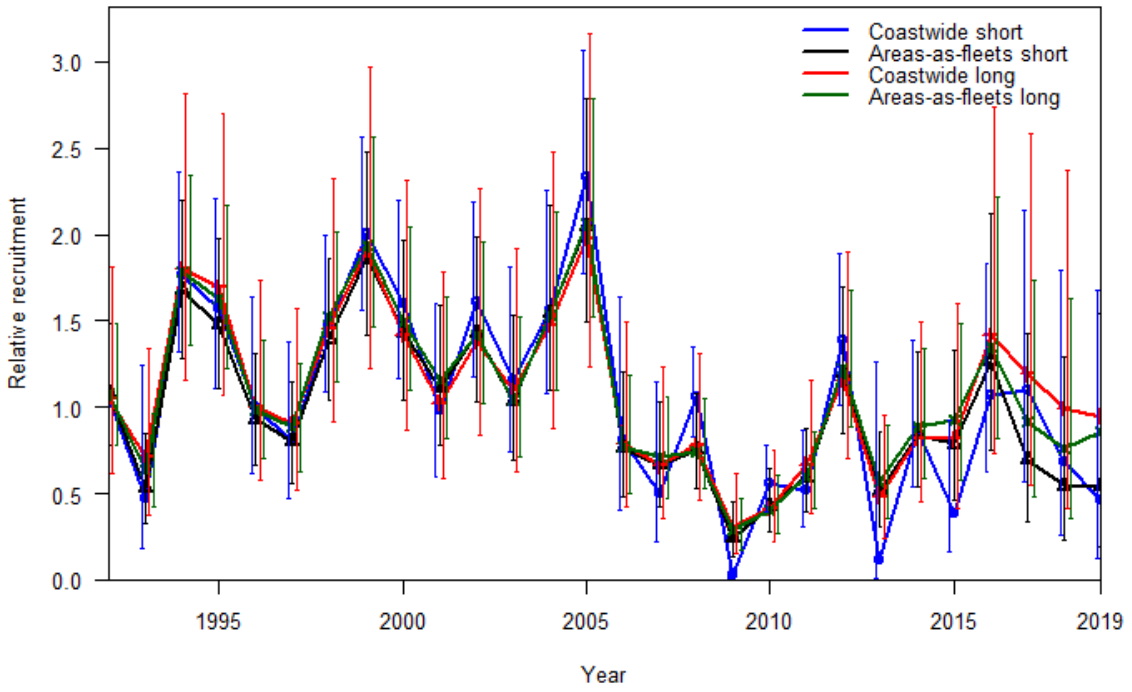


Figure 4. Estimated trends in age-0 relative recruitment (standardized to the mean for each model) from 1992-2019, based on the four individual models included in the 2024 stock assessment ensemble. Series indicate the maximum likelihood estimates; vertical lines indicate approximate 95% credible intervals.

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 trends in these biological processes at the scale of the entire population. Projections beyond three years are avoided due to the lack of mechanistic understanding of the factors influencing size-at-age and relative recruitment strength, the two most important factors in historical population trends along with fishing mortality. The reduction in estimated commercial fishery catch rates from the time the data sets for the stock assessment are closed until the data are relatively complete (sometime the following year) has been previously identified. Concern over the potential for incomplete fishery CPUE to bias the assessment results led to the recommendation to 'down-weight' the terminal year via doubling the estimated variance in the index. However, when the CPUE and other data provide differing information on the recent stock scale and/or trend this approach of inflating the variance may make subsequent analyses more sensitive to the change in CPUE rather than less. Historically this has not been an issue; however, in both the 2023 and 2024 stock assessments it has. An alternative analysis was conducted this year using the estimated variance without any inflation and applying an additional 5% decrease from the observed (now updated) 2023 value to the preliminary 2024 estimate. This resulted in an additional 2% decrease in the estimated 2025 spawning biomass. 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 ongoing Management Strategy Evaluation (MSE) process can inform the

development of management procedures that are robust to estimation uncertainty via the stock assessment, and to a wide range of hypotheses describing population dynamics.

Outlook

Short-term tactical stock projections were conducted using the integrated results from the stock assessment ensemble in tandem with summaries of the 2024 directed and non-directed fisheries. The harvest decision table (Table 9) 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 2025 (columns). In addition to the status quo (last year's coastwide TCEY), a range of higher and lower coastwide TCEYs is presented, including TCEYs bracketing the status quo, mortality levels consistent with the 1-year and 3-year surplus production (less than or equal to a 50% chance that the spawning biomass will be smaller in 2026 and 2028 than it is in 2025), TCEYs consistent with the reference SPR of 43%, values identified by the MSE process as proxies for Maximum Economic Yield (MEY; $F_{40\%}$) and Maximum Sustainable Yield ($F_{35\%}$) as well as other levels to provide for continuous evaluation of the change in risk across alternative yields. For each column of the decision table, the projected fishing mortality (including all sizes and sources), the coastwide TCEY and the associated level of fishing intensity projected for 2025 (median value with the 95% credible interval below) are reported.

Spawning biomass estimates in 2024 from the 2024 stock assessment are lower (17%) than those in last year's stock assessment, but the recent estimated trend is nearly flat (+3% from 2024 to 2025). Updated estimates of the 2012 and 2016 year-classes (both larger than all those occurring from 2006-2011) show that these two year-classes will be highly important in the short-term stock projections as both will be maturing over the next several years. However, these two year-classes are insufficient to support short-term fishing mortality appreciably higher than the status quo without a decrease in spawning biomass. Risks are similar over the three-year projection period as both year-classes continue to mature. Projections indicate that the spawning biomass would increase in the absence of any fishing mortality, with risks of stock decline over one and three years both less than 1/100. At the status quo coastwide TCEY (35.28 million pounds), risks of stock decrease over one and three years are 43/100 and 45/100. For all harvest levels that exceed the three-year surplus (37.4 million pounds) risks of stock decline are larger than 50/100 and reaching 88/100 for the coastwide TCEY that is projected to correspond to the $F_{35\%}$ MSY proxy harvest level in 2025. Alternative harvest levels around the status quo (+/- 5 and 10%) are projected to result in levels of fishing intensity ranging from $F_{50\%}$ to $F_{44\%}$, similar to those estimated in recent years. For larger reductions to the status quo (-15% and -25%) risk of one year stock decrease drops to 26/100 and 16/100 respectively. The alternatives around the status quo span a range of stock trajectories from increasing (all alternatives up to the status quo) to decreasing (status quo +10%). At the reference level of fishing mortality ($F_{43\%}$) the 2025 coastwide TCEY is projected to be 39.8 million pounds (41.7 million pounds of total mortality including U26 non-directed discard mortality). Stock decline over the next three years is projected to be likely (57/100 to 58/100) at this level of fishing intensity. The probability of a reduction in the coastwide TCEY in order to maintain a fishing intensity no greater than $F_{43\%}$ over the next three years is projected to be 49/100. All projections result in a probability of the relative spawning biomass dropping below the $SB_{30\%}$ threshold over the next three years of 17-28/100. The probability of dropping below the $SB_{20\%}$ limit is estimated to be <1-21%.

Scientific advice

Sources of mortality

In 2024, total Pacific mortality due to fishing decreased to 32.70 million pounds (14,832 t), below the 5-year average of 35.66 million pounds (16,174 t) and representing the lowest value in over 100 years, due to a TCEY reduction of 4.6% from 2023 to 2024. Of that total mortality, 83% was retained and utilized in one of the fishery sectors; this was below to the percent utilized in 2023 (84%) and equal to that observed in 2022.

Stock status (spawning biomass)

Current (beginning of 2025) female spawning biomass is estimated to be 149 million pounds (67,500 t), which corresponds to a 30% chance of being below the IPHC trigger reference point of $SB_{30\%}$, and an 11% chance of being below the IPHC limit reference point of $SB_{20\%}$. The stock is estimated to have declined 32% from 2016 to 2024, then increased by 3% to the beginning of 2025. The relative spawning biomass (compared to the biomass projected to be present at the beginning of 2025 in the absence of any fishing) is currently estimated to be 38%, after reaching the lowest point in the recent time series (28%) in 2011. Therefore, the stock is considered to be 'not overfished'.

Fishing intensity

The 2024 fishing mortality corresponded to a point estimate of SPR = 49%; there is a 33% chance that fishing intensity exceeded the IPHC's current reference level of $F_{43\%}$. The Commission does not currently have a coastwide fishing intensity limit reference point.

Stock distribution

After increases in 2020-2021, the proportion of the coastwide stock represented by Biological Region 3 has decreased in 2022-24 to the lowest estimate in the time-series. This trend occurs in tandem with increases in Biological Region 2. The lack of FISS sampling in Biological Region 4B in 2023-24 has resulted in increased uncertainty in both the trend and scale of the stock distribution in this Region.

Additional risks not included in the stock assessment

Directed commercial fishery catch rates coastwide, and in nearly all IPHC Regulatory Areas were at or near the lowest observed in the last 40 years. The absolute level of spawning biomass is also estimated to be near the lowest observed since the 1970s. The directed commercial fishery transitioned from the 2005 year-class to the 2012 year-class in 2022, with the 2012 year-class again the most numerous in the landed catch in 2023-24. This shift from older to younger (and smaller fish) has contributed to observed reduced catch rates. The current spawning stock is heavily reliant on the 2012 and now 2016 year-classes. Environmental conditions continue to be unpredictable, with important deviations from historical patterns in both oceanographic and biological processes observed across the stock range in the last decade.

Future research in support of the stock assessment

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 5-year research plan five-year research plan.

Harvest Strategy Policy

The Harvest Strategy Policy at the International Pacific Halibut Commission (IPHC) defines a strategic approach to setting harvest limits that is informed by many analyses and simulation studies. It provides a framework for applying a consistent and science-based approach to setting mortality limits for Pacific halibut fisheries throughout the IPHC Convention Area while ensuring sustainability of the Pacific halibut population. The framework uses a management procedure that incorporates science and policy to determine the coastwide Total Constant Exploitation Yield (TCEY) and then distribute it across all IPHC Regulatory Areas. Being a framework, the harvest strategy policy encompasses the entire process including monitoring principles, a reference management procedure, and the decision-making process to determine mortality limits as well as other important considerations such as objectives, key principles, and responses to specific events.

In 2017 the Commission agreed to a policy that separates the coastwide scale of harvest and the distribution of fishing mortality. The first step in the harvest strategy policy is to determine the reference coastwide TCEY using the reference coastwide fishing intensity based on Spawning Potential Ratio (SPR). The final step is the decision-making process by the Commission, which determines the TCEY in each IPHC Regulatory Area and may adjust the coastwide TCEY to account for socio-economic concerns. The harvest strategy policy accounts for all mortality from all sources and uses various sources of management supporting information to inform the Commission when making the decision of mortality limits in each IPHC Regulatory Area.

In 2018 and 2020, the Management Strategy Evaluation (MSE) process provided recommendations on the reference coastwide scale portion of the harvest strategy policy, resulting in a fishing mortality rate that corresponds to an SPR of 43% (a 57% reduction in the spawning potential). This SPR was based on the range of values identified through the MSE process, considering the trade-off between yield and interannual variability in the yield while ensuring that conservation objectives are met. The SPR can be thought of as the percentage of spawning potential for a fish over its lifetime given a constant level of fishing compared to without fishing. For example, a fish may have many chances to spawn without fishing, but that potential will be reduced with fishing.
The distribution of the coastwide TCEY is a decision made by the Commission using various sources of management supporting information. This includes estimates from the Fishery-Independent Setline Survey (FISS), relative harvest rates between IPHC Regulatory Areas, and possible agreements for IPHC Regulatory Areas. Estimates of biomass from the FISS is a science-based method to distribute the mortality similar to how the stock is distributed. Relative harvest rates, based on science and policy, are used to reduce the fishing mortality in western areas, which are typically less productive and from where Pacific halibut typically migrate to eastern areas. Socio-economic factors are also considered when determining the final TCEY for each IPHC Regulatory Area, often presented by stakeholders.

Management Strategy Evaluation

Management Strategy Evaluation (MSE) is a formal process in which to evaluate the performance of alternative management procedures for the Pacific halibut fishery against defined goals and objectives. Incorporating uncertainty about stock dynamics into the MSE can identify management procedures that are robust to those uncertainties. At the IPHC, the MSE process has been interactive, incorporating recommendations from a Management Strategy Advisory Board (MSAB) made up of stakeholders and managers involved in the resource. This includes defining objectives relevant to all parties involved and suggesting management procedures to evaluate against those objectives.

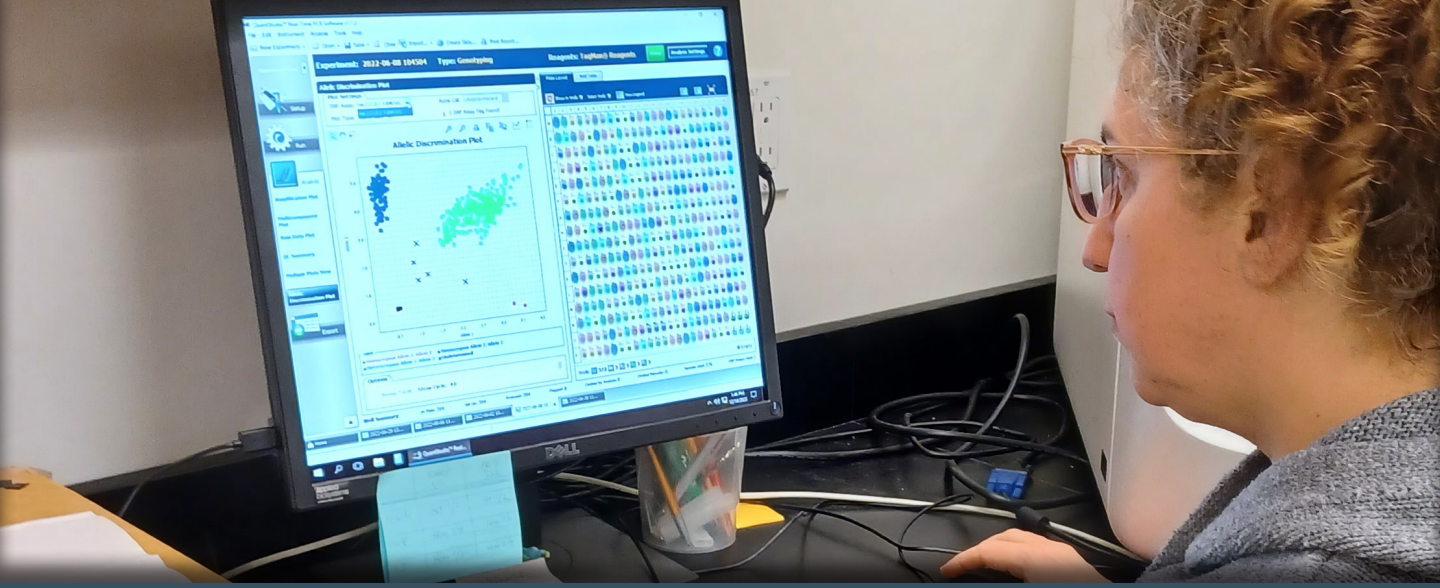
The MSE analysis was first completed in 2020 with an evaluation and comparison of many candidate management procedures that were presented to the Commission for potential adoption and implementation. These management procedures were made up of many different elements to determine the coastwide Total Constant Exploitation Yield (TCEY) and distribute it to IPHC Regulatory Areas. In 2023, alternative size limits (none, 26 inches, and the status quo 32 inches) and assessment frequency (annual, biennial, or triennial) were evaluated. Conservation and fishery objectives were used for the evaluations and the identification of trade-offs. Even though total yield would likely increase by reducing the size limit, this yield would be composed of more small fish which may have less value than large fish. The Commission has decided not to change the size limit for the directed commercial fisheries.

Current MSE work consists of analyses to support the development of a harvest strategy policy. This includes further defining management objectives, evaluating management procedures without an annual stock assessment, evaluating the effect of changes in the FISS design, identifying exceptional circumstances that would warrant additional evaluations of management procedures, and incorporating these outcomes in the harvest strategy policy. In 2025, fishing intensity and assessment frequency continue to be evaluated while a Harvest Strategy Policy, supported by past MSE results, is considered for adoption by the Commission.

Overall, the clear communication of MSE results is important so that stakeholders and Commissioners can make informed decisions and implement a harvest strategy policy.

Management Strategy Advisory Board (MSAB)

The central role of the MSAB is to provide advice to the Commission on options for fishery objectives, performance metrics, candidate management procedures, and to identify trade-offs between the various management procedures being evaluated. A range of stakeholders are represented on the MSAB. An MSAB meeting is scheduled to occur in spring of 2025 to guide the MSE work.



Research

Since its inception, the International Pacific Halibut Commission (IPHC) has had a long history of research activities devoted to describing and understanding the biology and ecology of the Pacific halibut. The main objectives of the Biological and Ecosystem Sciences Research activities 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 IPHC Secretariat develops new projects that are designed to address key biological and ecological topics as well as the continuation of certain projects initiated in previous years. Projects are based on input from the Commissioners, stakeholders, and specific subsidiary bodies to the IPHC such as the Scientific Review Board (SRB) and the Research Advisory Board (RAB). Importantly, biological and ecological research activities at IPHC are guided by a **5-Year Program of Integrated Research and Monitoring (2022-2026)** that identifies key research areas that follow Commission objectives.

The IPHC conducts data collection activities from fishery-independent and fishery-dependent sources such as the IPHC Fishery-independent setline survey (FISS) and commercial fishery landings, respectively, which are described in other chapters of this report.

Migration and Population Dynamics

Estimation of Pacific halibut juvenile habitat

The IPHC Secretariat recently completed a study to investigate the connectivity between spawning grounds and possible settlement areas based on a biophysical larval transport model (**Sadorus et al., 2021**)[1] . Although it is known that Pacific halibut, following the pelagic larval phase, begin their demersal stage as roughly 6-month-old juveniles, settling in shallow nursery (settlement) areas, near or outside the

1 Sadorus, L.L., Goldstein, E.D., Webster, R.A., Stockhausen, W.T., Planas, J.V., and Duffy-Anderson, J.T. 2021. Multiple life-stage connectivity of Pacific halibut (*Hippoglossus stenolepis*) across the Bering Sea and Gulf of Alaska. Fisheries Oceanography. 30(2): 174--193. doi:**https://doi.org/10.1111/fog.12512**.

mouths of bays (**Carpi et al., 2021**)[2], very little information is available on the geographic location and physical characteristics of these areas. In order to fill this knowledge gap, the IPHC Secretariat has initiated studies to identify potential settlement areas for juvenile Pacific halibut throughout IPHC Convention Waters. A first objective of this study is to create a map of suitable settlement habitat by combining available bathymetry information (e.g. benthic sediment composition and shoreline morphological data) and information on recorded presence of age-0, age-1 and age-2 Pacific halibut juveniles as well as absence of young Pacific halibut noted by various nursery habitat projects focused on other flatfish species. Data sources are currently being analyzed.

Wire tagging to study migration 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 National Marine Fisheries Service (NMFS) groundfish trawl survey and, beginning in 2016, on the IPHC FISS. A total of 492 Pacific halibut were tagged and released on the 2024 IPHC FISS. Therefore, a total of 11,641 U32 Pacific halibut have been wire tagged and released on the IPHC FISS and 333 of those have been recovered to date (these totals include a subset of U32 releases that were part of a tail pattern project). In the NMFS groundfish trawl surveys through 2019, a total of 6,421 tags have been released and, to date, 94 tags have been recovered.

Fine-scale analysis of the genetic structure of the Pacific halibut population in the Convention Area

Understanding population structure is imperative for sound management and conservation of natural resources. Pacific halibut in U.S.A. and Canadian waters are managed as a single, panmictic population. To provide support for this management approach, the IPHC Secretariat is conducting an analysis of Pacific halibut population structure in IPHC Convention waters using modern high-resolution genomic techniques (i.e. low-coverage whole genome resequencing, lcWGR) that allow for the examination of genetic structure of Pacific halibut in IPHC Convention Waters with unprecedented resolution. Genetic samples collected during the winter spawning season in known spawning sites (i.e., Bering Sea, Central Gulf of Alaska, Haida Gwaii, and central and western Aleutian Islands) from 1999 until 2020 have been used to investigate stock structure of Pacific halibut in IPHC Convention waters. The temporal replicates at many of these spawning locations will enable the IPHC Secretariat to evaluate the stability of genetic structure over time, ensuring confidence in the results. The IPHC Secretariat has recently produced a high-quality reference **genome**[3] and has generated genomic sequences from 570 individual

2 Carpi, P., Loher, T., Sadorus, L.L., Forsberg, J.E., Webster, R.A., Planas, J.V., Jasonowicz, A., Stewart, I.J., and Hicks, A.C. 2021. Ontogenetic and spawning migration of Pacific halibut: a review. Reviews in Fish Biology and Fisheries. 31: 879-908. doi:**https://doi.org/10.1007/s11160-021-09672-w**.

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

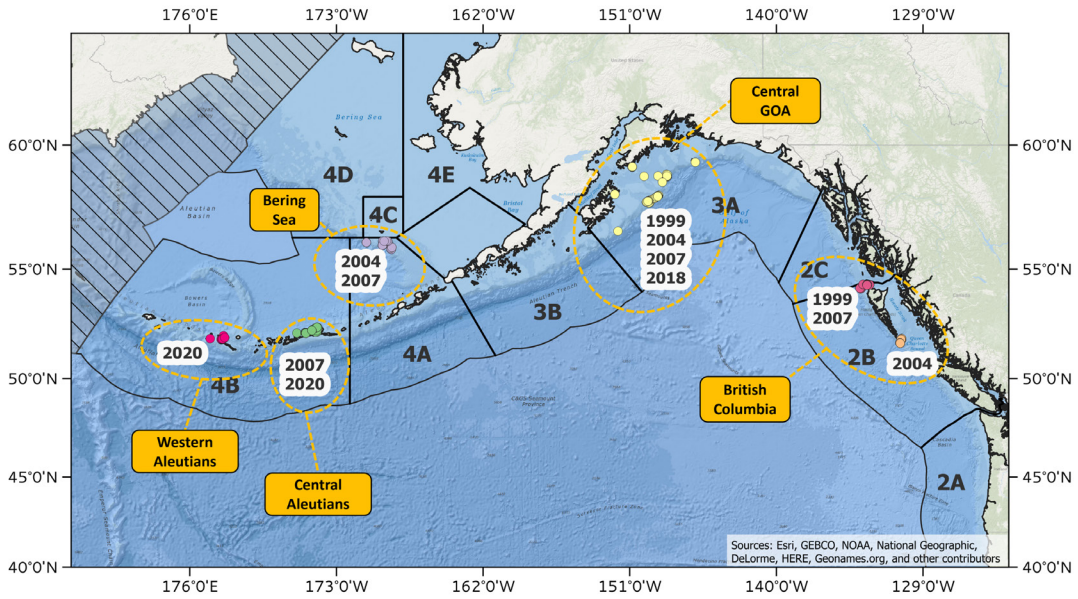


Figure 5. Map of winter sample collections made during the spawning season used for genomic analysis of population structure.

Pacific halibut collected from five geographic areas (Figure 5). Using the lcWGR approach and by leveraging the Pacific halibut reference genome, we have identified approximately 10.2 million single nucleotide polymorphisms (SNPs) that are currently being used to evaluate population structure at the highest resolution possible. Despite the very high-resolution genomic data, preliminary data on population structure using a genome-wide subset of 4.7 million SNPs indicated that distinct genetic groups were not apparent in the dataset, suggesting that there may be very little spatial structure among the spawning groups sampled in IPHC convention waters. Furthermore, assignment testing showed a limited ability (34.7%) to accurately assign samples back to the geographic location in which they were collected from. We hypothesize that the absence of distinct genetic groups among our sample collections is due to a considerable degree of geneflow among the geographic areas sampled in this study and, consequently, to the genetically panmictic nature of the Pacific halibut population sampled for this study.

Sex ratio of the commercial landings

Throughout the fishery's history, the sex ratio of commercially-caught Pacific halibut has remained unknown as landed individuals are eviscerated at sea and otherwise sexually indistinguishable. Historically, the sex ratio from the IPHC's FISS has been the only direct source of sex-ratio information, but differences in size between individuals landed commercially and on the FISS suggested a greater proportion of females in the fishery.

The IPHC has generated sex information of the entire set of aged commercial fishery samples collected from 2017 until 2023 (>10,000 fin clips per year) using genetic techniques based on the identification of sex-specific single nucleotide polymorphisms (SNPs) (Drinan et al., 2018)[4] using TaqMan qPCR assays conducted at the IPHC's Biological Laboratory. The IPHC Secretariat is currently processing genetic samples from the 2024 commercial landings, as 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.

Maturity assessment of female Pacific halibut

Each year, the FISS collects biological data on the maturity of female Pacific halibut that are used in the stock assessment. In

4 Drinan, D.P., Loher, T., and Hauser, L. 2018. Identification of genomic regions associated with sex in Pacific halibut. Journal of Heredity. 109: 326-332.

particular, a female maturity schedule based on characteristics that can be identified through direct examination (i.e. visual in the field) is used to estimate spawning stock biomass. Currently used estimates of maturity-at-age indicate that the age at which 50 percent of female Pacific halibut are sexually mature (i.e., the A_{50} value) is 11.6 years on average (**Clark and Hare, 2006**)[5]. However, female maturity schedules have not been revised in recent years and may be outdated. In addition, the currently used macroscopic visual criteria used to score female maturity in the field have an undetermined level of uncertainty and need to be contrasted with more accurate microscopic (i.e. histological) criteria.

In order to address these issues, the IPHC Secretariat conducted a thorough histological investigation of the temporal progression of female developmental stages and reproductive phases throughout an entire reproductive cycle (Fish et al. **2020**; **2022**)[6],[7],. Results from these studies indicate that female Pacific halibut follow an annual reproductive cycle involving a clear progression of female developmental stages towards spawning within a single year. These results have provided foundational information for ongoing studies aimed at updating maturity ogives by histological assessment in Pacific halibut. One of the most important results obtained show that the period of time when gonad samples can be collected in the FISS (June-August) is an appropriate temporal window during which we can identify Pacific halibut females that are developing towards the spawning capable reproductive phase and, therefore, considered mature for stock assessment purposes.

The IPHC Secretariat is currently conducting studies to revise maturity schedules in all four biological regions through histological (i.e. microscopic) characterization of maturity. For this purpose, the IPHC Secretariat collected ovarian samples for histology during the 2022 FISS (440 samples from Biological Region 2, 351 samples from Biological Region 3, 181 from Biological Region 4, and 51 samples from Biological Region 4B), during the 2023 FISS (403 samples from Biological Region 2 and 708 samples from Biological Region 3), and during the 2024 FISS (411 samples from Biological Region 2 and 336 samples from Biological Region 3, and 371 samples from Biological Region 4). Ovarian samples from the 2022 and 2023 FISS collections have been processed for histology and scored for maturity using histological maturity criteria previously defined 1,21, leading to immature or mature classification. Maturity ogives (i.e., the relationships between the probability of maturity determined by histological assessments and variables including IPHC Biological Region, age, and year) were estimated by fitting generalized additive models (GAM) with logit link (i.e., logistic regression) to the 2022 and 2023 data using year as a factor. When comparing Biological Regions 2 and 3 (the only two Biological Regions with two consecutive years of data) spatial and temporal differences in maturity ogives become apparent. First, the maturity ogive for Biological Region 2 showed lower steepness than that for Biological Region 3 in both years, indicating that Biological Region 2 has a lower proportion of mature females from ages 7 to 25 than Biological Region 3 over the period of ovarian sample collection during the FISS. Second, the maturity ogive

5 Clark, W.G., and Hare, S.R. 2006. Assessment and management of Pacific halibut: data, methods, and policy. Scientific Report No. 83, International Pacific Halibut Commission. **https://www.iphc.int/uploads/2023/10/IPHC-2006-SR083.pdf**

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

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

in Biological Region 2 increased markedly in steepness between 2022 and 2023, indicating an increase in the proportion of mature females at younger ages, whereas the maturity ogive in Biological Region 3 was very similar across the two years. To generate a coastwide maturity ogive, the estimated regional abundance proportions from IPHC's most recent FISS space-time model were used as weights given that sample size was not proportional to population size for each Biological Region. The value of the coastwide ogive at each age was calculated as the abundance proportion at age multiplied by the proportion of mature females at age summed across the Biological Regions. Using the coastwide maturity ogive, the revised A50 value was calculated to be at 10.3 years of age. These results strongly suggest that a higher proportion of female Pacific halibut are maturing at a younger age than previously indicated, with potential implications for overall SSB estimates.

Growth

Current studies in this research area are aimed at understanding the possible role of body growth variation in the observed changes in size-at-age (SAA), and at developing tools for measuring growth and physiological condition in Pacific halibut. In view of our limited knowledge on the underlying physiological basis of body growth and, importantly, on the possible contribution of growth alterations in driving changes in SAA, the IPHC is conducting studies to develop and apply tools to evaluate age-specific growth patterns and their response to environmental influences in Pacific halibut over space and time. The specific objectives of these studies are to investigate the effects of temperature, population density, social structure, and stress on biochemical and molecular indicators of body growth. In addition to significantly improving our understanding of the physiological mechanisms regulating growth, these studies aim at identifying key molecular and biochemical growth signatures that could be used to monitor growth patterns in the Pacific halibut population. At the present time, transcriptomic and proteomic analyses of skeletal muscle from fish subjected to different temperature-induced growth manipulations have resulted in the identification of a number of genes and proteins that could represent potential growth markers for Pacific halibut. Results from these studies are currently being analyzed and a draft manuscript intended for peer-reviewed publication is being prepared.

Mortality and survival assessment

Information on all Pacific halibut removals is integrated by the IPHC Secretariat, providing annual estimates of total mortality from all sources for the stock assessment. Discarding of Pacific halibut via the incidental catch of fish in non-target fisheries and 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 parameterisation.

Discard mortality rates in the directed Pacific halibut fishery

The IPHC Secretariat, with funding by a grant from the Saltonstall-Kennedy Grant Program NOAA (NA17NMF4270240; 2017-2020), has 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, to obtain experimentally-derived estimates of discard mortality rate (DMR) in the directed longline fishery. Our results on individual survival outcomes for captured Pacific halibut and released in excellent viability condition indicate a minimum DMR of 4.2%, that is consistent with the currently-applied DMR value of 3.5%. A second component of these studies investigated the relationships among hook release techniques (e.g., gentle shake, gangion cutting, and hook stripping), injury levels, viability categories, stress levels and physiological condition of released fish, as well as the environmental conditions that the fish experienced during capture. Gentle shake and gangion cutting resulted in the same injury and viability outcomes with 75% of sublegal fish classified in the Excellent viability category, while the hook stripper produced the poorest outcomes (only 9% in the Excellent viability category). Hook stripping also resulted in more severe injuries, particularly with respect to tearing injuries, whereas gentle shake and gangion cutting predominantly resulted in a torn cheek, effectively the injury incurred by the hooking event. Physiological stress indicators (plasma levels of glucose, lactate, and cortisol) did not significant change with viability outcomes, except for higher lactate plasma levels in fish in the Dead viability category. Hematocrit was significantly lower in fish that were classified in the Dead viability category. Furthermore, 89% of fish classified as Dead were infiltrated by sand fleas, present in several sets in deeper and colder waters. Our results indicated that avoiding the use of hook strippers and minimizing soak times in areas known to have high sand flea activity result in better survival outcomes (**Dykstra et al., 2024**)[8].

Discard mortality rates of Pacific halibut in the recreational fishery

The IPHC Secretariat recently completed a study aimed at evaluating the effects of capture and handling conditions on viability and survival of Pacific halibut in the charter

8 Dykstra, C., Wolf, N., Harris, B.P., Stewart, I.J., Hicks, A., Restrepo. F., and Planas, J.V. 2024. Relating capture and physiological conditions to viability and survival of Pacific halibut discarded from commercial longline gear. Ocean and Coastal Management. 249: 107018. **https://doi.org/10.1016/j.ocecoaman.2024.107018**

recreational fishery, with funding from the National Fish and Wildlife Foundation (Project 61484) and the North Pacific Research Board (Project 2009). Investigations on the discard mortality rate (DMR) of Pacific halibut captured using circle hooks and released in Excellent viability category using electronic accelerometer tags yielded DMR estimates of 1.35% (95% CI 0.00-3.95%) for fish that were captured and released. These results represent the first report of experimentally derived estimates of mortality of Pacific halibut captured and discarded in the recreational fishery. As with the study on the directed commercial fishery (previous section), work is currently being conducted to investigate the relationship of injury types, viability categories and survival of discarded fish with capture (e.g. environmental parameters, time on deck, hooking time, etc.) and physiological (e.g. stress) conditions.

Fishing technology

The IPHC Secretariat is conducting studies aimed at developing methods that involve modifications of fishing gear with the purpose of reducing Pacific halibut depredation and bycatch. Specific objectives in this area include 1) investigate new methods for whale avoidance and/or deterrence for the reduction of Pacific halibut depredation by whales (e.g. catch protection methods), and 2) investigate behavioral and physiological responses of Pacific halibut to fishing gear in order to reduce bycatch.

Gear-based approaches to catch protection to minimize whale depredation in the Pacific halibut longline fishery

The IPHC Secretariat has conducted investigations on gear-based approaches to catch protection as a means for minimizing whale depredation in the Pacific halibut longline fisheries with funding from NOAA's Bycatch Research and Engineering Program (BREP) (NOAA Award NA21NMF4720534). The objectives of this study were: 1) work with fishermen and gear manufacturers, via direct communication and through an international workshop, to identify effective methods for protecting hook-captured flatfish from depredation; and 2) develop and pilot test simple, low-cost catch-protection designs that can be deployed effectively using current longline fishing techniques and on vessels currently operating in Convention waters.

From the outcomes of the first part of the study, two different types of catch protection devices were selected for field testing: one based on a modification of a commercial catch protection device (i.e., shuttle system), and one based on a modification of a slinky pot (i.e. shroud system) deployed on branchline gear. Aluminum shuttle devices were modeled after the Sago Extreme device (Sago, Norway) but 80% smaller in size: 2.60 m (8.5 ft) long by 0.80 m (2.6 ft) in diameter, each weighing approximately 100 kg (220 lbs) when empty. Typically, these devices are set with the gear; however, for this study the units were deployed from the surface, during the haulback event. The device encounters the hooks and catch near the seabed, mechanically unhooks fish and entrains them in the storage area. After securing the catch, the device encounters a stopper and is hauled to the surface with fish inside. Several shroud systems were constructed consisting of a modified 'slinky pot' with an opening on one end and a closed end cap on the other that is designed to slide down the branch covering the catch during hauling.

The two different devices were tested off Newport, OR in May of 2023 on a 56 ft (17 m) chartered fishing vessel with an open deck design and typical boom and winch capacity. The focus of the testing was to investigate: 1) the logistics of setting, fishing, and hauling of the two pilot catch protection designs, and 2) the basic performance of the gear on catch rates and fish size compared to non-protected gear in the absence of whales. Pilot testing with the shuttle device consisted of ten sets, each with two 100 hook skates, one acting as a control, and the other equipped with the shuttle. For the shroud system, pilot testing consisted of single sets with six branch lines of 48 ft affixed on 100 ft spacing along the

groundline. Ten gangions and hooks were snapped to the branch lines on 4 ft spacing. Three branch lines had a shroud attached and three branch lines acted as controls. Data collected during the pilot testing of the two types of catch protection devices are currently being analyzed.

The IPHC Secretariat received additional funding (BREP, NOAA Award NA23NMF4720414) for further testing of the shuttle concept in areas with known whale depredation. This work is planned for the summer of 2025 and will allow for further refinements (e.g., attachment protocols, gangion/hook strength), statistical testing of catch rates, and catch composition (e.g., size ranges, species, catch volume) when using the devices, as well as allow for quantification of removals of fish from non-shuttle treatments by depredating whales.

Investigations on behavioral and physiological responses to fishing gear to reduce bycatch

The IPHC Secretariat has participated in studies led by Pacific States Fisheries Management Commission and in collaboration with NOAA Fisheries and fishing industry partners on bycatch reduction measures through the use of fishing gear modifications. Studies conducted include investigating the use of artificial illumination on bottom trawl gear to reduce Pacific halibut bycatch, and the results showed a decrease in the number of Pacific halibut caught in trawl gear when LED lights are present (**Lomeli et al. 2021**)[9]. Other studies investigated the introduction of modifications to circle hooks as a means to reduce yelloweye rockfish bycatch in the Pacific halibut longline fishery, and showed that hook appendages can significantly reduce yelloweye rockfish bycatch without affecting Pacific halibut catch rates (**Lomeli et al. 2023**)[10]. On this same topic, studies were also conducted to investigate the potential effectiveness of semi-demersal longlines in reducing yelloweye rockfish bycatch in the Pacific halibut longline fishery, and the resulting data are currently being analyzed.

Age composition data

The IPHC Secretariat is exploring an artificial intelligence (AI)-based approach to supplement the current Pacific halibut ageing protocol, reducing the need for extensive otolith reader training. The project focuses on developing a deep learning model, specifically a convolutional neural network (CNN), trained on a large dataset of otolith images labeled by expert otolith readers. This automated ageing method aims to enhance efficiency and consistency in age determination. Model testing is currently underway, with ongoing refinements to improve accuracy and reliability.

The most recent model run utilized 2,682 otolith images from the 2019 FISS, which provided a robust dataset capturing regional variations in otolith structures. Preliminary results are promising, with a root mean squared error (RMSE) of 1.90 and 30.3% of ages predicted correctly, and additional 40.7% within one year of error. Future enhancements may include incorporating auxiliary data such as collection date or geospatial characteristics to refine predictions further. By integrating AI-based age determination with traditional methods, the project aims to improve consistency, provide time and cost savings to the organization, and support reliable data input to stock assessments and management advice.

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

10 Lomeli, M.J.M., Wakefield, W.W., Abele, M., Dykstra, C.L., Herrmann, B., Stewart, I.J., and G.C. Christie. 2023. Testing of hook sizes and appendages to reduce yelloweye rockfish bycatch in a Pacific halibut longline fishery. Ocean & Coastal Management 241: 106664. **https://doi:10.1016/j.ocecoaman.2023.106664**.

Management-Supporting Information

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

Looking Forward

This section summarises the major decisions made at the 101st Session of the International Pacific Halibut Commission (IPHC) Annual Meeting (AM101) was held in Vancouver, BC, Canada, from 27-31 January 2025. A total of 21 participants (6 Commissioners: Members; 15 advisors/ experts) attended the Session from the two (2) Contracting Parties, as well as 165 members of the public (104 in-person and 61 remote). The meeting was opened by the Vice-Chairperson, Mr. Jon Kurland (U.S.A.), who welcomed participants.

For a full accounting of documents and presentations provided to the Commission for the meeting, and the final report of the meeting, visit the AM101 webpage: **https://www.iphc.int/meetings/101st-session-of-the-iphc-annual-meeting-am101/**

Mortality limits

The Commission adopted mortality limits (described as Total Constant Exploitation Yield, TCEY limits) for 2025 as provided in Table 10. These mortality limits include a variety of estimated sources of mortality which are detailed in Table 11a and 11b.

Fishing periods

The Commission recommended a commercial fishing for Pacific halibut in all IPHC Regulatory Areas from 06:00 hrs local time on 20 March 2025 until at 23:59 hrs local time on 7 December 2025.

Other regulatory changes

Recreational Fisheries

The Commission adopted changes for charter recreational Pacific halibut fisheries in IPHC Regulatory Areas 2C and 3A se to achieve the charter Pacific halibut allocation under the North Pacific Fisheries Management Council's (NPFMC) Pacific halibut Catch Sharing Plan:

a) IPHC Regulatory Area 2C – one fish bag limit with size limit of less than or equal to

37 inches (94.0 cm) or greater than or equal to 80 inches (203.2 cm), fishery closed on any Tuesday from 13 May to 9 September in 2025, one trip per vessel per day, one trip per charter halibut permit per day, and no annual limit;

b) IPHC Regulatory Area 3A – two-fish bag limit with one fish of any size and a second fish less than or equal to 27 inches (68.6 cm), fishery closed on any Tuesday or Wednesday in 2025, one trip per vessel per day, one trip per charter halibut permit per day, and no annual limit.

Commission officers

The Commission elected Mr Jon Kurland (U.S.A.) as Chairperson of the IPHC, and as Mr Mark Waddell (Canada) as Vice-Chairperson of the IPHC for the period commencing after AM101 through the completion of AM102.

Table 10. Adopted Mortality limits (TCEY) for 2025.

IPHC Regulatory Area	Distributed mortality limits (TCEY) (net weights)	
	Metric Tonnes (t)	Million Pounds (Mlbs)
Area 2A (California, Oregon, and Washington)	748	1.65
Area 2B (British Columbia)	2,472	5.45
Area 2C (southeastern Alaska)	2,368	5.22
Area 3A (central Gulf of Alaska)	4,119	9.08
Area 3B (western Gulf of Alaska)	1,297	2.86
Area 4A (eastern Aleutians)	608	1.34
Area 4B (central and western Aleutians)	472	1.04
Areas 4CDE (Bering Sea)	1,397	3.08
Total	13,481	29.72

Table 11a. Mortality table projected for the 2025 mortality limits (metric tonnes) by IPHC Regulatory Area.

Sector	IPHC Regulatory Area								
	2A	2B	2C	3A	3B	4A	4B	4CDE	Total
Non-FCEY Commercial discards	27	68	N/A	N/A	91	18	5	18	231
026 non-directed discards	27	141	23	118	77	132	59	640	1,220
Recreational	N/A	14	485	399	0	5	0	0	875
Subsistence	N/A	186	113	54	5	0	0	5	367
Total non-FCEY	**59**	**408**	**594**	**572**	**177**	**154**	**64**	**667**	**2,690**
Commercial discards	N/A	N/A	54	204	N/A	N/A	N/A	N/A	259
Recreational	277	376	367	857	N/A	N/A	N/A	N/A	1,583
Subsistence	9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9
Commercial landings	404	1,755	1,393	2,672	1,120	454	408	730	8,940
Total FCEY	**694**	**2,064**	**2,064**	**1,774**	**3,547**	**454**	**408**	**730**	**10,791**
							4C FCEY	340	
							4D FCEY	340	
							4E FCEY	54	
TECY	**748**	**2,472**	**2,368**	**4,119**	**1,297**	**608**	**472**	**1,397**	**13,481**
U26 non-directed discards	5	18	0	113	50	59	5	612	862
Total	753	2,490	2,368	4,232	1,347	667	476	2,009	14,343

Table 11b. Mortality table projected for the 2025 mortality limits (millions of net pounds) by IPHC Regulatory Area.

Sector	IPHC Regulatory Area								
	2A	2B	2C	3A	3B	4A	4B	4CDE	Total
Commercial discards	0.06	0.18	N/A	N/A	0.20	0.04	0.01	0.04	0.51
026 non-directed discards	0.06	0.31	0.05	0.26	0.17	0.29	0.13	1.41	2.69
Recreational	N/A	0.03	1.01	0.88	0.00	0.01	0.00	0.00	1.93
Subsistence	N/A	0.41	0.25	0.12	0.01	0.00	0.00	0.01	0.81
Total non-FCEY	**0.13**	**0.90**	**1.31**	**1.26**	**0.39**	**0.34**	**0.14**	**1.47**	**5.93**
Commercial discards	N/A	N/A	0.12	0.45	N/A	N/A	N/A	N/A	0.57
Recreational	0.62	0.68	0.72	1.48	N/A	N/A	N/A	N/A	3.49
Subsistence	0.02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.02
Commercial landings	0.89	3.87	3.07	5.89	2.47	1.00	0.90	1.61	19.71
Total FCEY	**1.53**	**4.55**	**3.91**	**7.82**	**2.47**	**1.00**	**0.90**	**1.61**	**23.79**
							4C FCEY	0.75	
							4D FCEY	0.75	
							4E FCEY	0.12	
TECY	**1.65**	**5.45**	**5.22**	**9.08**	**2.86**	**1.34**	**1.04**	**3.08**	**29.72**
U26 non-directed discards	0.014	0.04	0.00	0.18	0.09	0.13	0.01	1.35	1.90
Total	1.66	5.49	5.22	9.33	2.97	1.47	1.05	4.43	31.62

IPHC Secretartiat update

The activities highlighted in this report account for the majority of the IPHC Secretariat time. However, there is also considerable effort put into public outreach, attending conferences and meetings that enhance knowledge, and contributing expertise to the broader scientific community through participation on boards and committees. This section highlights some of those activities.

Committees and organisation appointments

North America:

- Canada – U.S. Groundfish Technical Committee - Dr. Josep Planas

Canada:

- Halibut Advisory Board (Canada) - Dr. David Wilson (Dr. Basia Hutniczak – Alternate)

United States of America:

- Bering Sea/Aleutian Islands Plan Team - Dr. Allan Hicks
- Bering Sea Fishery Ecosystem Plan Team - Dr. Ian Stewart
- NPFMC Scientific and Statistical Committee - Dr. Ian Stewart
- North Pacific Research Board Science Panel - Dr. Josep Planas
- Marine Resource Education Program, North Pacific – Dr. Allan Hicks
- Fisheries Monitoring Science Committee (NOAA-Alaska) – Dr. Ray Webster
- Interagency electronic reporting system for commercial fishery landings in Alaska (eLandings) Steering Committee – Dr. Basia Hutniczak
- Benchmark workshop on Mackerel and Norwegian spring-spawning herring (WKBMACNSSH), reviewer. – Dr. Allan Hicks

Academic affiliations

Affiliate Faculty:

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

Graduate student committee member:

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

Financial performance report and statements

The IPHC is funded jointly by the governments of Canada and the United States of America (U.S.A.). For fiscal year 2024, contributions for general operating expenses were as follows:

- Canada: US$927,419.21;
- U.S.A.: US$4,282,492.80

The U.S.A. is responsible for the IPHC Headquarters lease and maintenance which resulted in an ad-hoc contribution of US$513,712.50.

Independent auditor

The Commission's financial accounts for FY2024 were audited by the accounting firm of Clark Number PS. The auditors provided the following unmodified opinion:

"In our opinion, the accompanying financial statements present fairly, in all material respects, the financial position of the Commission as of September 30, 2024, and the results of its operations and its cash flows for the year then ended in accordance with accounting principles generally accepted in the United States of America."

The full report of the Independent Auditors is publicly available on the IPHC website: **IPHC-2025-FAC101-05**

Statement of financial activities

The total Assets at year-end closing totaled US$8,107,053.82.
The total equity or combined fund balance at year-end closing totaled US$2,764,086.00

At year end September 30, 2024, program balances were comprised of:

	10 - General	20 - Research	30 - Statistics	35 - AK Cost Recovery	40 - FISS	50 - Reserve	Total
Cash	$ 2,070,161	$ 467,636	$ 137,956	$ (485,167)	$ 208,917	$ 2,198,364	$ 4,597,867
Accounts receivable					4,143		4,143
Grants receivable		1,975		416,438			418,413
Prepaid expenses and other assets	67,790	4,648			4,229		76,667
Capital assets, net	2,901,623	25,263		49,698	33,379		3,009,963
Accounts payable	(157,392)	(2,267)	(2,755)	(2,065)	(2,912)		(167,391)
Accrued liabilities	(4,575)	(19,201)	(25)		(384)		(24,185)
Payroll liabilities	(115,548)	(67,032)	(44,073)	(35,726)	(13,678)		(276,057)
Compensated absences	(187,816)	(122,883)	(124,553)	(25,602)	(28,266)		(489,120)
Lease liabilities	(2,952,732)			(51,567)	(24,308)		(3,028,607)
Unearned revenue	(970,607)				(387,000)		(1,357,607)
Net Position	**$ 650,904**	**$ 288,139**	**$ (33,450)**	**$ (133,991)**	**$ (205,880)**	**$ 2,198,364**	**$ 2,764,086**

Clark Nuber PS

Independent Auditor's Report

To the Commissioners
International Pacific Halibut Commission
Seattle, Washington

REPORT ON THE AUDIT OF THE FINANCIAL STATEMENTS

Opinion

We have audited the financial statements of International Pacific Halibut Commission (the Commission), which comprise the statement of net position as of September 30, 2024, and the related statements of revenues, expenses and changes in net position, and cash flows for the year then ended, and the related notes to the financial statements, which collectively comprise the Commission's basic financial statements as listed in the table of contents.

In our opinion, the accompanying financial statements present fairly, in all material respects, the financial position of the Commission as of September 30, 2024, and the results of its operations and its cash flows for the year then ended in accordance with accounting principles generally accepted in the United States of America.

Basis for Opinion

We conducted our audit in accordance with auditing standards generally accepted in the United States of America (GAAS). Our responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of the Financial Statements section of our report. We are required to be independent of the Commission and to meet our other ethical responsibilities, in accordance with the relevant ethical requirements relating to our audit. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Responsibilities of Management for the Financial Statements

Management is responsible for the preparation and fair presentation of the financial statements in accordance with accounting principles generally accepted in the United States of America, and for the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is required to evaluate whether there are conditions or events, considered in the aggregate, that raise substantial doubt about the Commission's ability to continue as a going concern for one year after the date that the financial statements are available to be issued.

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Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance but is not absolute assurance and therefore is not a guarantee that an audit conducted in accordance with GAAS will always detect a material misstatement when it exists. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control. Misstatements are considered material if there is a substantial likelihood that, individually or in the aggregate, they would influence the judgment made by a reasonable user based on the financial statements.

In performing an audit in accordance with GAAS, we:

- Exercise professional judgment and maintain professional skepticism throughout the audit.
- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, and design and perform audit procedures responsive to those risks. Such procedures include examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Commission's internal control. Accordingly, no such opinion is expressed.
- Evaluate the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluate the overall presentation of the financial statements.
- Conclude whether, in our judgment, there are conditions or events, considered in the aggregate, that raise substantial doubt about the Commission's ability to continue as a going concern for a reasonable period of time.

We are required to communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit, significant audit findings, and certain internal control-related matters that we identified during the audit.

Clark Nuber PS

Required Supplementary Information

Accounting principles generally accepted in the United States of America require that the management's discussion and analysis on pages 4 through 7 be presented to supplement the basic financial statements. Such information, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board, who considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the basic financial statements, and other knowledge we obtained during our audit of the basic financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

Supplementary Information

Our audit was conducted for the purpose of forming an opinion on the financial statements as a whole. The statement of revenues, expenses, and changes in net position by fund is presented for purposes of additional analysis and is not a required part of the financial statements. Such information is the responsibility of management and was derived from and relates directly to the underlying accounting and other records used to prepare the financial statements. The information has been subjected to the auditing procedures applied in the audit of the financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the financial statements or to the financial statements themselves, and other additional procedures in accordance with auditing standards generally accepted in the United States of America. In our opinion, the information is fairly stated in all material respects in relation to the financial statements as a whole.

Clark Nuber P.S.

Certified Public Accountants
December 19, 2024

INTERNATIONAL PACIFIC HALIBUT COMMISSION

Statement of Revenues, Expenses and Changes in Net Position by Fund
For the Year Ended September 30, 2024

	10 - General	20 - Research	30 - Statistics	35 - AK Cost Recovery	40 - FISS	50 - Reserve	Total
Operating Revenue:							
Fish sales	$ -	$ -	$ -	$ -	$ 2,379,891	$ -	$ 2,379,891
Contracting party contributions	3,620,747	1,073,364	1,074,309		174,205		5,942,625
Grants, contracts and agreements		41,769		796,218			837,987
Interest income	103,776						103,776
Other income	25,886	915	4,793	16,507	6,571		54,672
Realized gains on foreign transaction fees	5		172		208		385
Fund transfer	(820,621)	4,073	4,024	74,225	(22,821)	761,120	
Total Income	**2,929,793**	**1,120,121**	**1,083,298**	**886,950**	**2,538,054**	**761,120**	**9,319,336**
Expenses:							
General expenses-							
Personnel	1,473,789	643,582	817,346	526,677	737,836		4,199,230
Benefits	450,250	189,862	218,137	148,155	151,254		1,157,658
Training and education	47,200	600	3,721	16,617	15,520		83,658
Personnel related expenses	2,271		2,095	3,113	5,759		13,238
Total general expenses	1,973,510	834,044	1,041,299	694,562	910,369		5,453,784
Operating expenses-							
Publications	2,349	6,998					9,347
Mailing and shipping	4,868	298	1,029	1,147	57,639		64,981
Travel	51,163	15,623	16,058	36,831	61,876		181,551
Meetings	238,920						238,920
Technology	116,555		19,192				135,747
Total operating expenses	413,855	22,919	36,279	37,978	119,515		630,546
Fees and contract expenses-							
Professional fees	193,629	140					193,769
Vessel expenses					326,109		326,109
Other fees and charges	27,958		883	8,673	16,091		53,605
Leases and contracts	23,415	1,088	19,762	16,197	1,038,280		1,098,742
Communications	29,138		676	543	1,274		31,631
Total fees and contract expenses	274,140	1,228	21,321	25,413	1,381,754		1,703,856
Facilities and equipment expenses-							
Equipment		21,140	10,236	17,364	8,817		57,557
Supplies	33,603	84,045	3,012	9,402	220,280		350,342
Maintenance and utilities	29,211	1,001	537	1,116	917		32,782
Facilities rentals	443,666	235	6,544	24,198	16,499		491,142
Total facilities and equipment expenses	506,480	106,421	20,329	52,080	246,513		931,823
Grant expense - change in grant revenue period recognition				1,669,001			1,669,001
Other expenses	(5,189)	1,617		71,345	21,069		88,842
Total Expenses	**3,162,796**	**966,229**	**1,119,228**	**2,550,379**	**2,679,220**		**10,477,852**
Change in Net Position	**(233,003)**	**153,892**	**(35,930)**	**(1,663,429)**	**(141,166)**	**761,120**	**(1,158,516)**
Net position, beginning of the year	883,907	134,247	2,480	1,529,438	(64,714)	1,437,244	3,922,602
Net Position, End of Year	**$ 650,904**	**$ 288,139**	**$ (33,450)**	**$ (133,991)**	**(205,880)**	**$ 2,198,364**	**$ 2,764,086**

See independent auditor's report.

Thank you

The IPHC wishes to thank all of the agencies, industry, and individuals who helped us in our investigations during 2024 in support of the Commission's mandate. A special thank you goes to the following:

- Personnel in the many processing plants who assist the IPHC Secretariat's Fishery-Independent Setline Survey (FISS) by storing and staging equipment and supplies, as well as our Fisheries Data Specialists operating in the field.
- OBI Seafoods, Icy Straight Seafoods, and E.C. Phillips & Son for working closely with the IPHC Secretariat throughout the FISS to provide quality chum salmon to be used as bait, and to the captains, crews, and buyers who help to make the FISS successful.
- IPHC Regulatory Area 2A tribal biologists and domestic agency staff for sampling IPHC Regulatory Area 2A tribal and non-tribal commercial fishery landings.
- CDQ managers for providing the total number and weight of undersized Pacific halibut retained by authorized persons and the methodology used to collect these data.
- The Observer Programs coastwide for deploying observers on vessels fishing in the directed commercial fishery, and for collecting, documenting, and forwarding tags recovered.
- The North Pacific Fishery Management Council and Pacific Fishery Management Council for their ongoing coordination with the IPHC.
- Fisheries and Oceans Canada for their ongoing coordination with the IPHC, in particular with electronic logbooks, Pacific halibut removal estimates, and with IPHC FISS operations given protected habitats and species.
- Provincial, state and federal agency staff from both Canada and the U.S.A., as well as government contractors, for their assistance in the provision of data for the various fisheries impacting Pacific halibut mortality, landing notifications, and for their assistance in conducting the IPHC FISS.
- Members of IPHC's Subsidiary bodies that dedicated their time and expertise to improve research, science, and management products.
- Grant funding agencies (North Pacific Research Board, National Fish and Wildlife Foundation, Bycatch Reduction Engineering Program – NOAA) for their financial support of IPHC research activities.

2024 Publications

The IPHC publishes an Annual Report, meeting documents, circulars, media releases, and peer reviewed journal articles. The IPHC website (**www.iphc.int**) includes a document library of all publications from 1931-2024. Articles and reports published during 2024 and authored by the IPHC Secretariat are cited below.

Dykstra, C., Wolf, N., Harris, B.P., **Stewart, I.J., Hicks, A.**, Restrepo. F., **Planas, J.V.** 2024. Relating capture and physiological conditions to viability and survival of Pacific halibut discarded from commercial longline gear. Ocean & Coastal Management. 249: 107018. **https://doi.org/10.1016/j.ocecoaman.2024.107018**

Sadorus, L. L., Webster, R. A. and Sullivan, M. 2024. Environmental conditions on the Pacific halibut fishing grounds obtained from a decade of coastwide oceanographic monitoring, and the potential application of these data in stock analyses. Marine and Freshwater Research. 75: MF23175. **https://doi.org/10.1071/MF23175**.

Simchick, C., Simeon, A., Bolstad, K., **Planas, J.V.** 2024. Endocrine patterns associated with ovarian development in female Pacific halibut (*Hippoglossus stenolepis*). General and Comparative Endocrinology. 347: 114425. **https://doi.org/10.1016/j.ygcen.2023.114425**

Thomas, R.E., Gauthier, S., Grandin, C., **Hicks, A.**, Parker-Stetter, S. 2024 To trawl or not to trawl: Questioning core assumptions of trawl placement choice in fisheries acoustic surveys. Fisheries Research. 270: 106897. **https://doi.org/10.1016/j.fishres.2023.106897**

Hutniczak, B., Wilson, D., Stewart, I., Hicks, A. 2024. A hundred years of Pacific halibut management in the context of global events. Frontiers in Marine Science. 11:1424002. **https://doi.org/10.3389/fmars.2024.1424002**

In Review:

McGilliard, C.R., Ianelli, J., Cunningham, C., **Hicks, A.**, Hanselman, D., Stram, D., Henry, A. Evaluating Bering Sea Pacific halibut bycatch management options using closed-loop simulations in a dynamic, multi-agency setting. Canadian Journal of Fisheries and Aquatic Sciences.

Ritchie, B., Smeltz, T.S., **Stewart, I.J.**, Harris, B., Wolf, N. Exploring spatial and temporal patterns in the size-at-age of Pacific halibut in the Gulf of Alaska. Fisheries Management and Ecology.

Adams, G., Holsman, K., Rovellini, A., **Stewart, I.J.**, Privitera-Johnson, K., Wasserman, S.N., Punt, A. Implications of predator-prey dynamics for single species management. Canadian Journal of Fisheries and Aquatic Sciences.

Centenary

Marking IPHC's centennial year

In 1923, Canada and the United States of America signed the *Convention for the Preservation of the Halibut Fishery of the Northern Pacific Ocean and Bering Sea* in response to conservation needs. This landmark agreement led to the establishment of the International Pacific Halibut Commission (IPHC), initially named the International Fisheries Commission, as an international organisation dedicated to the joint management of Pacific halibut. The Convention came into effect on 21 October 1924, marking the world's oldest international agreement for cooperative marine resource management, and still in operation.

Over the past century, the IPHC has been successfully managing the Pacific halibut resource for Canada and the USA, through the application of rigorous science, innovation, and the implementation of international best practice. To celebrate this milestone, the IPHC held a series of centennial events throughout 2024 and published a review detailing the history of the Commission's role in the sustainable management of Pacific halibut.

Centennial celebrations at AM100 in Anchorage, Alaska, USA

The main centennial celebration coincided with the 100th Session of the IPHC Annual Meeting (AM100) held in Anchorage, Alaska, USA. The event brought together distinguished guests, including First Chief Aaron Leggett of the Native Village of Eklutna and Anchorage Mayor Dave Bronson, who delivered opening remarks.

Chief Leggett, a leading advocate for Indigenous heritage, provided historical context on the Dena'ina Athabascan people, whose deep-rooted connection to the land and waters is integral to the region's history. Mayor Bronson highlighted Anchorage's significance in the Alaskan and international fisheries landscape, emphasizing the city's long-standing relationship with the IPHC.

The Centennial Reception, an evening of reflection and camaraderie, opened by Dr. David Wilson, IPHC Executive Director, was led by emcee Mr Glenn Reed, a veteran in the seafood industry. The event featured speeches from key figures such as Dr. Kelly Kryc, Deputy Assistant Secretary for International Fisheries at NOAA, and Mr Mark Waddell, Director General of Fisheries Policy for Fisheries and Oceans Canada. Their addresses underscored the importance of international cooperation in managing Pacific halibut stocks. Commissioner Richard Yamada presented a video chronicling the IPHC's 100-year history, showcasing its evolution from a bilateral treaty between Canada and the USA to a globally recognized model of sustainable fisheries governance.

In addition to formal addresses, the evening featured interactive elements, including a networking activity designed to foster connections among attendees. The highlight of the night was a performance by Pamyua, an Inuit-soul musical group that blends their culture with influences from around the world.

The IPHC Centennial Celebrations not only commemorated a century of achievements but also set the stage for the Commission's future endeavors in scientific research and responsible resource management. As attendees reflected on the past and looked ahead, the event reinforced the shared commitment of stakeholders across sectors to ensure the sustainability of Pacific halibut for generations to come.

IPHC Sessions at international conferences

In addition to AM100 celebrations, the IPHC marked its Centennial Year by organising two successful sessions held at major international conferences, highlighting the Commission's mission, history and accomplishments to a broad audience.

The first IPHC Session took place during the 2023 Annual Meeting of the North Pacific Marine Science Organization (PICES) held in Seattle, WA in October 2023. A long-term partner organisation for PICES since 2000, the IPHC has regularly contributed to PICES activities, recognizing the value of international cooperation in understanding of environmental impacts on the biology, distribution and management of flatfish species across the North Pacific Ocean. The IPHC Session entitled "The International Pacific Halibut Commission: 100 years of science-based fishery management" featured a series of presentations led by Dr. Wilson and followed by contributions from IPHC Secretariat staff that covered past, present and future activities of the Commission in fisheries science and management (Figure 6). During the 2023 PICES Annual Meeting, PICES honoured the IPHC Centenary by presenting the Commission with a commemorative plaque (Figure 5).

The second IPHC Session took place during the 9th World Fisheries Congress held in Seattle, WA in March 2024, one of the largest and most important events for fisheries science and management held every four years. The IPHC organised a session entitled "The International Pacific Halibut Commission: 100 years of science-based fishery management", featuring a series of presentations from the IPHC Secretariat highlighting key aspects of the IPHC's 100-year history of contributions to fisheries science and management (Figure 7). The session concluded with a networking reception, providing attendees and invited participants with an opportunity to engage in discussions about the IPHC's legacy and future role in international fisheries governance.

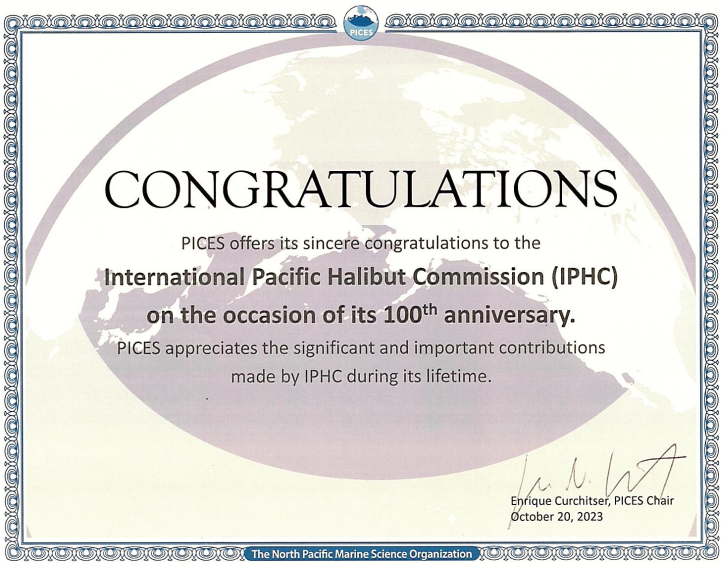


Figure 5. Commemorative plaque presented to the IPHC during the 2023 PICES Annual Meeting.

Publication

The IPHC's Centennial Year was an opportunity to not only celebrate a remarkable history of the Commission, but also reflect on challenges that shaped its mission. To mark this milestone, the IPHC Secretariat undertook a comprehensive review of the evolution of Pacific halibut management, culminating in the publication A hundred years of Pacific halibut management in the context of global events and trends in fisheries management (Hutniczak B., Wilson D. T., Stewart I. J., and Hicks A. C., Front. Mar. Sci., 1 December 2024, Sec. Marine Affairs and Policy, Volume 11 – 2024; **https://doi.org/10.3389/fmars.2024.1424002**).

This paper traces the origins of the IPHC to concerns over overfishing during World War I and explores the foundation of the IPHC dating back to the Convention for the Preservation of the Halibut Fisheries of the Northern Pacific Ocean, signed between Canada and the United States of America on 2 March 1923, and exchanged on 21 October 1924. This agreement established the International Fisheries Commission, renamed in 1953 to the International Pacific Halibut Commission. As the first international agreement for joint management of a marine fishery resource, it was a major milestone for development of modern standards for marine conservation.

Throughout its history, the Commission gradually expanded its authority to implement a wide range of conservation measures through established public confidence in its basis for decisions. This paper explores the evolution of management measures applied to Pacific halibut commercial fishing shaped not only by the changing stock conditions and growing demand for seafood, but also global events and trends in fisheries management. It examines the impact of rapid commercialization of fisheries driven by population growth and technological improvements, establishment of exclusive economic zones and altered access to fishing grounds, and adoption of Agenda 21, which highlighted the importance of balancing environmental, economic, and social aspects in fisheries management.

The paper concludes by reflecting on lessons learned over the past century and their implications for future fisheries management, emphasizing the importance of international cooperation, adaptive strategies, and science-based policies in sustaining transboundary fish stocks like the Pacific halibut.

The International Pacific Halibut Commission: 100 years of science-based fishery management

09:00-9:10 Welcome and Introduction to the Special Session

9:10-9:30 Invited Speaker: *The International Pacific Halibut Commission: 100 years of science-based fishery management decision making.* – Dr. David T. Wilson, Executive Director, International Pacific Halibut Commission

9:30–9:50 Invited Speaker: *Hundred years of Pacific halibut management in the context of global events.* – Dr. Barbara Hutniczak, International Pacific Halibut Commission

9:50–10:10 Invited Speaker: *Migration, MSE and management: the wonder world of Pacific halibut.* – Dr. Piera Carpi, Institute of Marine Research, Norway

10:10-10:30 Oral Communication: *More than fifty years of management strategy evaluation at the International Pacific Halibut Commission.* – Dr. Allan Hicks, International Pacific Halibut Commission, USA

10:30-10:50 Coffee Break

10:50-11:10 Oral Communication: *The long path to ensemble-based stock assessment.* – Dr. Ian J. Stewart, International Pacific Halibut Commission, USA

11:10-11:30 Oral Communication: *Fishery-Dependent Data Collection at the International Pacific Halibut Commission.* – Ms. Monica M. Thom International Pacific Halibut Commission, USA

11:30-11:50 Oral Communication: *The IPHC's fishery-independent setline survey: an historical review and a look to the future.* – Dr. Ray Webster, International Pacific Halibut Commission, USA

11:50-12:10 Oral Communication: *International Pacific Halibut Commission Fishery-Independent Setline Survey (FISS).* –Ms. Kayla Ualesi, International Pacific Halibut Commission, USA

12:10-12:30 Oral Communication: *Biological and Ecological Research at the International Pacific Halibut Commission.* – Dr. Josep Planas, International Pacific Halibut Commission, USA

Figure 6. Agenda for "The International Pacific Halibut Commission: 100 years of science-based fishery management" held during the PICES 2023 Annual Meeting.

WORLD FISHERIES CONGRESS | 3–7 MARCH 2024 Seattle

The International Pacific Halibut Commission: 100 years of science-based fishery management

09:00-9:15 Welcome and Introduction to the Session – Dr. David T. Wilson, Executive Director, International Pacific Halibut Commission

9:15–9:30 Oral Communication: *Using Environmental Regimes to Inform Stock Assessment Recruitment Estimates for Pacific Halibut.* – Dr. Ian J. Stewart, International Pacific Halibut Commission, USA

9:30–9:45 Oral Communication: *Hundred years of Pacific halibut management in the context of global events.* – Dr. Barbara Hutniczak, International Pacific Halibut Commission

9:45-10:00 Oral Communication: *Evolution of a management procedure for Pacific halibut fisheries.* – Dr. Allan Hicks, International Pacific Halibut Commission, USA

10:00-10:15 Oral Communication: *IPHC's fishery-independent setline survey: historical review and future challenges.* – Dr. Ray Webster, International Pacific Halibut Commission, USA

10:15-10:30 Oral Communication: *Fishery-Dependent Data Collection at the International Pacific Halibut Commission.* – Ms. Monica M. Thom International Pacific Halibut Commission, USA

10:30-11:00 Coffee Break

11:00-11:15 Oral Communication: *Biological and Ecological Research at the International Pacific Halibut Commission.* – Dr. Josep Planas, International Pacific Halibut Commission, USA

11:15-12:00 Discussion Session

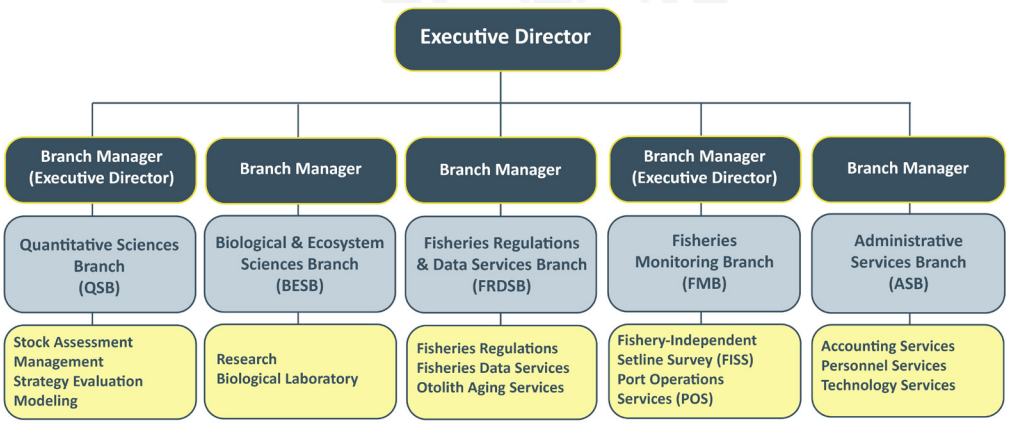
Figure 7. Agenda for 9th World Fisheries Congress held in Seattle, WA in March 2024.

IPHC Secretariat
(31 December 2024)

Seattle Headquarters		
Name	**Branch**	**Position Title (Official)**
David T. Wilson, Ph.D.		Executive Director
Allan Hicks, Ph.D.	Quantitative Sciences	Quantitative Scientist (Management Strategy Evaluation)
Ian Stewart, Ph.D.	Quantitative Sciences	Quantitative Scientist (Stock Assessment)
Raymond Webster, Ph.D.	Quantitative Sciences	Quantitative Scientist (Biometrician)
Josep Planas, Ph.D.	Biological and Ecosystem Sciences	Branch Manager
Claude Dykstra, M.Sc.	Biological and Ecosystem Sciences	Research Biologist (Mortality and Survivorship)
Andy Jasonowicz, M.Sc.	Biological and Ecosystem Sciences	Research Biologist (Genetics)
Colin Jones, M.Sc.	Biological and Ecosystem Sciences	Research Biologist (Life History)
Crystal Simchick, B.Sc.	Biological and Ecosystem Sciences	Biological Science Laboratory Technician
Rebecca Barsky	Biological and Ecosystem Sciences	Undergraduate Intern
Max Luthy	Biological and Ecosystem Sciences	Undergraduate Intern
Barbara Hutniczak, Ph.D.	Fisheries Regulations and Data Services	Branch Manager
Huyen Tran, A.A.	Fisheries Regulations and Data Services	Fisheries Data Coordinator
Tom Kong, B.Sc.	Fisheries Regulations and Data Services	Fisheries Data Specialist (HQ-GIS)
Kimberly Sawyer Van Vleck, B.Sc.	Fisheries Regulations and Data Services	Fisheries Data Specialist (HQ)
Kelsey Magrane, B.Sc.	Fisheries Regulations and Data Services	Fisheries Data Specialist (HQ)
Joan Forsberg, B.Sc.	Fisheries Regulations and Data Services	Otolith Laboratory Technician (Snr)
Christopher Johnston, B.Sc.	Fisheries Regulations and Data Services	Otolith Laboratory Technician
Monica Thom, B.Sc.	Fisheries Monitoring	Port Operations Coordinator
Kayla Ualesi, B.Sc.	Fisheries Monitoring	Setline Survey Coordinator
Tyler Jack, M.Sc.	Fisheries Monitoring	Setline Survey Specialist (Snr)
Rachel Rillera, B.Sc.	Fisheries Monitoring	Setline Survey Specialist
Kevin Coll, B.Sc.	Fisheries Monitoring	Setline Survey Specialist
Vacant	Administrative Services	Branch Manager
Kelly Chapman, B.A.	Administrative Services	Administrative Coordinator
Tara Coluccio, B.A.	Administrative Services	Administrative Specialist (Snr)/Publications
Ola Wietecha, B.A.	Administrative Services	Administrative Specialist
Mohammad Arian, B.B.A.	Administrative Services	Administrative Specialist (Accounting)
Kenneth Wickham, B.A.	Administrative Services	Administrative Specialist
Robert Tynes	Administrative Services	Lead IT Specialist (INFOSEC/SysAdmin)
Afshin Taheri, B.Sc.	Administrative Services	IT Specialist

Fisheries Data Specialists (Field) Port Operations Services	
Name	**Location**
Stephen Brennan	Kodiak, AK
Lisa Crawford	Port Hardy, B. C.
Jessica Marx	Homer, AK
Binget Nilsson	Seward, AK
Ann-Marie Stogrin	Prince Rupert, B. C.
Phoenix Keane	Dutch Harbor, AK
Natachan (Tachi) Sopow	Sitka, AK
Matthew Thompson	Petersburg, AK

Setline Survey Specialists (Field) Fisheries-Independent Setline Survey	
Name	
Colin Blackie	Francis Maddox
Sean Burns	Margaret McDonald
Nancy Franco	Rodolfo Curralo Moreira
Monica Fezuk	Maurice O'Malley
Allen Dean Gaidica	Silvestre Natario
Peter Jankiewicz	Jeffrey Scott
Gregory Jay	Jon Turnea
Taylan Tolga Koken	Sarah Williamson



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Chris Oliver 2018-2020
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