ALASKA RESPONSIBLE FISHERY MANAGEMENT CERTIFICATION SURVEILLANCE REPORT (NO.4)

For The

Alaska Pacific Halibut Commercial Fishery

Client

'Eat on the Wild Side (FVOA)

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I. Summary and Recommendations

The Alaska Seafood Marketing Institute (ASMI) owns a Certification Scheme for the Responsible Fisheries Management of Alaska Fisheries. Eat on the Wild Side (FVOA) is the client representative for the Alaska Pacific halibut (*Hippoglossus stenolepis*) commercial fisheries. The fishery was certified on the 25th April 2011. In accordance with procedure, an approved certification body is required to conduct an annual surveillance audit to conform the circumstances for continued certification.

This report is the **4th Surveillance Report (ref: AK/HAL/001.4/2015)** for the Alaska Pacific Halibut commercial fisheries following Certification. The objective of the Surveillance Report is to monitor for any changes/updates (after 12 months) in the management regime, regulations and their implementation since the previous assessment (in this case 3rd Surveillance) and to determine whether these changes (if any) and current practices remain consistent with the overall confidence rating scorings of the fishery allocated during initial certification.
In addition to this, any areas reported as "items for surveillance" or corrective action plans (following identified non-conformance) in the previous assessment are reassessed and a new conclusion on consistency of these items with the Conformance Criteria is given accordingly. No non-conformances were identified during the full or the 1st, 2nd, or 3rd surveillance assessments. Consequently, no formal corrective action plans were issued. However, a number of issues relating to the estimation of bycatch in the halibut fleet were identified for review as item for surveillance during the surveillance activities.

The certification covers the Pacific halibut (*Hippoglossus stenolepis*) commercial fisheries employing benthic longline gear within the IPHC's Regulatory Areas 2C, 3A, 3B, 4B and 4CDE, within Alaska jurisdiction (200 nautical miles EEZ), under international [International Pacific Halibut Commission (IPHC)], federal [National Marine Fisheries Services (NMFS)/North Pacific Fishery Management Council (NPFMC)] and state [Alaska Department of Fish and Game (ADFG)] management.

The surveillance assessment was conducted according to the Global Trust Certification procedures for FAO – Based Responsible Fisheries Management Certification using the FAO – Based RFM Conformance Criteria V1.2 fundamental clauses as the assessment framework.

The assessment was conducted by a team of Global Trust appointed Assessors comprising of one externally contracted fishery expert and Global Trust internal staff. Details of the assessment team are provided in Appendix 1.

The main Key outcomes have been summarized in Section 5 "Assessment Outcome Summary".

II. Assessment Team Details

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III. Acronyms

ABC	Allowable Biological Catch
ACL	Annual Catch Limits
ADFG	Alaska Department of Fish and Game
AFA	American Fisheries Act
AFSC	Alaska Fisheries Science Center
ANILCA	Alaska National Interest Lands Conservation Act
ASMI	Alaska Seafood Marketing Institute
AWT	Alaska Wildlife Troopers
BOEM	Bureau of Ocean Energy Management, Regulation and Enforcement
BOF	Board of Fisheries
BSAI	Bering Sea and Aleutian Islands
CCRF	Code of Conduct for Responsible Fisheries
CDQ	Community Development Quota
CFEC	Commercial Fisheries Entry Commission
CP	Catcher Processor (vessel)
CPUE	Catch per Unit Effort
CV	Catcher Vessel
DEC	Department of Environmental Conservation
DFO	Department of Fisheries and Oceans (Canada)
DNR	Department of Natural Resources
EBio	Exploitable (stock) biomass
EBS	Eastern Bering Sea
EIS	Environmental Impact Statement
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
ESA	Endangered Species Act
FAO	Food and Agriculture Organization of the United Nations
FMP	Fishery Management Plan
GOA	Gulf of Alaska
HCR	Harvest Control Rules
IFQ	Individual Fishing Quota
IPHC	International Pacific Halibut Commission
LLP	License Limitation Program
MSA	Magnuson-Stevens Act
MSAB	Management Strategy Advisory Board
Mlb	Millions of pounds
mt	Metric tons
MSY	Maximum Sustainable Yield
NEPA	National Environmental Policy Act
Nm	Nautical miles
NMFS	National Marine Fisheries Service

NOAA	National Oceanic and Atmospheric Administration
NPFMC	North Pacific Fishery Management Council
OFL	Overfishing Level
OLE	Office for Law Enforcement
OPMP	Office of Project Management and Permitting
PSC	Prohibited Species Catch
RACE	Resource Assessment and Conservation Engineering
REFM	Resource Ecology and Fisheries Management
RFM	Responsible Fisheries Management
SAFE	Stock Assessment and Fishery Evaluation (Report)
SBio	Spawning (stock) biomass
SHARC	Subsistence Halibut Registration Certificate
SPR	Spawning Potential Ratio
SRB	Scientific Review Board
SSC	Scientific and Statistical Committee
TAC	Total Allowable Catch
TCEY	Target Constant Exploitation Rate
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service

1. Introduction

This Surveillance Report documents the 4th Surveillance Assessment (2015) of the Alaska Pacific halibut commercial fisheries originally certified on April 28th 2011, and presents the recommendation of the Assessment Team for continued FAO-Based RFM Certification.

Unit of Certification

The Pacific halibut (*Hippoglossus stenolepis*) commercial fisheries employing benthic longline gear within the IPHC's Regulatory Areas 2C, 3A, 3B, 4B and 4CDE, within Alaska jurisdiction (200 nautical miles EEZ), under international [International Pacific Halibut Commission (IPHC)], federal [National Marine Fisheries Services (NMFS)/North Pacific Fishery Management Council (NPFMC)] and state [Alaska Department of Fish and Game (ADFG)] management, underwent their 4th surveillance assessment against the requirements of the FAO-Based RFM Conformance Criteria Version 1.2 Fundamental clauses.

This 4th Surveillance Report documents the assessment result for the continued certification of commercially exploited Pacific halibut fisheries to the FAO-Based RFM Certification Program. This is a voluntary program that has been supported by ASMI who wishes to provide an independent, third-party accredited certification that can be used to verify that these fisheries are responsibly managed according to the FAO-Based RFM Program.

The assessment was conducted according to the Global Trust procedures for FAO-Based RFM Certification using the fundamental clauses of the FAO-Based RFM Conformance Criteria Version 1.2 (Sept 2011) in accordance with EN45011/ISO/IEC Guide 65 accredited certification procedures. The assessment is based on the fundamental clauses specified in the FAO-Based RFM Conformance Criteria.

The assessment is based on 6 major components of responsible management derived from the FAO Code of Conduct for Responsible Fisheries (1995) and Guidelines for the Eco-labelling of products from marine capture fisheries (2009); including:

A The Fisheries Management System
B Science and Stock Assessment Activities
C The Precautionary Approach
D Management Measures
E Implementation, Monitoring and Control
F Serious Impacts of the Fishery on the Ecosystem

These six major components are supported by 13 fundamental clauses (+ 1 in case of enhanced fisheries) that guide the FAO-Based RFM Certification Program surveillance assessment.

A summary of the site meetings is presented in Section 4. Assessors included both externally contracted fishery experts and Global Trust internal staff (Appendix 1).

1.1. Recommendation of the Assessment Team

Following this 4th Surveillance Assessment, in 2015, the assessment team recommends that continued Certification under the FAO-Based Responsible Fisheries Management Certification Program is maintained for the management system of the applicant fisheries, the Pacific halibut (*Hippoglossus stenolepis*) commercial fisheries employing benthic longline gear within the IPHC's Regulatory Areas 2C, 3A, 3B, 4B and 4CDE, within Alaska jurisdiction (200 nautical miles EEZ), under international [International Pacific Halibut Commission (IPHC)], federal [National Marine Fisheries Services (NMFS)/North Pacific Fishery Management Council (NPFMC)] and state [Alaska Department of Fish and Game (ADFG)] management.

2. Fishery Applicant Details

Key Management Contact Information			
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Position:			
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3. Unit of Certification

Unit of Certification			
U.S. ALASKA PACIFIC HALIBUT COMMERCIAL FISHERIES			
Fish Species (Common & Scientific Name)	***Geographical Location of Fishery***	***Gear Type***	***Principal Management Authority***
Pacific halibut (Hippoglossus stenolepis)	*Gulf of Alaska* *and* *Bering Sea & Aleutian Islands*	*Benthic longline*	*International Pacific Halibut Commission (IPHC)* *National Marine Fisheries Service (NMFS)* *North Pacific Fishery Management Council (NPFMC)* *Alaska Department of Fish and Game (ADFG)*

4. Surveillance Meetings

Organization	Time, day and location	Main items discussed
International Pacific Halibut Council (IPHC)	Monday 27th of July 2015, 9:30 AM IPHC Headquarters Seattle, Washington, USA.	• Survey design expansion • Stock assessment models • Key changes to management measures • Updates on observer deployment plan
Client Mr Robert Alverson	Monday 27th of July 2015, 1:00 PM Fishermen terminal Seattle, Washington, USA.	• Current challenges in management or conservation based science • How well does the fishery management system respond to resolving issues in the industry?
NPFMC (North Pacific Fisheries Management Council) Anchorage	Tuesday 28th July 2015 Time 9.00am	• Key changes to management measures • Impact of recent measures to reduce halibut by-catch • 2014 Observer Annual Report
Alaska Division Fish and Game (ADFG)	Wednesday 29th of July 2015, 9:00 AM ADFG Headquarters, Juneau, AK	• Tagging programme • 2014 Sablefish survey • Low recruitment issues • Management Issues
Alaska State Troopers	Wednesday 29th of July 2015, 1:00 PM AWT Headquarters, Juneau	• Boardings and violations
NOAA NMFS Alaska Fisheries Science Center, Ted Stevens Research Institute (NOAA AKFSC)	Wednesday 29th of July 2015, 3:00 PM NOAA AKFSC Ted Stevens Research Institute, Juneau, AK	• Key changes to surveys, data collection • Stock assessment improvements • Seabird data
NOAA Alaska NMFS Regional Office	Thursday 30th of July 2015, 9:30 AM NOAA Alaska NMFS Regional Office Juneau, AK	• Bycatch data • Observer programme • Fleet allocations, apportionments

Stakeholder Submissions: The Alaska Seafood Marketing Institute website provides an opportunity for stakeholders to provide information that is relevant for the full assessment or surveillance audit of fisheries within the Alaska FAO Based Responsible Fisheries Management Certification Program. All scientific, objective information relative to the assessment provided to the assessment team is used as part of the assessment and referenced for transparency at the end of the report.

5. Assessment Outcome Summary

Fundamental Clause Summary

Clause 1: Structured and legally mandated management system
Evidence adequacy rating: High
The IPHC is a bilateral, international treaty based organization, composed of representatives from the USA and Canada. Its mandate is research (on stock assessment and halibut biology research) and management (allocation between regulatory areas in US and Canada, developing various harvest regulations and setting annual harvest levels) of the stocks of Pacific halibut (Hippoglossus stenolepis) within the convention waters of both nations. The Northern Pacific Halibut Act of 1982 (Halibut Act) at 16 U.S.C 773-773k provides the Secretary of State of the US, with the concurrence of the Secretary of Commerce, the authority and general responsibility to carry out the requirements of the Convention and the Halibut Act. Following IPHC apportionments, the halibut fisheries in the American EEZ off Alaska are managed by the North Pacific Fishery Management Council (NPFMC), the National Marine Fisheries Service (NMFS) and the Alaska Department for Fish and Game (ADFG). The U.S. Coast Guard (USCG) and NMFS Office of Law Enforcement (OLE) enforce Pacific halibut fisheries laws and regulations in federal waters. The Alaska Wildlife Troopers (AWT) take part in enforcement activities in state waters.

Clause 2: Coastal area management frameworks
Evidence adequacy rating: High
NMFS and NPFMC participate in coastal area management-related institutional frameworks through the federal National Environmental Policy Act (NEPA) processes. The state of Alaska is a cooperating agency in the NEPA process for federal actions, giving it a seat at the table for federal actions. The assessment team considers that the collectivity of: the NEPA process, existing agencies and processes (e.g. ADFG, DEC, DNR, USFWS, ANILCA, OPMP and BOEM), and the existing intimate and routine cooperation between federal and state agencies managing Alaska's coastal resources is capable of planning and managing coastal developments in a transparent, organized and sustainable way. The IPHC annual meeting, regular meetings of the NPFMC and the Board of Fisheries (BOF) public meetings provide forums for resolution of potential fisheries conflicts.

Clause 3: Management objectives and plan
Evidence adequacy rating: High
The objectives of the initial US and Canada Agreement for the management, conservation and sustainable utilization of Pacific halibut in the North Pacific, signed in 1923 pointed to the first basic regulations for closure of the fishery in determinate periods, halibut bycatch in other fisheries and the need for reporting such removals, enabling prosecutions for violation of the provisions and investigation into the life history of the Pacific halibut. Amendment 15 and 20 to the Fishery Management Plan (FMP) for the Groundfish Fishery of the BSAI and GOA in 1992 established an individual fishing quota (IFQ) limited access system in commercial fixed gear fisheries for Pacific halibut and sablefish in and off Alaska and implemented a Western Alaska Community Development Quota (CDQ) program for halibut and sablefish fixed gear fisheries. These amendments effectively provide a framework for the management of halibut resources in the BSAI and GOA. These actions were intended by the NMFS to promote the conservation and management of halibut and sablefish

resources, and to further the objectives of the Northern Pacific Halibut Act of 1982 (Halibut Act) and the Magnuson Fishery Conservation and Management Act (Magnuson Stevens Act or MSA) that provided authority for regulating these fisheries.

Clause 4: Fishery Data

Evidence adequacy rating: High

The IPHC collects yearly data from a variety of sources to characterize the fishery, status and population trends in all regulatory areas, and assist in fitting a population assessment model. Some of the key datasets collected include IFQ e-landings catch, sport catch, bycatch, personal use and wastage data. Every year, the IPHC places a sampler aboard the NMFS EBS groundfish/crab trawl survey. The sampler collects biological data on the halibut catches, taking lengths of almost all halibut caught and selecting a subsample for ageing. The biennial GOA survey was conducted in 2013. The biennial AI survey was conducted in 2014, and the IPHC participated in the survey in 2014, (and in 2012 for the first time since 2000). The swept-area estimates of abundance derived from the three NMFS trawl surveys (BS, GOA, AI) are a valuable independent indicator of long-term trends in halibut biomass. In 2014, eleven commercial longline vessels, six Canadian and five U.S., were chartered by the IPHC for the longline survey operations. Of the 1,430 setline survey stations planned for the 2014 survey season, 1,417 were considered appropriate for stock assessment analysis. Seabird occurrence data have also been collected during IPHC stock assessment surveys since 2002. IPHC also investigates the use of data from surveys by other agencies to calibrate the IPHC setline survey index in regions that are not sampled annually by the setline survey.

Bycatch data collected during the IPHC surveys are used as proxy to estimate total bycatch in the halibut fishery. However, from January 2013, there are also new partial coverage observer requirements for halibut vessels fishing hook and line gear. Halibut vessels are registered with the NMFS and can be selected on a vessel or trip basis

Clause 5: Stock assessment

Evidence adequacy rating: High

For 2014, there was a full review of the data, specific model formulations and general approach used to assess the stock in recent years. Stock assessments in 2014 were also guided by comments from a Scientific Review Board, appointed by IPHC. The results of the 2014 stock assessment indicate that the stock declined rapidly from the late 1990s through 2011, as a result of the decline in the exceptionally strong 1987 year-class, recruitment strengths that are generally smaller than those observed through the 1980s and 1990s, as well as decreasing size-at-age. In the last few years, female spawning biomass is estimated to have stabilized around 200 million pounds. For the 2014 assessment, the final ensemble included four individual models, each of both short and long time-series models based on coastwide and Areas-As-Fleets data structures. As in recent years, forecast projections were conducted for a range of alternative management actions, and probabilities of various risk metrics are reported in a decision-making table framework. Work continued in 2014 on development of Management Strategy Evaluation (MSE) for this stock, with assistance and guidance from an Advisory Board (MSAB).

Clause 6: Biological reference points and harvest control rule

Evidence adequacy rating: High

IPHC's harvest policy is to harvest 20% of the coastwide exploitable biomass when the spawning biomass is estimated to be above 30% (B30 threshold level) of a level defined as the unfished level. The harvest rate is linearly decreased towards a rate of zero as the spawning biomass approaches 20% (B20 limit level) of this estimated unfished level. That is, fishing ceases completely if the stock is below 20% of the unfished biomass. Since 1985, the IPHC has followed a constant harvest rate policy

to determine annual available yield, termed the Constant Exploitation Yield (CEY). A biological target level for total removals from each regulatory area is calculated yearly by applying a fixed area-specific harvest rate to the estimate of exploitable biomass in each IPHC regulatory area. This combination of harvest rate and precautionary levels of biomass protection have, in simulation model studies, provided a large fraction of maximum available yield, minimizing risk to the spawning biomass, while allowing for the quickest stock recovery to at least, threshold levels. The minimum observed spawning biomasses for the three IPHC core areas all occurred in the mid-1970s, approximately 9 million pounds in 2B, 13 million pounds in 2C and 42 million pounds in 3A. By definition, these become the observed spawning biomass limits. The current harvest policy for Pacific halibut utilizes a ramp from target harvest rates to no fishing between 30% relative spawning biomass and 20% relative spawning biomass. Catch forecasts are presented in decision tables, showing yield alternatives and risk metrics, where the probability of a particular risk (e.g. of biomass being below B30 or B20) can be determined for a given catch forecast.

Clause 7: Precautionary approach
Evidence adequacy rating: High
Based on the 2014 stock assessment results, IPHC adopted a 2015 fishery CEY of 29.2 million pounds, with an associated total mortality of 42.8 million pounds. At this level of catch, there is an 8% chance that spawning biomass in 2016 will be less than the B30 threshold, and <1% chance that it will be less than the B20 limit, which are the Precautionary Approach reference points for this stock. Various options with associated risk levels were presented and considered by IPHC in the decision making process. The 2014 stock assessment results represent the integration of four separate stock assessment models, accounting for the uncertainty (structural and estimation) within each model and among models to generate the final decision table. This stock assessment includes significant 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. This represents an improvement over previous assessments, although some sources of uncertainty remain, such as the link between environmental factors and halibut recruitment, and the sex ratio of halibut in the commercial catches.

The IPHC has expressed concern over continued declining catch rates in several areas and has taken aggressive action leading to reduced harvests. IPHC recommended to the governments of Canada and the United States catch limits (Fishery CEY) for 2015 totalling 29.2 million pounds. This represents a 6% increase from the 2014 catch limit, but is still about 6% below the 2013 catch limit.

The halibut fleet is highly regulated and subjected to defined fishery data collection systems, operating under an IFQ system, with conservatively defined catch quotas, gear specifications and restrictions, size limits, and closed seasons and areas. In addition, if halibut bycatch limits (Prohibited Species Catch) are reached in the groundfish fisheries, or if areas with high concentrations of juvenile halibut are recorded, fishery and area closure measures are adopted respectively.

Clause 8: Management measures
Evidence adequacy rating: High
The IPHC has developed, refined, and utilized a constant harvest rate policy since the 1980's. The policy was initially designed to harvest 20% of the coastwide exploitable biomass when the spawning biomass is estimated to be above 30% of the unfished level. The harvest rate is linearly decreased

towards a rate of zero as the spawning biomass approaches 20% of the unfished level. Harvest rates are applied in each of the Regulatory Areas. This combination of harvest rate and precautionary levels of biomass protection have, in simulation studies, provided a large fraction of maximum available yield while minimizing risk to the spawning biomass. There are numerous technical management measures aimed at sustainable utilization of the halibut resource. Under the individual fishing quota share system in place for the Pacific halibut fishery, fishing capacity (vessels and gear) has been reduced, seasons were extended and wastage was reduced. Longline is the principal gear utilized for this fishery. Regulations are in place to address discards. General spawning areas have been mapped in Alaska, and the halibut fishery is closed during peak spawning times, by regulation. The NPFMC has established Marine Protected Areas and additional trawl closures that benefit juvenile fish and adult spawners. Bycatch of seabirds has been addressed by specific regulations now including the use of streamer (tory) lines, night setting, lineshooters and lining tubes. Management actions are in place in respect to increasing knowledge on the halibut and non-halibut bycatch dynamics in the directed halibut longline fishery. The NPFMC has taken recent action to reduce halibut bycatch in GOA groundfish fisheries.

Clause 9: Management measure to produce maximum sustainable levels
Evidence adequacy rating: High

The IPHC and NPFMC objectives for fisheries management are based on the long term maintenance of MSY levels. The policy for achieving this includes setting biological reference points that are used in determining the annual CEY for the Pacific halibut stock. Under the individual fishing quota share system in place for the Pacific halibut fishery, fishing capacity (vessels and gear) has been reduced and is now relatively stable. In 1983, industry made the operational switch from J-hooks to circle hooks in the commercial fishery, lowering the mortality of undersized halibut caught and released during commercial fishing. Discards of Pacific halibut, considered a Prohibited Species Catch (PSC) by the groundfish fisheries in Alaska are regulated, and the NPFMC voted in June 2012 to further reduce the halibut bycatch cap in the GOA groundfish fisheries. A fishery management plan amendment, "Amendment 95," came into effect in 2014 and is intended to minimize halibut bycatch in the GOA groundfish fisheries. Similar measures have been introduced to lower by-catch levels in the BSAI groundfish fisheries.

Clause 10: Appropriate standards of fisher's competence
Evidence adequacy rating: High

Any aspirant halibut fisherman must have 150 days of halibut fishing experience before being able to purchase halibut IFQs. Obtaining halibut IFQ share most often will require the purchaser to enter into loan capital arrangements with banks that will require comprehensive fishing business plans supported by competent, professional fishermen with demonstrable fishing experience. Several training opportunities are available to train crewmembers in Alaska.

Clause 11: Effective legal and administrative framework
Evidence adequacy rating: High

The Northern Pacific Halibut Act, governs the commercial, sport, charter, and subsistence halibut fisheries in the U.S. The U.S. Coast Guard (USCG) and NMFS Office of Law Enforcement (OLE) enforce Alaska fisheries laws and regulations, especially 50CFR679. The Alaska Wildlife Troopers enforce halibut regulations in state waters. The violations in this fishery are reported to and investigated by NOAA's Office of Law Enforcement's Alaska Division and prosecuted by NOAA's Office of General Counsel's Enforcement Section. OLE Special Agents and Enforcement Officers conduct complex criminal and civil investigations, board vessels fishing at sea, inspect fish processing plants, review sales of wildlife products on the internet and conduct patrols on land, in the air and at sea. NOAA

Agents and Officers can assess civil penalties directly to the violator in the form of Summary Settlements (SS) or can refer the case to NOAA's Office of General Counsel for Enforcement and Litigation (GCEL).

Clause 12: Framework for sanctions
Evidence adequacy rating: High

The Magnuson-Stevens Act (50CFR600.740 Enforcement policy) provides four basic enforcement remedies for violations: ***1)*** *Issuance of a citation (a type of warning), usually at the scene of the offense,* ***2)*** *Assessment by the Administrator of a civil money penalty,* ***3)*** *for certain violations, judicial forfeiture action against the vessel and its catch,* ***4)*** *Criminal prosecution of the owner or operator for some offenses. In some cases, the Magnuson-Stevens Act requires permit sanctions following the assessment of a civil penalty or the imposition of a criminal fine. The 2011 Policy for the Assessment of Civil Administrative Penalties and Permit Sanctions issued by NOAA Office of the General Counsel – Enforcement and Litigation, provides guidance for the assessment of civil administrative penalties and permit sanctions under the statutes and regulations enforced by NOAA.*

Clause 13: Impacts of the fishery on the ecosystem
Evidence adequacy rating: High

The IPHC, NPFMC and NOAA/NMFS conduct assessments and research related to fishery impacts ecosystems and habitats and how environmental factors affect the fishery. Findings and conclusions are published in the Ecosystem section of the SAFE document, annual Ecosystem Considerations documents, and the various other research reports. The Essential Fish Habitat Environmental Impact Statement (EFH EIS) (NMFS, 2005) concluded that the benthic longline fishery has minimal or temporary impacts on halibut habitat. Various studies have applied ecosystem models to food webs and impacts of climate change. Halibut have low discard rates, but high PSC rates in other fisheries and discussions are underway between the agencies to put inplace additional regulatory measures to avoid halibut and further minimize halibut bycatch mortality. The directed halibut fishery takes significant amounts of grenadiers, arrowtooth flounder, spiny dogfish, sharks and some rockfish; but the fishery does not pose a threat to bycatch species. Management measures limit interactions with seabirds and the fishery has minimal impact on the short-tailed albatross, the only seabird listed as endangered under the ESA. Interactions with whales remain a problem as they take fish off longline gear, but the fishery does not adversely affect whale populations.

6. Conformity Statement

The Assessment Team recommended that continued certification under the FAO Based Responsible Fisheries Management Program is granted to the Pacific halibut (*Hippoglossus stenolepsis*) commercial fishery employing benthic longline gear within the IPHC's Regulatory Areas 2C, 3A, 3B, 4B and 4CDE, within Alaska jurisdiction (200 nautical miles EEZ), under international [International Pacific Halibut Commission (IPHC)], federal [National Marine Fisheries Services (NMFS)/North Pacific Fishery Management Council (NPFMC)] and state [Alaska Department of Fish and Game (ADFG)] management.

7. FAO-Based Conformance Criteria Fundamental Clauses for Surveillance Reporting

A. The Fisheries Management System

1. There shall be a structured and legally mandated management system based upon and respecting International, National and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment.

FAO CCRF 7.1.3/7.1.4/7.1.9/7.3.1/7.3.2/7.3.4/7.6.8/7.7.1/10.3.1
FAO Eco 28

Evidence adequacy rating:

☑ High **☐ Medium** **☐ Low**

Rating determination

The IPHC is a bilateral, international treaty based organization, composed of representatives from the USA and Canada. Its mandate is research (on stock assessment and halibut biology research) and management (allocation between regulatory areas in US and Canada, developing various harvest regulations and setting annual harvest levels) of the stocks of Pacific halibut (Hippoglossus stenolepis) within the convention waters of both nations. The Northern Pacific Halibut Act of 1982 (Halibut Act) at 16 U.S.C 773-773k provides the Secretary of State of the US, with the concurrence of the Secretary of Commerce, the authority and general responsibility to carry out the requirements of the Convention and the Halibut Act. Following IPHC apportionments, the halibut fisheries in the American EEZ off Alaska are managed by the North Pacific Fishery Management Council (NPFMC), the National Marine Fisheries Service (NMFS) and the Alaska Department for Fish and Game (ADFG). The U.S. Coast Guard (USCG) and NMFS Office of Law Enforcement (OLE) enforce Pacific halibut fisheries laws and regulations in federal waters. The Alaska Wildlife Troopers (AWT) take part in enforcement activities in state waters.

International Pacific Halibut Commmission (IPHC)

The IPHC is a bilateral, international treaty based organization, composed of representatives from the USA and Canada. Its mandate is research (on stock assessment and halibut biology research) and management (allocation between regulatory areas in US and Canada, developing various harvest regulations and setting annual harvest levels) of the stocks of Pacific halibut (*Hippoglossus stenolepis*) within the convention waters of both nations. Specifically the IPHC main objective is to conserve the biological viability of the stock, while allowing for maximum sustainable yield harvests from commercial, sport and subsistence users. The Northern Pacific Halibut Act of 1982 (Halibut Act) at 16 U.S.C 773-773k provides the Secretary of State of the US, with the concurrence of the Secretary of Commerce, the authority and general responsibility to carry out the requirements of the Convention and the Halibut Act.

Other Agencies

Following IPHC apportionments, the halibut fisheries in the American EEZ off Alaska are managed by

the North Pacific Fishery Management Council (NPFMC), the National Marine Fisheries Service (NMFS), and the Alaska Department for Fish and Game (ADFG).

The **NPFMC** recommends regulations to govern the directed halibut fisheries in waters off Alaska and makes allocation decisions among halibut users and user groups fishing off Alaska. The **NMFS** works closely with the NPFMC and the IPHC, performing scientific research and being responsible for developing, implementing, and enforcing regulations pertaining to management of halibut fisheries in US waters. NMFS also manages the halibut subsistence program for Native, rural, ceremonial and educational purposes. Additionally, **ADFG** licenses halibut anglers, sport anglers, fishing businesses and guides, monitors and reports on sport and subsistence halibut harvests, and assists federal agencies with preparation of regulatory analyses. These agencies, and all of their activities and decisions regarding halibut, are subject to the North Pacific Halibut Act.
The **U.S. Coast Guard (USCG)** and **NMFS Office of Law Enforcement (OLE)** enforce Pacific halibut fishery laws and regulations. The **Alaska Wildlife Troopers (AWT)** take part in enforcement activities in state waters.

The primary purpose of IPHC is to conduct research on the halibut stock for the biological conservation of the halibut resource for fishery use in the area through which the species migrates during its life cycle, by taking into account the whole stock unit over its entire area of distribution (from California to the Bering Sea). The halibut within the IPHC convention area are considered to be one stock, which is studied, managed and enforced by IPHC, NPFMC, NMFS, ADFG and the US coast guard (USCG)/Alaska Wildlife Troopers (AWT). The NMFS Alaska Region and the NPFMC gather data on all sources of halibut removals and mortality off Alaska: fishing (directed and incidental) and natural mortality. All IFQ share holders must report their catches via an electronic filing ("e-landing") method.

Sport charter vessels keep and submit a Charter Logbook to ADFG. The operators must submit their harvest information weekly, and ADFG summarizes the data in October and submits it to the NPFMC and NMFS. In addition, ADFG collects data from halibut sport fishermen (both guided/charter and un-guided), through an annual survey. Subsistence halibut data are gathered by NMFS under its Subsistence Halibut Registration Certificate (SHARC) program. Those data are reported to IPHC, which also collects its own data through employment of port samplers and at-sea sampling agents for the commercial harvest.

Halibut management is an active public process. The IPHC receives extensive input and guidance from stakeholders and researchers. Also, the NPFMC and the NMFS provide a great deal of information on their websites, including agenda of meetings, discussion papers, and records of decisions. The NPFMC actively encourages stakeholder participation, and all NPFMC deliberations are conducted in open, public sessions.

IPHC 2015 Annual Meeting

The International Pacific Halibut Commission (IPHC) completed its Ninety-first (January, 2015) Annual Meeting in Vancouver, Canada. The Commission recommended to the governments of Canada and the United States catch limits for 2015 totalling 29,223,000 pounds, a 6.2% increase from the 2014 catch limit of 27,515,000 pounds.

In addition to setting catch limits for 2015, the Commission addressed a wide range of regulatory issues and took important actions regarding stock challenges with a risk-based precautionary approach and a review of the current harvest policy. The Commission also addressed other regulatory issues and took actions regarding assessment survey expansion and bycatch

management.

Stock Assessment and Harvest Rates

An executive summary of the 2014 stock assessment is posted on the IPHC website[1], and the complete report of the 2014 stock assessment [2].

A thorough exploration of data sources for the entire historical record was completed during 2013. Notable changes to the input data used for the 2014 stock assessment include the data sets aggregated to geographical regions and a full re-processing of the historical setline survey catchper-unit-effort time-series. The latter analysis includes adjustments for all areas not annually sampled during standard survey operations, including expansions in 2014 as well as calibrations with the NMFS sablefish longline survey to estimate density in deep areas (>275 fa). All time-series were extended to include updated estimates for 2013 and 2014. In addition, recreational discard mortality is now included in estimated removals.

The results of the 2014 stock assessment indicate that the Pacific halibut stock declined continuously from the late 1990s to around 2010. That trend is estimated to have been a result of decreasing size-at-age, as well as recent recruitment strengths that are much smaller than those observed through the 1980s and 1990s. Since that time period, the estimated female spawning biomass appears to have stabilized near 200 million pounds, with flatter trajectories estimated in coastwide models and slightly increasing trends estimated in AAF models.

As in 2014, the IPHC staff harvest advice was presented in the form of a decision table that estimates the consequences to stock and fishery status and trends from different levels of harvest. The final version of the decision table for 2015, incorporating the adopted catch limits, is posted on the IPHC website at http://www.iphc.int/meetings-and-events/annual-meeting.html[3].

Regulatory Changes and Issues [4]

Control of Charter Harvest in Area 2C and 3A

80 FR 35195, June 19, 2015 NMFS issues regulations that revise Federal regulations regarding sport fishing guide services for Pacific halibut in International Pacific Halibut Commission Regulatory Areas 2C (Southeast Alaska) and 3A (Central Gulf of Alaska). The regulations remove the requirement that a guided sport (charter) vessel guide be on board the same vessel as a charter vessel angler to meet the definition of providing sport fishing guide services. This final rule clarifies that all sport fishing for halibut in which anglers receive assistance from a compensated guide would be managed under

[1] International Pacific Halibut Commission. 2014. Interim Meeting 2014. Accessed 2015. http://iphc.int/meetings-and-events/interim-meeting.html

[2] International Pacific Halibut Commission. 2014. Assessment of the Pacific halibut stock at the end of 2014. Accessed 2015. http://www.iphc.int/publications/rara/2014/rara2014_11stockassessment.pdf.[2]

[3] International Pacific Halibut Commission. 2015. Annual Meeting 2015. Accessed 2015.http://www.iphc.int/meetings-and-events/annual-meeting.html

[4] 2014 commercial fishery and regulation changes Heather L. Gilroy, Lara M. Erikson, and Kirsten A. MacTavish http://www.iphc.int/publications/rara/2014/rara2014_03commercialfishery.pdf

charter fishery regulations, and all harvest (except halibut harvested under the Guided Angler Fish Program) would accrue toward charter allocations. This final rule aligns Federal regulations with State of Alaska regulations.

80 FR 35195, June 19, 2015[5]

80 FR 13771, March 17, 2015 Final rule publishing the annual management measures governing the Pacific Halibut fishery recommended as regulations by the International Pacific Halibut Commission to enhance conservation of Pacific halibut. Effective March 13, 2015.The Secretary of State accepted the annual management measures, including the following changes to the previous IPHC regulations for 2015:

1. New halibut catch limits in all regulatory areas in Section 11;

2. New commercial halibut fishery opening and closing dates in Section 8;

3. New management measures for Area 2C and Area 3A guided sport fisheries in Section 28, and in Figure 3 and Figure 4; and

[5] 80 FR 35195, June 19, 2015 https://alaskafisheries.noaa.gov/frules/80fr35195.pdf

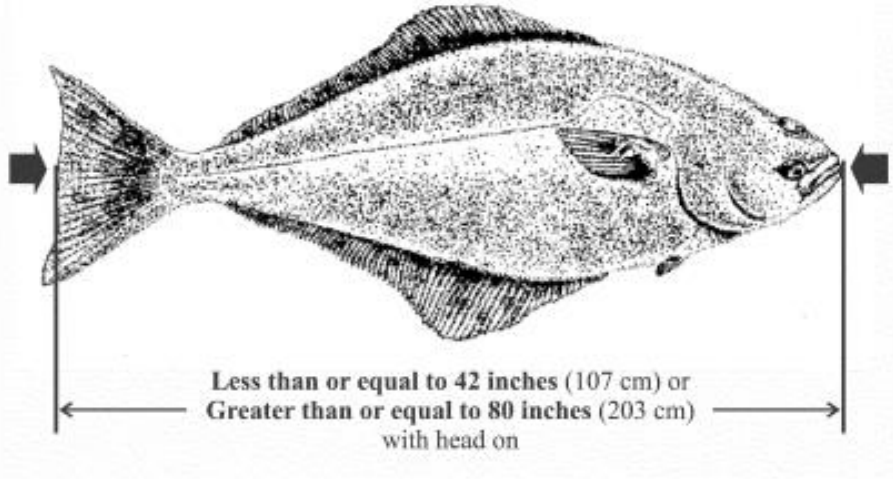


Figure 3. Recreational reverse slot limit for halibut on board a charter vessel referred to in 50 CFR 300.65 and fishing in Regulatory Area 2C (see Section 28 paragraph 2(c)).

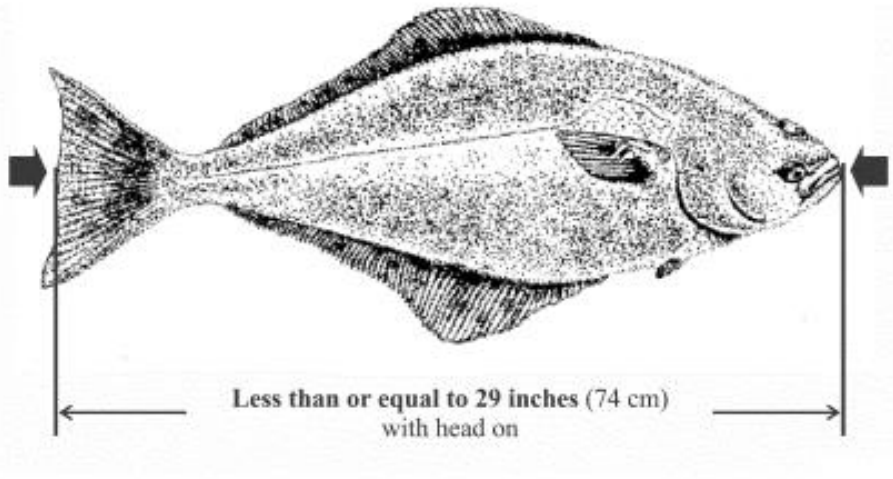


Figure 4. Recreational maximum size limit for one fish in two-fish bag limit for halibut on board a charter vessel referred to in 50 CFR 300.65 and fishing in Regulatory Area 3A (see Section 28 paragraph 3(c)). If only one halibut is retained, it may be of any size.

4. Addition of California Division of Fish and Wildlife to the list of officers authorized to enforce these regulations in Section 3.

80 FR 13771, March 17, 2015 [6]

Other Actions

Survey Expansion

The Commission approved the expansion of the IPHC's annual setline survey to include previously unsurveyed areas between 10 and 400 fathoms' depth. The setline survey currently samples at depths from 20 to 275 fathoms in most areas, and there are some gaps within that range. The

[6] 80 FR 13771, March 17, 2015 https://alaskafisheries.noaa.gov/frules/80fr13771.pdf

expansion is designed to provide better data for the stock assessment through more complete coverage of all halibut habitat. The expansion is proposed to occur over a period of five years, until the whole range has been surveyed, and will be initiated with Areas 2A and 4A in 2014. Further analysis of the proposed expansion will occur this year, and will be used to guide implementation in future years. Additional details of the survey expansion plan are available in this year's Bluebook. [7]

Performance Review [8]

The Commission reviewed the implementation of recommendations from the 2012 Performance Review in January 2014 and produced a progress report. Action taken since the review has produced increased openness and transparency in Commission meetings and operations, and the recommendations have been incorporated into ongoing work to improve the Commission's procedures and processes, including the development of scientific advice, planning and review of research, and operation of the advisory bodies.

In assessing the results of the 2012 review, the Commission notes that many of its recommendations have been accomplished or are in work. Some recommendations resulted in immediate changes to the Commission's operations, while others are the subject of longer-term development and experimentation. In both cases, they have become part of standard practice and continuing work, and the focus is now less on the review itself and more on its products and results [9].

Management Strategy Advisory Board and Scientific Review Board

At the 2014 Annual Meeting, the International Pacific Halibut Commission advanced the development of a Management Strategy Evaluation (MSE) program for the halibut resource. The MSE process and its place in the IPHC decision-making framework was discussed, including whether the MSAB would displace other IPHC advisory bodies. MSE will provide inputs to both assessment and harvest management decisions. Refinement of management objectives and procedures has reached a good level, and the task now is to proceed with developing the operating model and conduct detailed evaluations.

The MSAB held its fourth meeting at the IPHC offices in Seattle 20-21 October, 2014.

The primary objectives for the MSAB's second meeting were to:

- Update on the status of the MSE objectives.
- Current status of the coast-wide Operating Model.
- A new tool for exploring alternative policy options.
- Compare notes with the Pacific hake MSE process.

[7] International Pacific Halibut Commission Ninetieth Annual Meeting
http://www.iphc.int/publications/bluebooks/IPHC_bluebook_2014.pdf
[8] International Pacific Halibut Commission. 2012. Performance Review. Accessed 2015.
http://iphc.int/meetings-and-events/review.html.
[9] INTERNATIONAL PACIFIC HALIBUT COMMISSION PERFORMANCE REVIEW 2012 A Progress Report http://iphc.int/documents/review/PerformancereviewprogressreportJan2014.pdf

- Set research priorities.
- Selection of chairs and co-chairs, and develop procedures for reporting to the Commission[10]

Halibut Bycatch

In 2011, the Commission began an initiative aimed at better understanding the implications of current halibut bycatch and to explore possible actions to address those concerns. The initiative created a Bycatch Project Team, composed of the IPHC Commissioners, to direct the work and lead the effort. Additionally, a Bycatch Working Group was created to provide analytic support to the Project Team. The IPHC staff also participates by providing analytic and editorial support.

The Project Team has recently completed the latest draft of a report, which includes a review of bycatch across all areas, the effects of bycatch on the resource and fishery yields, and actions recently taken to reduce the overall level of bycatch. The report was released for public comment in November-December, 2014. [11]

The Project Team Summary
Halibut bycatch is estimated in all areas, throughout the range of the species. At-sea observer programs provide data for estimation in all major fisheries in which bycatch occurs. Levels of observer coverage vary widely across areas, with the highest occurring in IQ programs for trawl fisheries in Areas 2A and 2B, where bycatch is the lowest. Observer coverage is much lower in Areas 3A and 3B, but a change in observer deployment methodology for those areas in 2013 resulted in lower coverage and a more random distribution of observers on vessels. The results of the initial review of the new deployment methodology are being analyzed but some initial conclusions can be drawn. Coverage of non-trawl fisheries has increased, especially for the fixed-gear halibut fleet at vessel sizes down to 40 ft LOA. In addition, the deployment of 20 observers for most fleets has achieved a more statistically-sound, random deployment pattern, than that of previous deployment methods. However, overall coverage of trawl fisheries has diminished under the new deployment and the deployment of observers in the fixed-gear fleet under the vessel selection pool resulted in a significant bias in coverage. The implications of this changed coverage are a broader but lower level of monitoring for those fisheries generating the majority of bycatch mortality in the Gulf of Alaska fisheries. Direct observations are mostly lacking in minor fisheries, where bycatch is likely much lower. Previous IPHC analyses of bycatch in these instances should be updated. While gaps in monitoring of bycatch in some fisheries have been identified, the bycatch in these fisheries is not expected to be significant.

[10] International Pacific Halibut Commission. 2014. IPHC Management Strategy Evaluation Framework & Management Strategy Advisory Board. Accessed 2015.
http://www.iphc.info/Pages/MSAB---Previous-Meetings.aspx
[11] Report of the Halibut Bycatch Work Group II (5 September 2014)
http://www.iphc.int/documents/bycatch/Halibut_Byc_Work_Group_rept_v17_final.pdf

2. Management organizations shall participate in coastal area management institutional frameworks, decision-making processes and activities related to the fishery and its users, in support of sustainable and integrated resource use, and conflict avoidance.

FAO CCRF 10.1.1/10.1.2/10.1.4/10.2.1/10.2.2/10.2.4

Evidence adequacy rating:

☑ **High** ☐ **Medium** ☐ **Low**

Rating determination

NMFS and NPFMC participate in coastal area management-related institutional frameworks through the federal National Environmental Policy Act (NEPA) processes. The state of Alaska is a cooperating agency in the NEPA process for federal actions, giving it a seat at the table for federal actions. The assessment team considers that the collectivity of: the NEPA process, existing agencies and processes (e.g. ADFG, DEC, DNR, USFWS, ANILCA, OPMP and BOEM), and the existing intimate and routine cooperation between federal and state agencies managing Alaska's coastal resources is capable of planning and managing coastal developments in a transparent, organized and sustainable way. The IPHC annual meeting, regular meetings of the NPFMC and the Board of Fisheries (BOF) public meetings provide forums for resolution of potential fisheries conflicts.

NEPA

The NMFS and NPFMC, cooperating with the IPHC in Alaska to effectively manage halibut stocks within state and federal jurisdiction (200 mile EEZ), participate in coastal area management-related institutional frameworks through the federal National Environmental Policy Act (NEPA) processes. Virtually every development affecting the natural environment, by regulation, has to go through the NEPA environmental impact assessment process, which identifies its potential environmental, social and economic impacts and/or benefits. The NEPA process is essentially a biological/environmental, and socio-economic impact assessment where proposed options for significant developments and/or changes in current management practices are evaluated, before a final decision is taken. The NEPA processes provide public information and opportunity for public and agencies involvement that is robust and inclusive at both the state and federal levels.

The state of Alaska is a cooperating agency in the NEPA process for federal actions, giving it a seat at the table for federal actions. The NEPA process includes decision-making processes and activities relevant to the fishery resource and its users in support of sustainable and integrated use of living marine resources and avoidance of conflict among users. A recent example of the NEPA process concerning the halibut fishery is the restructuring of the observer program that started January 2013, partially covering the previously unobserved Alaska halibut fleet. [12]

DEC

The Alaska Department of Environmental Conservation (DEC) implements statutes and regulations affecting air, land and water quality. DEC is the lead state agency for implementing the federal Clean Water Act and its authorities provide considerable opportunity to maintain high quality fish and wildlife habitat through pollution prevention[13]

[12] United States Environmental Protection agency. Accessed 2015 http://www2.epa.gov/nepa/what-national-environmental-policy-act

[13] Alaska Department of Environmental Conservation. Accessed 2015. http://dec.alaska.gov/

ADFG

ADFG protects estuarine and marine habitats primarily through cooperative efforts involving other state and federal agencies and local governments. ADFG has jurisdiction over the mouths of designated anadromous fish streams and legislatively designated state special areas (critical habitat areas, sanctuaries and refuges). Some marine species also receive special consideration through the state's Endangered Species program. [14]

DNR

The Alaska Department of Natural Resources (DNR) manages all state-owned land, water and natural resources except for fish and game. This includes most of the state's tidelands out to the three mile limit and approximately 34,000 miles of coastline. DNR authorizes the use of log-transfer sites, access across state land and water, set-net sites for commercial gill net fishing, mariculture sites for shellfish farming, lodge sites and access for the tourism industry, and water rights and water use authorizations. DNR also uses the state Endangered Species Program to preserve natural habitat of species or subspecies of fish and wildlife that are threatened with extinction [15].

USFWS

The U.S. Fish and Wildlife Service (USFWS) is a bureau within the Department of the Interior. Its objectives include 1) Assisting in the development and application of an environmental stewardship ethic based on ecological principles, scientific knowledge of fish and wildlife, and a sense of moral responsibility; 2) Guide the conservation, development, and management of the US's fish and wildlife resources. 3) Administer a national program to provide the public opportunities to understand, appreciate, and wisely use fish and wildlife resources. The USFWS functions include enforcement of federal wildlife laws, protection of endangered species, management of migratory birds, restoration of nationally significant fisheries, conservation and restoration of wildlife habitat such as wetlands, help of foreign governments with their international conservation efforts. Additionally, the USFWS distributes hundreds of millions of dollars, collected through the Sport Fish and Restoration Program. These funds are derived from an excise taxes on fishing equipment, motorboat and small engine fuels and import duties. Funds are distributed to State fish and wildlife agencies for fishery projects, boating access and aquatic education[16].

ANILCA

The Alaska National Interest Lands Conservation Act (ANILCA) conveyed large sections of federal land to settle Alaska native lands claims and provide the State of Alaska title to other large sections promised under Statehood. Additionally, it enclosed large swaths of land into federal parks and monuments for ecological protection for future generations. ANILCA directs federal agencies to consult and coordinate with the state of Alaska. State agencies responsible for natural resources, tourism, and transportation work as a team to provide input throughout federal planning processes. [17]

OPMP

The Department of Natural Resources (DNR) Office of Project Management and Permitting (OPMP) coordinates the review of larger scale projects in the state. Because of the complexity and potential impact of these projects on multiple divisions or agencies, these projects typically benefit from a single primary point of contact. A project coordinator is assigned to each project in order to facilitate interagency coordination and a cooperative working relationship with the project proponent. The

[14] ADF&G homepage. Accessed 2015. http://www.adfg.alaska.gov/index.cfm?adfg=home.main
[15] Alaska Department of Natural Resources. 2015. Home Page. Accessed 2015. http://dnr.alaska.gov/
[16] US Fish and Wildlife Service. 2015. About Page. Accessed 2015. http://www.fws.gov/help/about_us.html
[17] Alaska National Interest Lands Conservation Act (ANILCA). Accessed 2015 http://dnr.alaska.gov/commis/opmp/anilca/

office deals with a diverse mix of projects including transportation, oil and gas, mining, federal grants, ANILCA coordination, and land use planning. Every project is different and involves a different mix of agencies, permitting requirements, statutory responsibilities, and resource management responsibilities [18]

BOEM

The Bureau of Ocean Energy Management (BOEM) (previously Minerals and Management) is responsible for managing environmentally and economically responsible development and provide safety and oversight of the offshore oil and gas leases. The activities of BOEM and the process for application and approval of oil exploration permits overlaps extensively with evaluations by ADNR, ADFG and ADEC given the potential impacts of such activities on anadromous and other marine resources and their habitat. An example of this is provided by the *Cook Inlet Offshore Oil & Gas Exploration Permit Application & Approval Process* [19]

The assessment team considers that the collectivity of: the NEPA process, existing agencies and processes (e.g. ADFG, ADEC, DNM, USFWS, ANILCA, OPMP and BOEM), and the existing intimate and routine cooperation between federal and state agencies managing Alaska's coastal resources is capable of planning and managing coastal developments in a transparent, organized and sustainable way. However, effects of the failure to re-establish a formal coastal management program previously in place 30 years have yet to be determined.

IPHC and NPFMC meetings

The IPHC annual meeting, and the regular meetings of the NPFMC provide forums for resolution of potential international and national fisheries conflicts. The IPHC accepts regulatory proposals in the fall of each year, and users can testify in person or in writing at IPHC and NPFMC meetings. In addition, stakeholders may review and submit written comments to the NMFS on proposed rules published in the Federal Register. The NPFMC works closely with ADFG and the BOF to coordinate fishery management programs in state and federal waters off Alaska to address fish habitat concerns, catch limits, allocation issues and other conservation management issues [20]

The NPFMC is responsible for allocation of the halibut resource among user groups in Alaska waters. In addition, the Board of Fisheries (BOF) public meetings process provides a regularly scheduled public forum for all interested individuals, fishermen, fishing organizations, environmental organizations, Alaskan Native organizations and other governmental and non-governmental entities that catch halibut off Alaska to participate in the development of legal regulations for the commercial and sport fisheries.

Advisory Committees (AC) are local "grass roots" citizen groups intended to provide a local voice for the collection and expression of public opinions and recommendations on matters relating to the management of fish and wildlife resources in Alaska. ADFG staff regularly attends the AC meetings in their respective geographic areas to provide information to the public and hear local opinions on fisheries related activities. Currently, there are 84 advisory committees in the state. Of these, approximately 80% to 85% are "active", meaning they regularly meet, write proposals, comment and

[18] Alaska Department of Natural Resources. 2015. Welcome to the Office of Project Management & Permitting Homepage. Accessed 2015. http://dnr.alaska.gov/commis/opmp/).

[19] ARCADIS. Cook Inlet Offshore Oil & Gas Exploration Permit Application & Approval Process. Accessed 2015. http://dog.dnr.alaska.gov/Permitting/Documents/Arcadis/Arcadis_Flowchart_CookInletOffshore_Draft.pdf http://www.boem.gov/uploadedFiles/Proposed_OCS_Oil_Gas_Lease_Program_2012-2017.pdf

[20] ADF&G. 2015. Pacific Halibut. Get Involved. Accessed 2015 http://www.adfg.alaska.gov/index.cfm?adfg= halibut.getinvolved

attend BOF meetings. The enabling statute for the AC system is AS 16.05.260. Regulations governing the ACs are found in the Alaska Administrative Code (AAC) Title 5, Chapters 96 – 97 [21]

The IPHC has already taken action on several recommendations concerning increased openness and transparency in Commission meetings and operations. Action on other recommendations will be incorporated into ongoing work to improve the Commission's procedures and processes, including the development of scientific advice, planning and review of research, and operation of the advisory bodies. An update on the IPHC performance review and how the Commission was instituting some of the suggested changes is detailed in Section A1 of this report.

3. Management objectives shall be implemented through management rules and actions formulated in a plan or other framework.

FAO CCRF 7.3.3/7.2.2

Evidence adequacy rating:

☑ **High** ☐ **Medium** ☐ **Low**

Rating determination

The objectives of the initial US and Canada Agreement for the management, conservation and sustainable utilization of Pacific halibut in the North Pacific, signed in 1923 pointed to the first basic regulations for closure of the fishery in determinate periods, halibut bycatch in other fisheries and the need for reporting such removals, enabling prosecutions for violation of the provisions and investigation into the life history of the Pacific halibut. Amendment 15 and 20 to the Fishery Management Plan (FMP) for the Groundfish Fishery of the BSAI and GOA in 1992 established an individual fishing quota (IFQ) limited access system in commercial fixed gear fisheries for Pacific halibut and sablefish in and off Alaska and implemented a Western Alaska Community Development Quota (CDQ) program for halibut and sablefish fixed gear fisheries. These amendments effectively provide a framework for the management of halibut resources in the BSAI and GOA. These actions were intended by the NMFS to promote the conservation and management of halibut and sablefish resources, and to further the objectives of the Northern Pacific Halibut Act of 1982 (Halibut Act) and the Magnuson Fishery Conservation and Management Act (Magnuson Stevens Act or MSA) that provided authority for regulating these fisheries.

The initial US and Canada Agreement for the management, conservation and sustainable utilization of Pacific halibut in the North Pacific, signed in 1923 stated that "*The Commission (IPHC) shall report the results of its investigation to the two Governments and shall make recommendations as to the regulation of the halibut fishery of the North Pacific Ocean, including the Bering Sea, which may seem desirable for its preservation and development.*" Objectives of this agreement pointed to the first basic regulations for closure of the fishery in determinate periods, halibut bycatch in other fisheries and the need for reporting such removals, enabling prosecutions for violation of the provisions and investigation into the life history of the Pacific halibut.

[21] ADF&G. 2015. Alaska's Fisheries and Game Board Process. Accessed 2015. http://www.boards.adfg.state.ak.us/bbs/what/prps.php

Control of removal rate, or the amount of fishing on each stock, was made possible by amendments in the Treaties of 1930 and 1937, which authorized the division of the coast into areas and the limitation of the catch in each area. In 1953, a further Agreement of the Commission expanded on previous objectives of the IPHC as follows: "*The Contracting Parties agree that for the purpose of developing the stocks of halibut of the Northern Pacific Ocean and Bering Sea to levels which will permit the maximum sustained yield from that fishery and for maintaining the stocks at those levels, the IPHC, with the approval of the President of the United States of America and of the Governor General in Council of Canada, may, after investigation has indicated such action to be necessary, in respect of the nationals and inhabitants and fishing vessels and boats of the United States of America and of Canada, and in respect of halibut:*

***(a)** divide the Convention waters into areas;*
***(b)** establish one or more open or closed seasons, as to each area;*
***(c)** limit the size of the fish and the quantity of the catch to be taken from each area within any season during which fishing is allowed;*
***(d)** during both open and closed seasons, permit, limit, regulate or prohibit, the incidental catch of halibut that may be taken, retained, possessed, or landed from each area or portion of an area, by vessels fishing for other species of fish;*
***(e)** prohibit departure of vessels from any port or place, or from any receiving vessel or station, to any area for halibut fishing, after any date when in the judgment of the IPHC the vessels which have departed for that area prior to that date or which are known to be fishing in that area shall suffice to catch the limit which shall have been set for that area under section (c) of this paragraph;*
***(f)** fix the size and character of halibut fishing appliances to be used in any area;*
***(g)** make such regulations for the licensing and departure of vessels and for the collection of statistics of the catch of halibut as it shall find necessary to determine the condition and trend of the halibut fishery and to carry out the other provisions of this Convention;*
***(h)** close to all taking of halibut such portion or portions of an area or areas as the IPHC finds to be populated by small, immature halibut and designates as nursery grounds.*

In November 1993, the NMFS issued a final rule to implement Amendment 15 to the Fishery Management Plan (FMP) for the Groundfish Fishery of the BSAI Area and Amendment 20 to the FMP for Groundfish of the GOA Area. These are regulatory amendments affecting the fishery for Pacific halibut in and off Alaska. These regulations established an individual fishing quota (IFQ) limited access system in commercial fixed gear fisheries for Pacific halibut and sablefish in and off Alaska.

In addition, this action implemented a Western Alaska Community Development Quota (CDQ) program for halibut and sablefish fixed gear fisheries. These actions were intended by the NMFS to promote the conservation and management of halibut and sablefish resources, and to further the objectives of the Northern Pacific Halibut Act of 1982 (Halibut Act) and the Magnuson Fishery Conservation and Management Act (Magnuson Stevens Act or MSA) that provided authority for regulating these fisheries. The IFQ program was intended to resolve various conservation and management problems that stemmed from the "open access" regulatory regime in place at that time. The CDQ program was intended to help develop commercial fisheries in Western Alaskan communities on the Bering Sea coast by allowing them exclusive access to specified amounts of halibut and sablefish in the BSAI. Amendments 15 and 20 implemented halibut and sablefish IFQ program to the Groundfish FMPs of Alaska. These amendments effectively provide a framework for the management of halibut resources in the BSAI and GOA.

New regulations on observer deployment for the fisheries of Alaska became effective on 1 January 2013. Amendment 86 to the Fisheries Management Plan (FMP) of the Bering Sea and Aleutian Islands and Amendment 76 to the FMP of the Gulf of Alaska established the new North Pacific

Groundfish and Halibut Observer Program (Observer Program). The new regulations modify observer coverage funding and observer coverage requirements for vessels and processors. These changes will increase the statistical reliability of data collected by the program, address cost inequality among fishery participants, and expand observer coverage to previously unobserved fisheries.[22]

The Alaska halibut fishery is managed cooperatively by the IPHC, NMFS and the NPFMC. The NPFMC and NMFS manage the halibut fishery in the Alaska region of the American EEZ. Management decisions are made by the NPFMC, and implemented and enforced by NMFS. The NPFMC has developed Pacific halibut regulations that are in addition to, and not in conflict with, the regulations of the IPHC. These NPFMC regulations generally address domestic allocation concerns (e.g., individual fishing quotas, catch sharing between sectors, subsistence, local area management planning), some of which had profound management and conservation impact. For example, the IFQ program regulations developed by the NPFMC facilitated the maintenance of total commercial harvest within the catch limits specified by the IPHC while addressing domestic allocation concerns in the fishery. Similarly, bycatch limits of Pacific halibut (a Prohibited Species Catch species) distributed among other commercial fisheries in Alaska (e.g. groundfish) essentially function as a bycatch cap that closes these fisheries once the cap is reached.

The NPFMC develops its Pacific halibut fishery regulations pursuant to the authority in section 5(c) of the Northern Pacific Halibut Act of 1982 (Halibut Act). The NPFMC's Halibut Act regulations are implemented only after review and rulemaking conducted by the NMFS.

The IPHC outputs (Annual Reports, Reports of Assessment and Research Activities, Scientific Reports, Technical Reports, Regulations, Information Bulletins, Annual Meeting Reports) seek to address the fishery development and conservation objectives set out in the various Agreements between US and Canada to manage the Pacific halibut stock. The Commission's Annual Report details the performance of the fisheries (commercial, sport, and personal use), with emphasis on the biological considerations, stock assessment, management issues (e.g. bycatch), and scientific research. The Report also presents the results of the Commission's annual meeting (usually held in January), at which the catch limits for upcoming season are determined. [23]

[22] NOAA. 2013. The Restructured North Pacific Groundfish and Halibut Observer Program. Accessed 2015. http://www.afsc.noaa.gov/Quarterly/jfm2013/JFM2013-Feature.pdf

[23] International Pacific Halibut Commission. IPHC Homepage. Accessed 2015. www.iphc.washington.edu/home.html

NOAA. Federal Register / Vol. 76, No. 51 / Wednesday, March 16, 2011 / Rules and Regulations. Accessed 2015. http://www.fakr.noaa.gov/frules/76fr14300.pdf

International Environmental Agreements (IEA) Database Project. 1923 Convention for the Preservation of the Halibut Fishery . Accessed 2015. http://iea.uoregon.edu/pages/view_treaty.php?t=1953-Halibut.EN.txt&par=view_treaty_html

International Pacific Halibut Commission. 2010. IPHC Annual Reports. Accessed 2015.www.iphc.washington.edu/library/annual-reports.html

North Pacific Management Council Homepage. Accessed 2015. www.fakr.noaa.gov/npfmc/default.htm

Alaska Fishery Regulations and Notices. Accessed 2015. http://www.fakr.noaa.gov/regs/summary.htm

Magnuson-Stevens Fishery Conservation and Management Act. Public Law 94-265 As amended through October 11, 1996. Accessed 2015. www.nmfs.noaa.gov/sfa/magact

NOAA. 2015. Individual Fishing Quota (IFQ) Program. Accessed 2015.www.fakr.noaa.gov/ram/ifq.htm

NOAA. 1993. Federal Register I Vol. 58, No. 215 I Tuesday, November 9, 1993 I Rules and Regulations 59375. Accessed 2015.http://alaskafisheries.noaa.gov/frules/fr59375.pdf

B. Science and Stock Assessment Activities

4. There shall be effective fishery data (dependent and independent) collection and analysis systems for stock management purposes.

FAO CCRF 7.1.9/7.4.4/7.4.5/7.4.6/8.4.3/12.4
ECO 29.1-29.3

Evidence adequacy rating:

☑ **High** ☐ **Medium** ☐ **Low**

Rating determination

The IPHC collects yearly data from a variety of sources to characterize the fishery, status and population trends in all regulatory areas, and assist in fitting a population assessment model. Some of the key datasets collected include IFQ e-landings catch, sport catch, bycatch, personal use and wastage data. Every year, the IPHC places a sampler aboard the NMFS EBS groundfish/crab trawl survey. The sampler collects biological data on the halibut catches, taking lengths of almost all halibut caught and selecting a subsample for ageing. The biennial GOA survey was conducted in 2013. The biennial Aleutian Islands (AI) survey was conducted in 2014, and the IPHC participated in the survey in 2014, (and in 2012 for the first time since 2000). The swept-area estimates of abundance derived from the three NMFS trawl surveys (BS, GOA, AI) are a valuable independent indicator of long-term trends in halibut biomass. In 2014, eleven commercial longline vessels, six Canadian and five U.S., were chartered by the IPHC for the longline survey operations. Of the 1,430 setline survey stations planned for the 2014 survey season, 1,417 were considered appropriate for stock assessment analysis. Seabird occurrence data have also been collected during IPHC stock assessment surveys since 2002. IPHC also investigates the use of data from surveys by other agencies to calibrate the IPHC setline survey index in regions that are not sampled annually by the setline survey.

Bycatch data collected during the IPHC surveys are used as proxy to estimate total bycatch in the halibut fishery. However, from January 2013, there are also new partial coverage observer requirements for halibut vessels fishing hook and line gear. Halibut vessels are registered with the NMFS and can be selected on a vessel or trip basis.

Observations from the survey, commercial and other fisheries

The IPHC collects yearly data from a variety of sources to characterize the fishery, status and population trends in all regulatory areas, and assist in fitting population assessment models. Some of the more important datasets are summarized below, with materials from the 2014 IPHC Report of Assessment and Research Activities (RARA)[24].

Halibut fishery removals

[24] Stewart, I.J. 2015. Overview of data sources for the Pacific halibut stock assessment and related analyses. . Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 87-160. http://www.iphc.int/publications/rara/2014/rara2014_10sadatasources.pdf

Total removals from the halibut populations are shown by catch area (Figure B4.1, 2, 3, 4), and come from five categories:

1) commercial catch (IFQ e-landings & IPHC port survey data are included in this category),
2) sport catch (Charter boat logbook, ADFG port samplers and annual mail-in survey),
3) bycatch (observer data and logbooks from a variety of fisheries targeting species other than halibut),
4) personal use (port samplers, subsistence interviews and SHARC reports), and
5) wastage from the commercial fishery (on board observers).

Bycatch and wastage are subdivided into O26 (over 26 inches) and U26 (under 26 inches) components as the U26 components are not used for purposes of determining fishery CEY (they are factored into the harvest rate). Detailed descriptions of each category are contained in the Fishery Removals section(s) of the annual IPHC RARA,[25],[26] and are summarized in the figures below. [27]

Recent aggregate total removals from all sources reveal that although the directed commercial fishery represents the majority of the catch-based mortality, other sources, including bycatch and sport removals, tend to contribute a larger proportion when the total is lower. Total removals in 2014, estimated to be about 42.5 million pounds, continued the recent decline (Fig. B4.1), and are approaching those from the 1970s, below the 100-year average of 64 million pounds. Recent total removals from all sources by regulatory area reveal that Area 3A has been the dominant contributor to total mortality throughout the last five decades, that Area 4 has increased in its proportion of the total, and that the other areas have been somewhat consistent. The full time-series of estimated total removals illustrates that all four of the major peaks in the commercial fishery mortality have been of similar magnitude (around 70 million pounds) but that each peak has been larger than the previous. When the removals by source are compared among areas, there are a number of differing patterns in magnitude and distribution (Fig. B 4.2, 4.3. 4.4).[28]

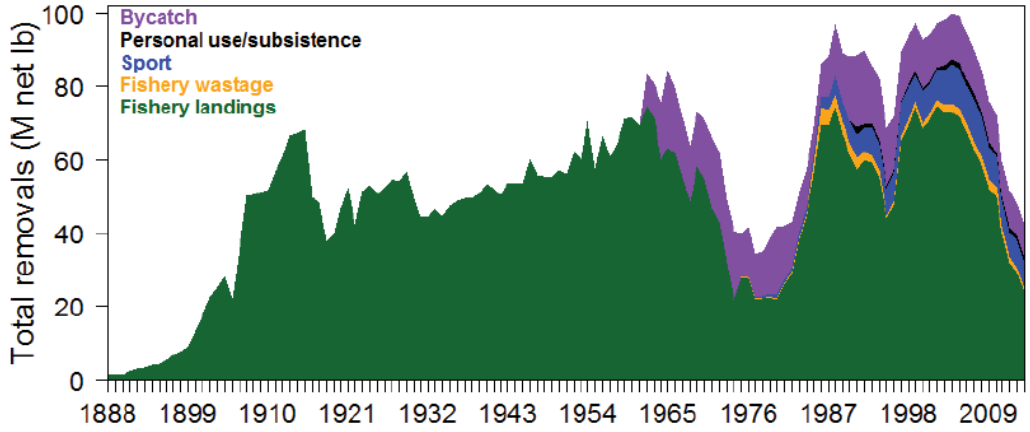


Figure B4 1. Total estimated halibut removals, by source, since 1988. All areas combined.

[25] Ibid.

[26] Stewart, I.J., B.M. Leaman, and S.J.D. Martell. 2015. Accounting for and managing all Pacific halibut removals. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 221-266. http://www.iphc.int/publications/rara/2014/rara2014_15allremovalsmanagement.pdf

[27] Stewart, I.J. 2015. Overview of data sources for the Pacific halibut stock assessment and related analyses. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 87-160.

[28] Ibid

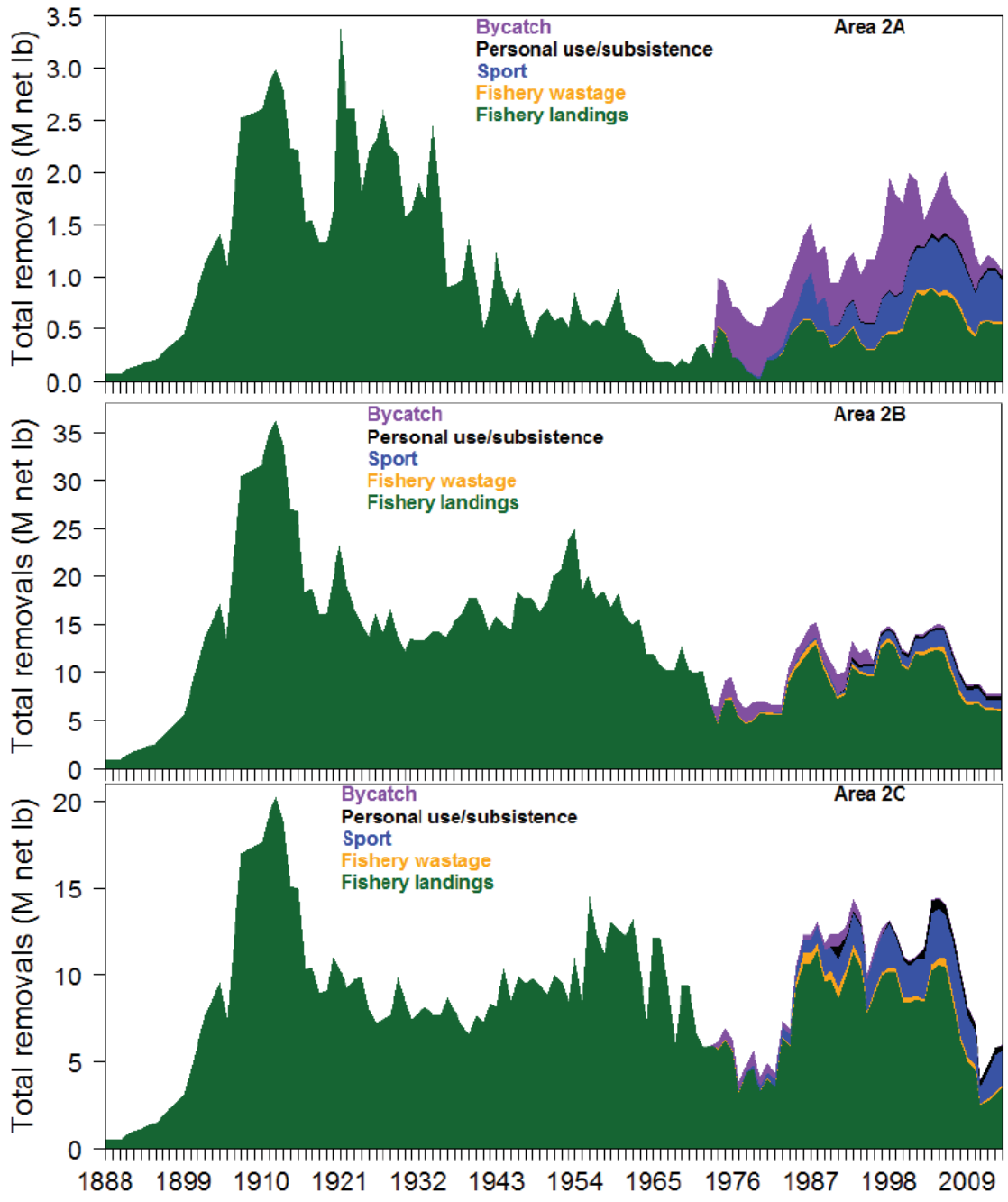


Figure B4 2. Total estimated halibut removals, by source, in Areas 2A, 2B, and 2C since 1988. Note the Y-axes differ in scale.

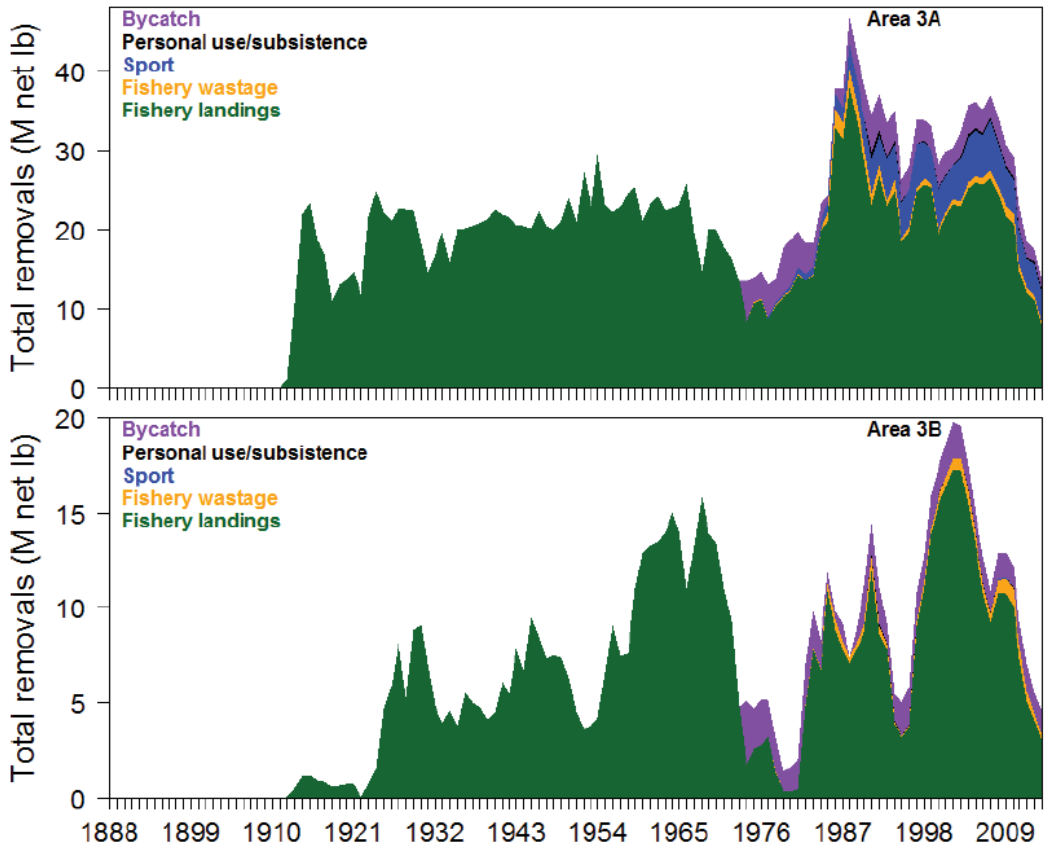


Figure B4 3. Total estimated halibut removals, by source, in Areas 3A, and 3B since 1988. Note the Y-axes differ in scale.

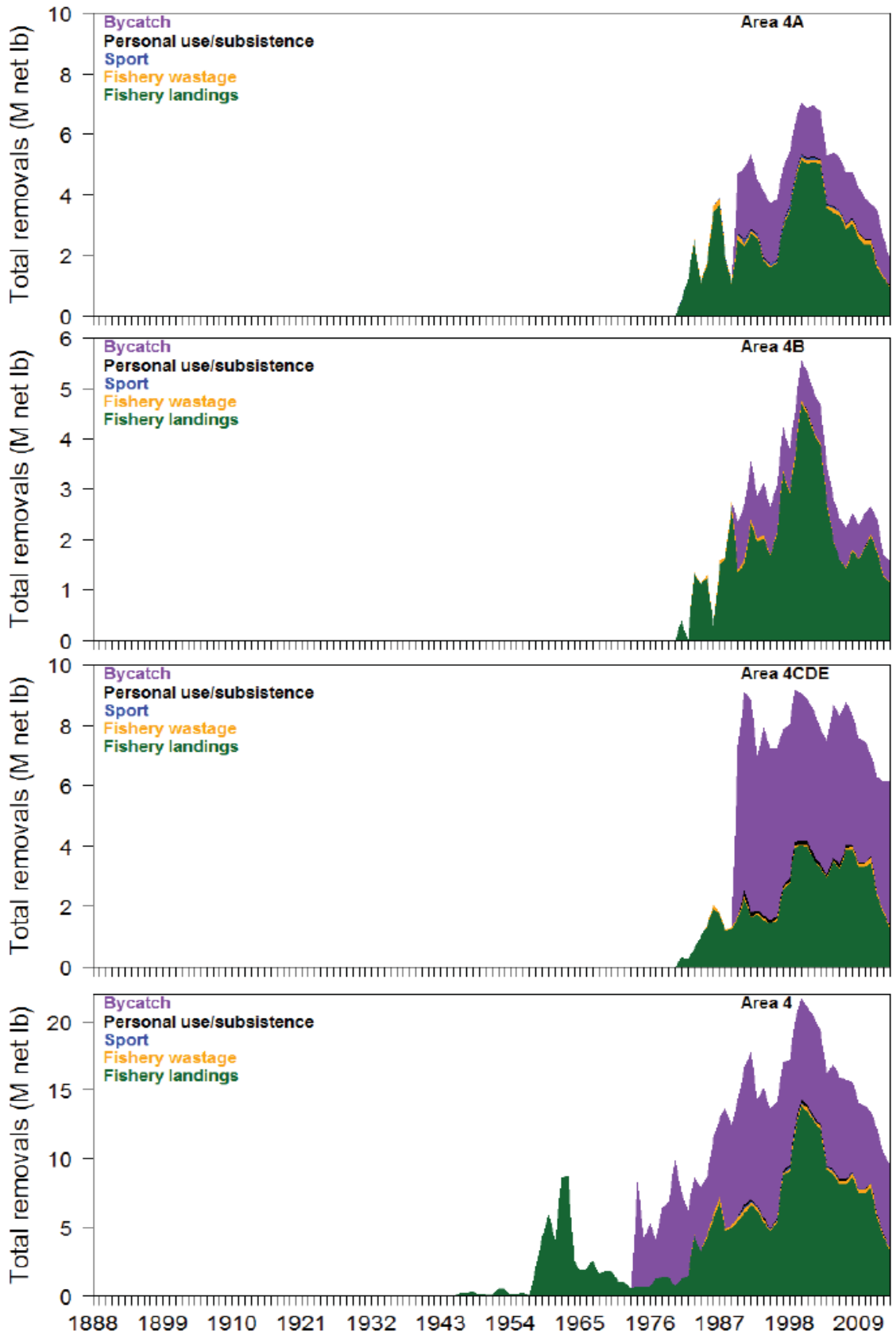


Figure B4 4. Total estimated halibut removals, by source, in Areas 4A, 4B, and 4CDE since 1988. Note the Y-axes differ in scale.

Fishery-independent data

NMFS trawl surveys
Bering Sea

Every year, the IPHC places a sampler aboard the NMFS Eastern Bering Sea (EBS) groundfish/crab trawl survey. The sampler collects biological data on the halibut catches, taking lengths of almost all halibut caught and selecting a subsample for aging. The EBS groundfish trawl survey is used to assess halibut because of the high cost, and very low catch rate when conducting setline survey for halibut in the EBS. For this reason, the IPHC does not conduct the Standardized Stock Assessment (SSA) grid survey in that region. While the IPHC survey does operate along the Area 4D shelf edge, that region is not indicative of densities and trends across the broad shelf.

The traditional NMFS survey (i.e., as operated from 1982-present) generates swept area estimates of abundance for the southern part of the EBS shelf (equivalent to operational IPHC area 4S, the southern part of the EBS shelf). Beginning in 2010, Area 4S comprises the part of the shelf covered by the traditional NMFS EBS shelf survey, including the southern parts of IPHC regulatory areas 4D and 4E. This differs from the definition of Area 4S utilized in 2009. The reason for the change is that starting in 2010 the NMFS expanded the EBS trawl survey north to 65.5 ˚N and covering the entire remainder of the EBS shelf. ADFG also conducts trawl surveys that are included in the IPHC assessment. From the NMFS trawl survey IPHC obtains swept area estimates of abundance at length and can then apply the stock assessment estimated survey selectivity at length schedule to the full catch to provide an index of survey catch rate, comparable to the SSA survey fishing gear.

In 2014, the International Pacific Halibut Commission (IPHC) participated in the National Marine Fisheries Service (NMFS) annual Bering Sea shelf trawl survey for the 17th straight year[29]. The survey is a continuation of a time series started in 1975, and continued annually since 1979. Data collected on the trawl survey along with IPHC setline survey data and commercial catch information are used to create abundance estimates and to map year-class strengths. IPHC biologists participated in trips of two chartered vessels conducting the survey, and a total of 1053 Pacific halibut were sampled for length, age structures, sex, and maturity.

Aleutian Islands
The National Marine Fisheries Service biennial trawl survey in the Aleutian Islands survey was conducted in 2014, and IPHC participated for the second consecutive time in recent years. The 2012 survey was the first that IPHC had participated in since 2000. The survey was conducted on board two charter vessels, and covered the area surrounding the Aleutian Islands between Unimak Pass in the east and Stalemate Bank in the west. A total of 510 Pacific halibut were sampled for length, age structures, sex, maturity, and prior hooking injuries[30].

Estimates of abundance and biomass from this survey are based upon the area swept technique and are considered to be relative indices of abundance. The halibut population index peaked in 1997 with a biomass estimate of 146 million pounds and steadily declined through 2012 to about

[29] Sadorus, L.L. and R. Lauth. 2015. Cruise report for the 2014 NMFS Bering Sea trawl survey. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 619-626. http://www.iphc.int/publications/rara/2014/rara2014_38nmfsbstrawl.pdf

[30] Sadorus, L.L., W.A. Palsson, and A. Ranta. 2015. Results from the NMFS Aleutian Islands biennial bottom trawl survey in 2014. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 635-644 http://www.iphc.int/publications/rara/2014/rara2014_40nmfsaitrawl.pdf

70 million pounds. A slight increase to 74 million pounds occurred in 2014 but may simply reflect survey variability. The average length of the halibut caught during the survey was 65 cm in 2014, compared to a 60 cm average in 2012. It is possible that the increase in average fork length in the 2014 survey reflects the 2004 and 2005 year classes moving through the population, but age data were not yet available for 2014 so this could not yet be confirmed.

Gulf of Alaska

NOAA, Alaska Fisheries Science Center, conducted a bottom trawl survey of Gulf of Alaska groundfish and invertebrate resources in 2013 as a continuation of a series started in 1984. This survey is the eighth since changing the series from triennial to biennial in 1999. One IPHC biologist was deployed on one vessel for the duration of the survey to sample Pacific halibut for length, gender, maturity, otoliths, and prior hooking injuries.[31] A total of 1,051 Pacific halibut were sampled for the general collection and an additional 67 were sampled for the clean otolith archive collection. With the exception of the 2009 estimate, which was higher, the total estimated Pacific halibut abundance has steadily declined since 2003 to 105 million halibut in 2013. The 2004 and 2005 year-classes continued to show strongest in the 2011 aging data[32]. The next survey in this series is scheduled for 2015.

Alaska trawl swept-area estimates of abundance

The swept-area estimates of abundance derived from the three NMFS trawl surveys (Bering Sea, Gulf of Alaska, Aleutian Islands) continue to be an independent indicator of long-term trends in halibut biomass. While the survey regions do not correspond precisely to IPHC regulatory areas and not all surveys are conducted in all years, they provide useful estimates of abundance trends. There is the potential that trawl surveys, accessing juvenile halibut habitat and capturing much younger fish than those observed from longline sampling, could provide information on recruitment strengths for halibut several years prior to currently available sources of data.. NMFS also conducts annual trawl surveys off the U.S. west coast, which also enumerate halibut catches. DFO (Canada) conducts both trawl and longline surveys off the B.C. coast ,which could be included in an analysis of juvenile or adult habitat. Analyses of these various datasets are ongoing[33].

[31] Sadorus, L.L. and W.A. Palsson. 2014. Results from the Gulf of Alaska NOAA Fisheries Service bottom trawl survey in 2013. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2013: 471-478. http://www.iphc.int/publications/rara/2013/rara2013_34_2013goatrawlsurvey.pdf

[32] Sadorus, L.L., W.A. Palsson, and A. Ranta. 2014. Abundance and age composition of Pacific halibut as estimated by the NOAA Fisheries Service Gulf of Alaska bottom trawl survey. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2013: 479-486.
http://www.iphc.int/publications/rara/2013/rara2013_35_2013goatrawlage.pdf

[33] Stewart, I.J. 2015. Overview of data sources for the Pacific halibut stock assessment and related analyses. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 87-160.

IPHC Setline survey

In 2014, eleven commercial longline vessels, six Canadian and five U.S., were chartered by the IPHC for setline survey operations. During a combined 78 trips and 747 charter days, these vessels fished 33 charter regions, covering habitat from northern California to the Aleutian Islands, and north along the Bering Sea continental shelf edge. All 1,430 survey stations planned for the 2014 survey season were either scouted or completed. Of these stations, 1,417 (99.1%) were considered successful for stock assessment analysis. Approximately 765,419 pounds of halibut, 119,474 pounds of Pacific cod, and 49,501 pounds of rockfish were landed from the standardized survey stationsBy Regulatory Area, increased from 2013 to 2014 were observed as follows: 2C (+1%), 3B (+2%), 4A (+45%), and 4C (+26%). WPUE decreased in Areas 2A (-25%), 2B (-2%), 3A (-2%), 4B (-12%), and 4D (-8%) (Fig. B4.5)[34]. Coastwide, compared to 2013 results, survey WPUE increased by 6% for all sizes of halibut, and by 2% for O32 halibut (Fig B4.6).

The IPHC has conducted standardized setline surveys in selected areas during most years since 1963 (with a break from 1987 to 1992). The majority of the current survey station design and sampling protocols have been consistent since 1998. This survey provides a key index for the stock assessment.

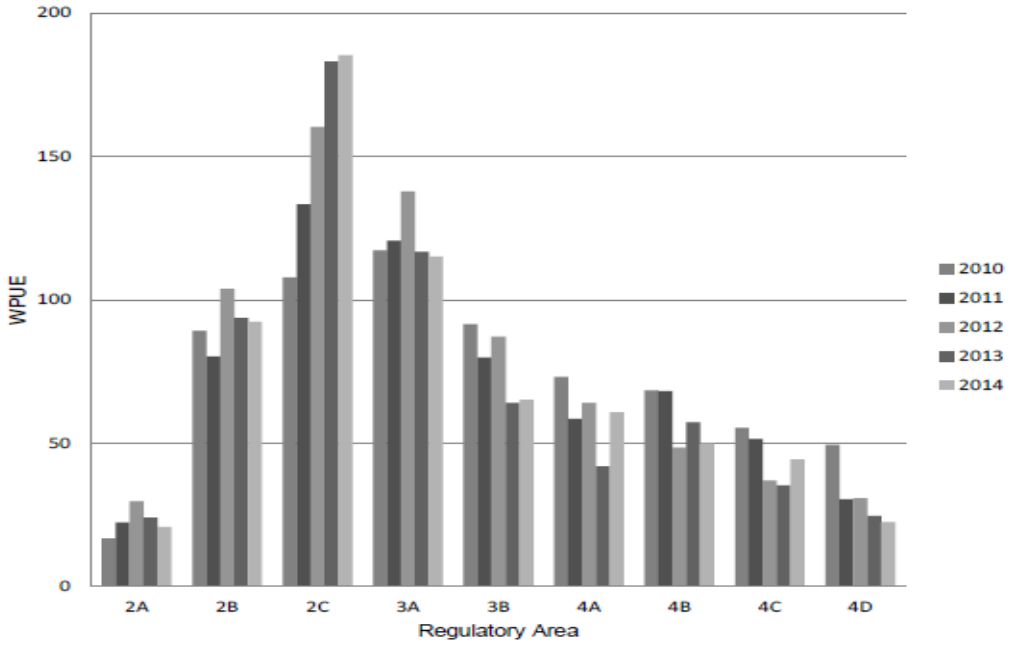


Fig. B4.5. Average WPUE (lb/skate) of halibut, by IPHC area, from 2010-2014 setline surveys. Includes newly added stations in Area 2A and 4A.[35]

Number per unit effort (NPUE) was also observed by region. In 2014, there was a 14% increase in the relative numbers of U32 caught and a 1% decrease in catch rates of O32 length halibut relative to 2013. There were 26% more U32 halibut captured than O32, which is a 14% increase in difference from the 2013 value of 12%. In 2014, Areas 2B, 2C, 3B, and 4A all had a slight increase in the rate of capture of both large and small halibut. Area 3A showed a decrease in O32, but an increase in U32 halibut NPUE.

[34] Henry,E., E.Soderlund, C.L. Dykstra, T. Geernaert, A.M. Ranta, and T.Kong. 2014. Standardized stock assessment survey. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 531-568. http://www.iphc.int/publications/rara/2014/rara2014_33ssasurvey.pdf

[35] Ibid.

In 2014, on the recommendation of the IPHC's Scientific Review Board (SRB), the stock assessment began fitting directly to the NPUE from the setline survey. This avoids converting observed lengths to weights based on the length-weight relationship, and provides a delineation between changes in the number of fish and changes in the size of those fish. In broad terms, very similar trends have been observed for NPUE when compared to the WPUE.[36]

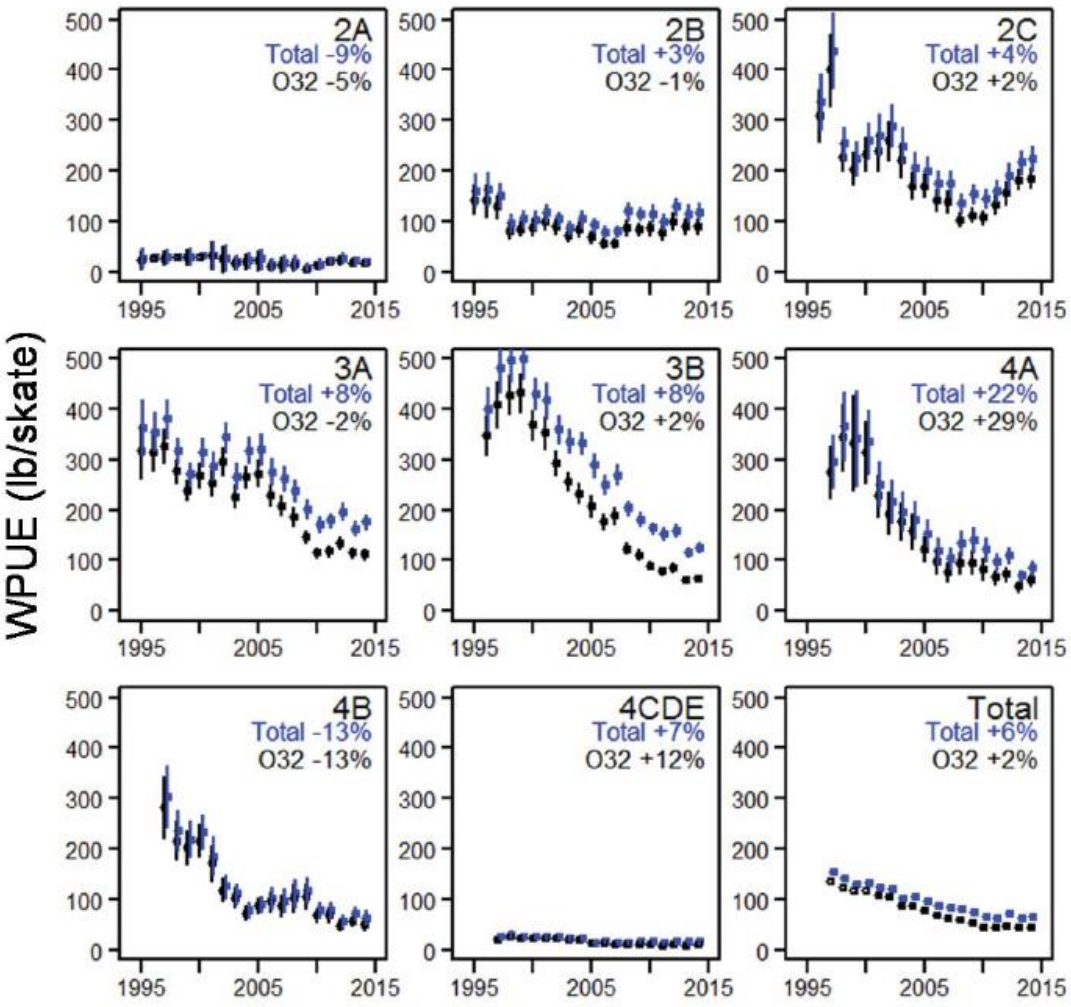


Fig. B4.6 Recent setline survey WPUE (lbs/skate) for all (blue, upper series) and legal-sized fish (black, lower series) by regulatory area and year through 2014. Percentages for each area indicate the change from 2013 to 2014. [37]

The age distribution of halibut sampled during the setline stock assessment survey contained fish ranging from 4 to 46 years old, with nine-year-olds comprising the largest age group in the overall catch[38]. Average age was higher and average fork length was lower for males than females in all regulatory areas. The age distribution is summarized in Table B4.1. In 2014, the 2005 year class

[36] Stewart, I.J. 2015. Overview of data sources for the Pacific halibut stock assessment and related analyses. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 87-160.
[37] Ibid.
[38] Forsbeg, J. E. 2015. Age distribution of Pacific halibut in the 2014 IPHC stock assessment setline survey. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 569-576. http://www.iphc.int/publications/rara/2014/rara2014_34surveyage.pdf

accounted for the largest proportion (in numbers) of sampled halibut for all areas and sexes combined. The next most abundant year classes were 2004 and 2003 (10- and 11-year-olds, respectively).

There has been a strong trend of declining weight-at-age in recent surveys, although there are differences in the magnitude of this decline among regulatory areas. There also appear to be some patterns associated with specific cohorts. There are no apparent consistent or strong trends from 2010-2014 in the area specific data.

Table B4.1. Age distribution of all halibut (male, female, and unknown sex combined) collected in the 2014 IPHC setline survey.[39]

Age	Regulatory Area									
(years)	2A	2B	2C	3A	3B	4A	4B	4C	4D	Total
4			1							1
5		1	5	1	1	3	6	1		18
6	4	23	21	20	9	13	14	4	6	114
7	24	47	43	46	42	22	30	6	23	283
8	84	170	154	124	124	79	153	29	54	971
9	281	442	331	262	390	311	303	85	68	2,473
10	268	373	285	297	400	394	256	75	124	2,472
11	156	222	200	265	316	409	243	138	132	2,081
12	140	240	254	260	319	367	169	99	138	1,986
13	108	182	199	240	208	259	165	50	71	1,482
14	55	179	222	244	174	201	82	32	44	1,233
15	31	126	143	224	129	160	49	24	32	918
16	16	85	85	107	69	117	40	12	25	556
17	8	50	58	82	50	67	21	6	15	357
18	3	36	28	68	31	57	35	4	13	275
19	1	21	31	40	14	39	16	1	7	170
20	1	14	16	35	13	31	31	1	10	152
21	1	6	4	25	12	16	38		8	110
22		6	3	11	4	12	9		4	49
23	1	12	2	13	3	15	13		5	64
24		5	4	9	1	24	12		3	58
25		8	4	8	7	33	15	1	12	88
≥26		14	12	20	8	120	83	1	24	282
Total	1,182	2,262	2,105	2,401	2,324	2,749	1,783	569	818	16,193

By-catch in the IPHC survey [40]

For details on bycatch, seabird and marine mammal interaction please refer to section F13.

Fishery-dependent data

Commercial catch and effort

A second major component of the annual IPHC data collection is sampling the commercial catch. The port sampling program[41], age sampling [42], and calculation of commercial fishery WPUE and

[39] Ibid.

[40] Henry,E., E.Soderlund, C.L.Dykstra, T. Geernaert, A.M. Ranta, and T.Kong. 2014. Standardized stock assessment survey. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 531-568.

NPUE[43] for use in the stock assessment are summarized below, from various authors in the 2014 RARA.

Commercial fishery logbook data is collected by port samplers, and reported directly to the IPHC by fishermen. This dataset represents a valuable source of information about many aspects of the commercial fishery, including seasonal and spatial patterns, gear usage, and other details. A relatively simple method is used to calculate the annual index of fishery WPUE, and a detailed exploratory analysis of the logbook standardization was completed during 2014. The WPUE by regulatory area is combined into a coastwide total by multiplying the area-specific values by the geographic extent of the 0-400 fathom bathymetry in each area (as is done for survey WPUE). This is consistent with the concept that the commercial WPUE is also a 'survey' of the stock and therefore the estimates are a proxy for density, but diverges from the more common approach of weighting the commercial WPUE from each area by the catch in that area relative to the total.

As has been observed over several previous stock assessments, the final verified record of logbooks available approximately 10-12 months after the end of the annual fishing season (August to September of the following year) have tended to show a lower catch rate than the preliminary data available in November used in the stock assessment each year. These differences reflect the inclusion of logbooks that were not collected by port samplers during the year of fishing, as well as logbooks that had been collected but were not available for analysis in 2014. After the development of indices for the 2014 stock assessment, an inconsistency in the treatment of unverified logs was also identified in the data processing routines. Therefore, the 3% increase currently estimated from the revised 2013 value should be interpreted with caution and tempered by inspection of previous trends, particularly at the area-specific level. Recent trends in the commercial WPUE series differ substantially among regulatory areas, with Areas 2A, 2B and 2C showing increases, and Areas 3A through 4A showing clear continued declines (Fig B4.8). In Areas 3A through 4 fishery catch rates were substantially higher in the late 1980s through the late 1990s than at present.

The most dramatic change in the commercial WPUE time series corresponds to the transition from "J" to circle hooks in 1984 (Fig B4.9), although there have been many other changes in the definition of effort over the time series. Additional uncertainty throughout the historical series is reflected by increased CVs (fixed at 0.1) for all years prior to 1996. Commercial WPUE at the coastwide level declined steadily from the early 2000's, but increased in 2014 by 7%. However, it was noted that these records were unverified and incomplete at the time of the stock assessment.

Fig B4.7 shows how WPUE is incorporated into the stock assessment for P. halibut, and also shows the relationships among fishery WPUE and biological data sources. [44]

[41] Erikson, L.M. and K.A. MacTavish. 2015. Commercial catch sampling. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 65-78.
http://www.iphc.int/publications/rara/2014/rara2014_08commcatsampling.pdf

[42] Forsberg, J.E. 2015. Age distribution of the commercial halibut catch for 2014. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 79-86.
http://www.iphc.int/publications/rara/2014/rara2014_09commercialage.pdf

[43] Stewart, I.J. and S. Martell, 2015. Assessment of the Pacific halibut stock at the end of 2014. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 161-180.

[44] Stewart, I.J. and S. Martell, 2015. Assessment of the Pacific halibut stock at the end of 2014. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 161-180.

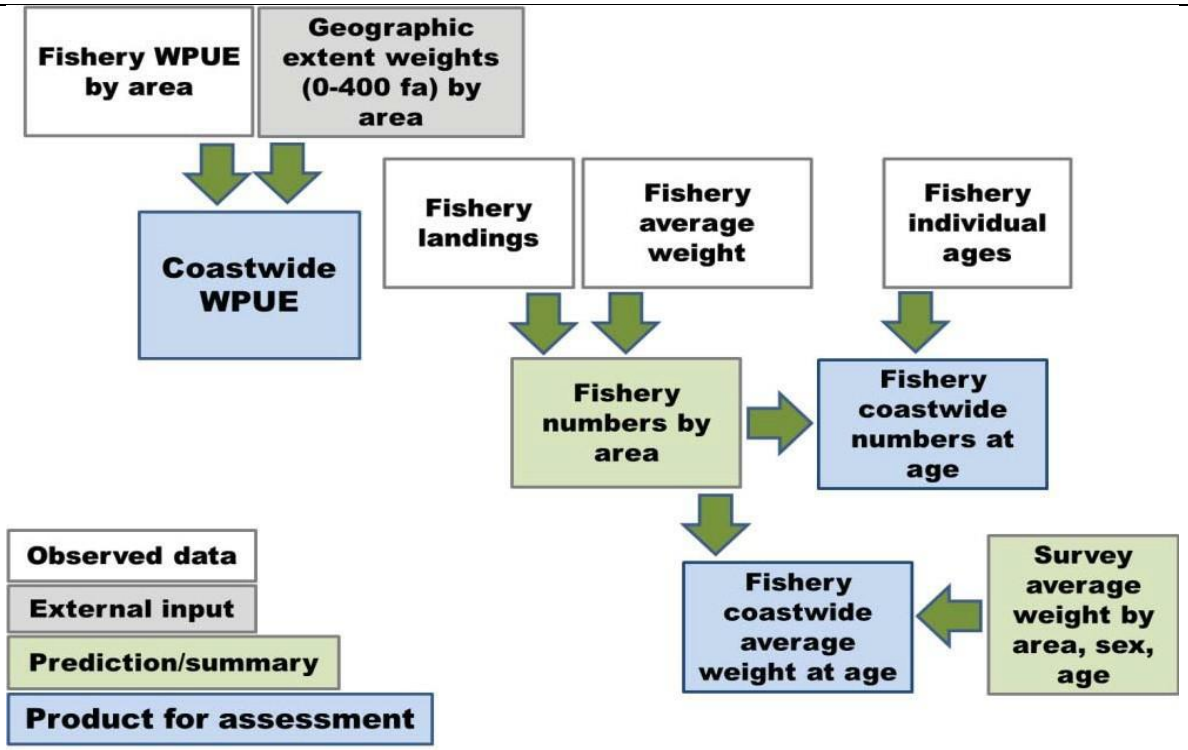


Fig. B4.7. Schematic showing relationships among fishery WPUE and various datasets used in the stock assessment of Pacific halibut.

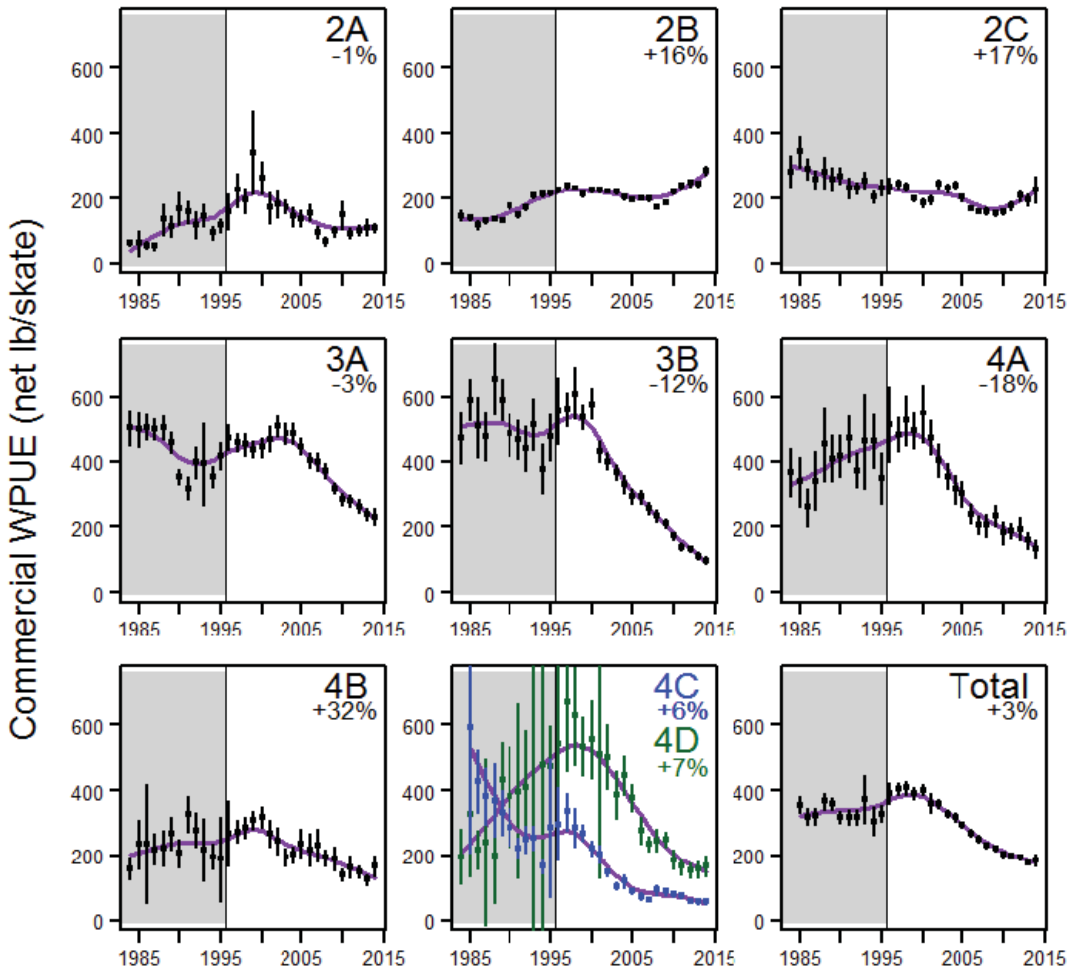
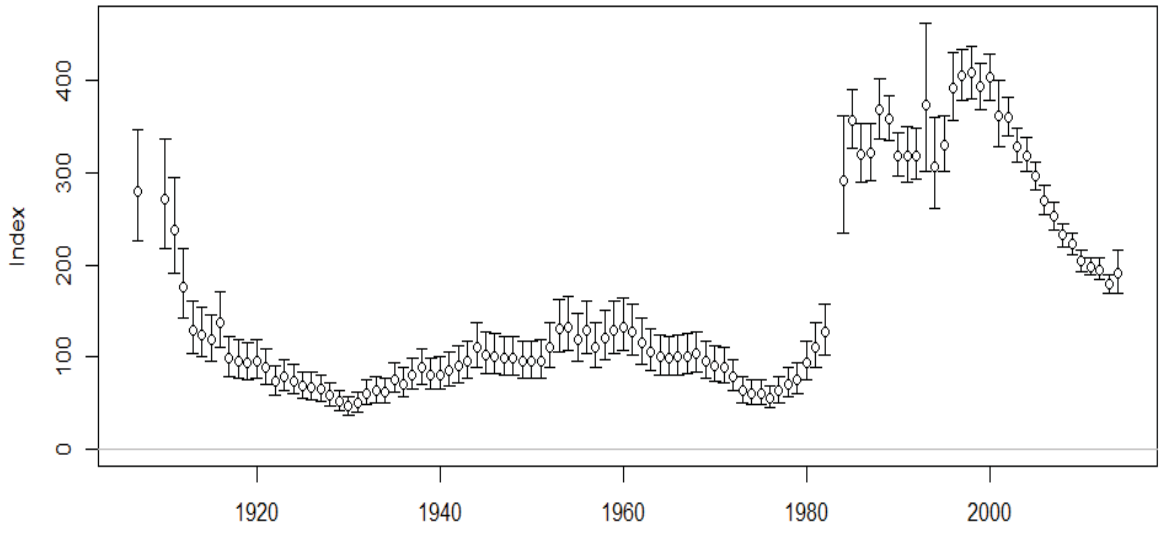


Fig B4.8. Commercial WPUE summarized by regulatory area and year. Percentages for each Area indicate the change from 2013 to 2014; lines represent a smoother for trend visualization purposes only. [45]



[45] Stewart, I.J. 2015. Overview of data sources for the Pacific halibut stock assessment and related analyses. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 87-160.

Fig B4.9. Coastwide commercial WPUE from historical catch and effort records, as well as more recent direct logbook processing. The large change from 1982 to 1984 coincides with adoption of circle hooks.[46]

Fishery age distributions

Recent fishery ages are created from otoliths collected by port samplers in proportion to the landings in the ports that are annually staffed by the IPHC (Erikson and MacTavish 2015). Because of this method, the raw ages can be directly aggregated within each area and year to estimate the age composition of the catch. In 2014, 12,606 otoliths collected from the commercial fishery were aged[47] . The age distribution for 2014 is shown in Table B4.2 and FigB4.10.

Table B4.2. Age distribution of commercial catch of P. halibut by regulatory area, 2014.[48]

Age	Regulatory Area									
(years)	2A	2B	2C	3A	3B	4A	4B	4C	4D	Total
6		12	2	3	2	1				**20**
7	3	17	12	5	7			1	1	**46**
8	49	44	27	18	39	13	3	7	2	**202**
9	180	207	101	55	126	103	18	23	24	**837**
10	211	289	125	140	255	233	54	81	87	**1,475**
11	186	245	176	185	231	320	80	266	131	**1,820**
12	175	285	257	285	230	332	144	222	180	**2,110**
13	101	210	244	292	187	259	131	80	121	**1,625**
14	66	215	192	273	113	131	112	47	72	**1,221**
15	26	155	142	256	135	102	88	23	39	**966**
16	9	96	69	140	78	86	63	10	40	**591**
17	7	50	37	111	53	35	44	2	11	**350**
18	5	38	26	93	30	35	30	6	11	**274**
19	5	26	21	47	24	27	25	7	9	**191**
20	1	15	12	50	20	20	22	1	13	**154**
21	3	10	6	28	10	9	17	2	10	**95**
22		7	4	31	9	15	8	1	9	**84**
23	1	7	2	29	7	15	8	1	4	**74**
24	1	5	1	24	4	16	13	1	9	**74**
25		2	2	17	10	25	28		6	**90**
≥26	2	16	10	43	10	94	94	3	35	**307**
Total	1,031	1,951	1,468	2,125	1,580	1,871	982	784	814	**12,606**

[46] Stewart, I.J. 2015. Overview of data sources for the Pacific halibut stock assessment and related analyses. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 87-160.

[47] Forsberg, J.E. 2015. Age distribution of the commercial halibut catch for 2014. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 79-86.

[48] Ibid.

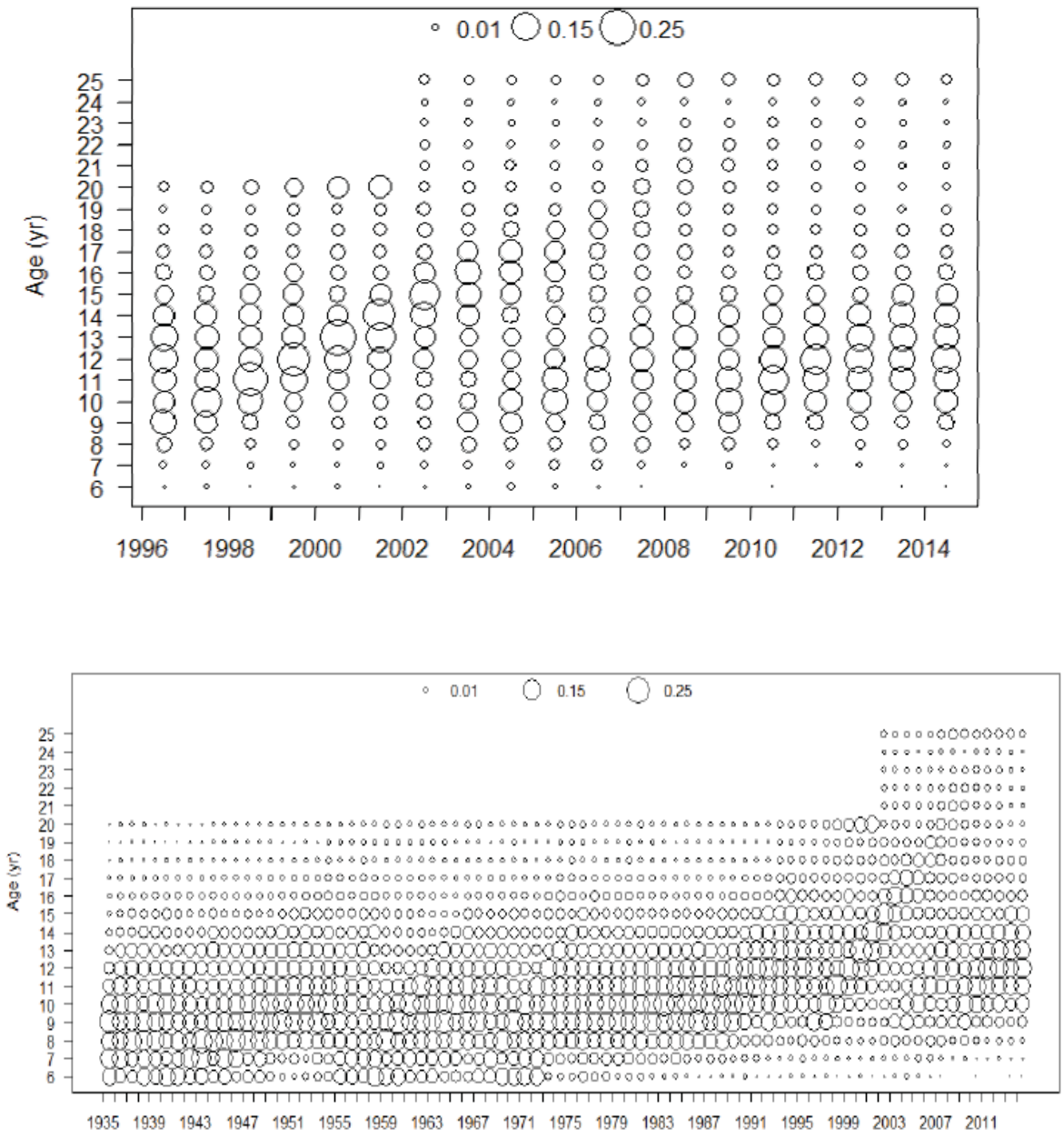


Fig B4.10. Estimates of recent commercial fishery catch numbers (proportions) at age. Upper panel shows the data from 1996 onward from the lower panel.[49]

For the period included in recent stock assessments (upper panel of Fig B4.10), the coastwide age distribution displays a very similar pattern to that of the setline survey ages: a very strong 1987 cohort moving through the stock, followed by catches comprised primarily of 9 to 15 year-old halibut. Commercial fishery ages prior to 1991 have been summarized in several previous studies. The resultant fishery age-frequency distributions reveal that halibut in the commercial landings from the 1930s to 1973 (when the current minimum size limit was implemented) have been predominantly age 6 to 14 (Lower panel of Fig. B4.10). Several strong cohorts can be observed in the data, but none more conspicuous than the 1987 cohort. When the fishery age data are

[49] Stewart, I.J. 2015. Overview of data sources for the Pacific halibut stock assessment and related analyses. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 87-160.

aggregated by geographic region, a similar pattern emerges to that seen in the setline survey data: a greater proportion of older halibut in Areas 4 and 4B than in Areas 2 and 3, but a similar overall age over which much of the catch has been taken. There is also clear evidence that the 1987 cohort was very strong across the entire range of the population. [50]

Fishery average weight and weight-at-age

Both lengths and otoliths are collected by port samplers, and the lengths can be converted into individual weight estimates. No sex information is available from port samples. The average weight of a landed halibut has shown relatively flat trends over Areas 2A, 2B, and 2C, steep declines in Areas 3A and 3B and somewhat less pronounced declines in Area 4 (Fig. B4.11). Several areas showed an increase in average weight in 2013, but the coastwide trend has been relatively flat over the last five years. These observations accurately reflect the fishery landings, but combine the relative influences of weight-at-age, age- and sex-structure, as well as selectivity relative to the underlying population.

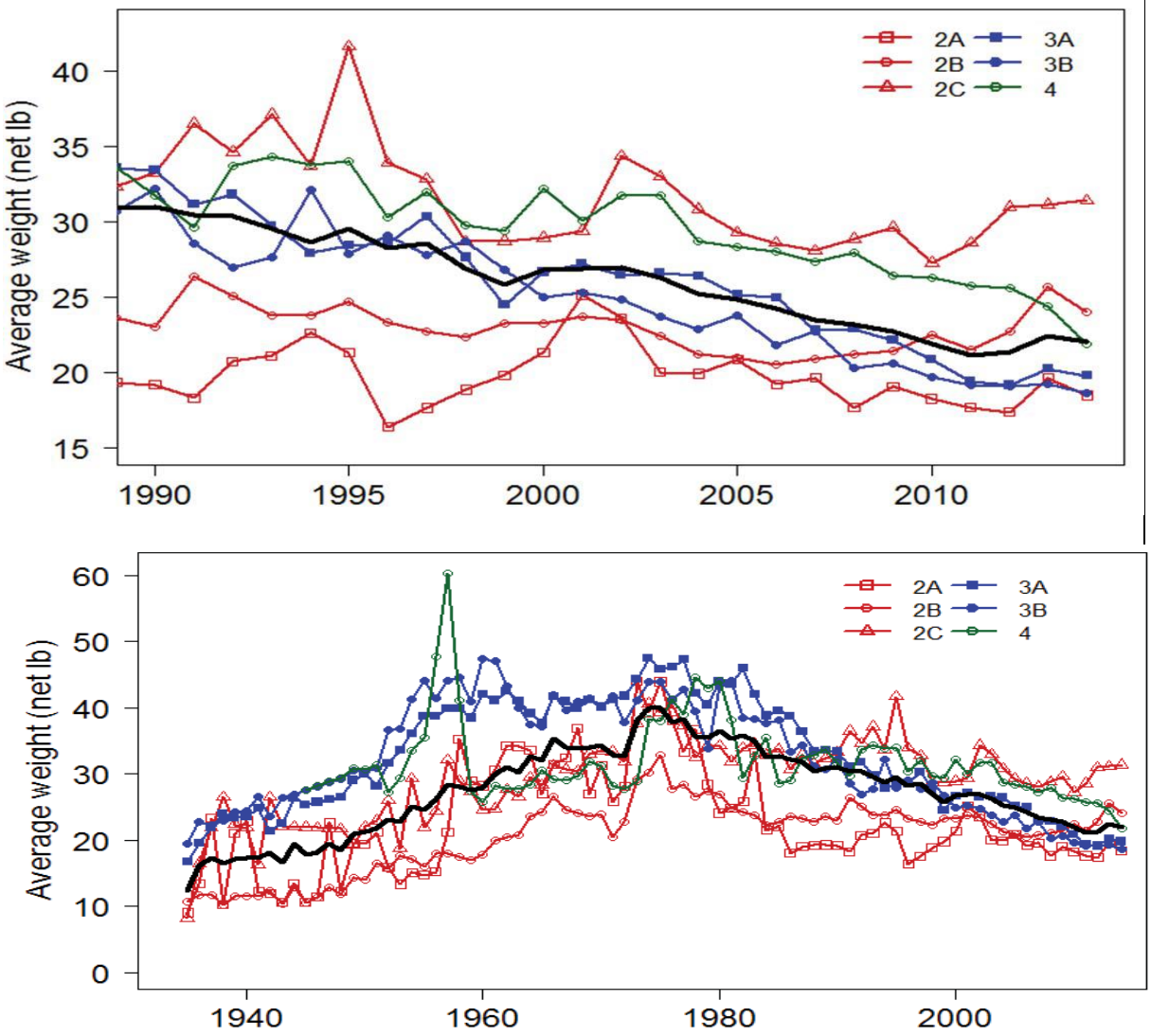


Fig. B4.11. Average halibut weight by regulatory area in the directed fishery; thick black line indicates the coastwide average. Upper panel shows the data from 1989 from the lower panel.[51]

[50] Stewart, I.J. 2015. Overview of data sources for the Pacific halibut stock assessment and related analyses. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 87-160.

[51] Ibid.

Historical observations of average weight are more problematic. Specifically, from 1963-1990 the IPHC did not collect individual lengths from the commercial landings. It was thought at the time that otolith measurements could be used to adequately estimate the body size of the fish, and therefore the weight. Subsequent investigation of the relationship between otolith measurements and individual length resulted in the resumption of length sampling in 1991. For this reason, the weights-at-age for most of the historical period should be considered much more uncertain than recent observations. In addition, there has yet been no detailed evaluation of surface ageing bias or precision for the period prior to the 1990s (although this work is currently underway at the IPHC). Despite these considerations, there is a clear pattern of increasing fish size in the landings from the 1930s through the 1970s, followed by a subsequent decline to the present. Also clearly visible is the effect of the implementation of the 32 inch minimum size limit in 1974.[52]

Following the same method applied to the age-composition data (weighting the historical weight-at-age for each regulatory area by the number of fish in the landings for that area), a coastwide weight-at-age can be constructed for the entire time-series (Fig. B4.12). Unfortunately, this series is not sex-specific due to the dressing of fish at sea prior to sampling by port samplers. However, there are similar trends for the best represented ages (8-16) over the historical period, and average size and weight at age have generally declined since the late 1970's.

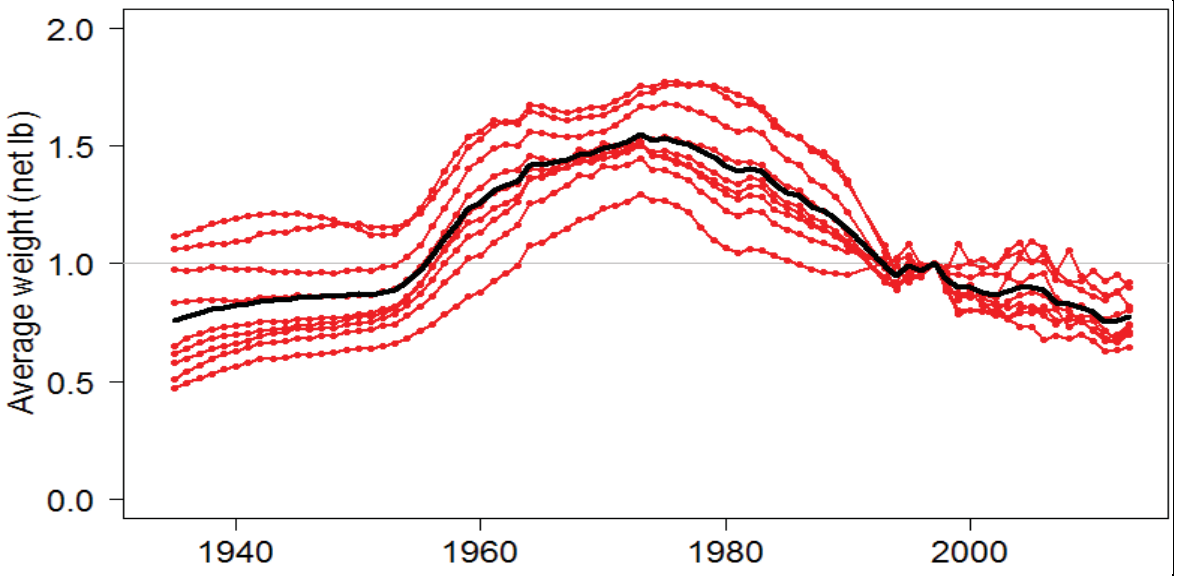


Fig. B4.12. Trends in average individual halibut weight (shown as as deviations from 1997) in the commmercial fishery landings for halibut aged 8-16 years old (red lines). The black line represents average trend among the nine ages included. [53]

Incidental mortality of halibut in the commercial halibut fishery (wastage)

The removals of Pacific halibut accounted for in the IPHC stock assessment include commercial and sport catch, personal use (ceremonial and subsistence), and the incidental mortality of halibut from the commercial halibut fisheries (wastage) and other commercial fisheries (bycatch). Commercial fishery wastage includes 1) halibut that are smaller than the commercial minimum size (≤81.3 cm or <32 inches) that must be released by regulation but subsequently die, 2) fish of all sizes

[52] Ibid.

[53] Stewart, I.J. 2015. Overview of data sources for the Pacific halibut stock assessment and related analyses. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 87-160.

estimated to have been captured by fishing gear that was subsequently lost or abandoned during fishing operations, 3) fish that are discarded for regulatory reasons (e.g., the vessels trip limit has been exceeded). The methods applied to produce each of these estimates differ due to the amount and quality of the information available.

Wastage in the commercial fishery is estimated to have been highest in the early 1980s, subsequently declining (particularly in Area 3A in 1995 when the derby fishery was converted to a quota system), and then increasing from 1995 to 2010 as the size-at-age of halibut declined and more fish at older ages remained below the minimum size limit. The estimates of wastage cannot be delineated within Regulatory Area 4 prior to 1981, but there is very little wastage estimated prior to that time (Gilroy and Stewart 2015). Tables B4.3, 4.4, and 4.5 show time series of data on discards (U32), fish killed by lost or abandoned gear, and total wastage. The estimate for 2014 total wastage is preliminary, and declined slightly from the 2013 value.[54]

Incidental catch (bycatch) and mortality in non-directed fisheries

IPHC relies upon information supplied by observer programs run by domestic agencies for bycatch estimates in most fisheries. Discard mortality rates (DMRs), used to determine the fraction of the estimated bycatch that dies, vary by fishery and area. Where observers are used for fishery monitoring, DMRs are calculated from data collected on the release viability or injury of halibut. For areas without observers, assumed DMRs are used[55] .

Estimates of the bycatch mortality of P. halibut in 2014 totaled 9.3 million pounds (net weight), representing an increase of 5% from 2013 (Fig. B4.13). Bycatch increased in all areas, with the largest increases occurring in Area 3 (12%). In Area 2A, bycatch mortality continued to be low, mainly as a result of an individual quota program in the groundfish trawl fishery. Bycatch in the area dropped by almost 50% from 2012 to 2013, the latest year for which data are available. Bycatch in Area 2B also remained low in 2014, at about the same level reported for the past 10 years, 0.2 million pounds. In Alaskan areas, bycatch increased in 2014, with the largest increase (27%) occurring in Area 3B, going from 0.98 million pounds in 2013 to 1.25 million pounds in 2014. Analyses to update estimates of bycatch taken by fishing within state waters of Alaska or those managed by the State of Alaska were provided by the Alaska Department of Fish and Game. Their new estimates for crab pot fisheries in southeast Alaska are included in this year's report but were not available in time for the halibut assessment.

[54] Gilroy, H.L. and Stewart, I.J. 2015. Incidental mortality of halibut in the commercial halibut fishery (Wastage). Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 87-160. http://www.iphc.int/publications/rara/2014/rara2014_05incidentalmortality.pdf

[55] Williams, G.H. 2015. Incidental catch and mortality of Pacific halibut, 1962-2014. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 313-336. http://www.iphc.int/publications/rara/2014/rara2014_19incidentalcatch.pdf

Table B4.3. Estimated U32 halibut discard mortality in thousands of net pounds, killed in the commercial halibut fishery, listed by IPHC regulatory area and year, 1974 – 2014.[56]

	Regulary Area											
Year	2A	2B	2C	3A	3B	4	4A	4B	4C	4D	4E	Total
1974	0.002	0.081	0.042	0.061	0.013	0.002	NA	NA	NA	NA	NA	0.201
1975	0.004	0.143	0.048	0.091	0.021	0.002	NA	NA	NA	NA	NA	0.309
1976	0.002	0.164	0.044	0.107	0.025	0.002	NA	NA	NA	NA	NA	0.344
1977	0.002	0.135	0.026	0.093	0.032	0.004	NA	NA	NA	NA	NA	0.292
1978	0.001	0.113	0.036	0.115	0.014	0.004	NA	NA	NA	NA	NA	0.283
1979	0.001	0.119	0.039	0.130	0.004	0.004	NA	NA	NA	NA	NA	0.297
1980	0.000	0.136	0.029	0.132	0.003	0.002	NA	NA	NA	NA	NA	0.302
1981	0.002	0.152	0.036	0.147	0.006	NA	0.004	0.002	0.002	0.000	0.000	0.351
1982	0.002	0.163	0.033	0.124	0.067	NA	0.010	0.000	0.002	0.000	0.000	0.401
1983	0.003	0.192	0.064	0.117	0.114	NA	0.023	0.009	0.004	0.000	0.000	0.526
1984	0.005	0.363	0.065	0.162	0.104	NA	0.010	0.008	0.006	0.001	0.000	0.724
1985	0.006	0.440	0.129	0.284	0.198	NA	0.021	0.012	0.009	0.004	0.000	1.101
1986	0.007	0.492	0.173	0.517	0.190	NA	0.048	0.002	0.011	0.011	0.000	1.452
1987	0.007	0.513	0.175	0.525	0.172	NA	0.050	0.015	0.014	0.005	0.001	1.479
1988	0.005	0.508	0.179	0.652	0.145	NA	0.024	0.016	0.009	0.002	0.000	1.540
1989	0.004	0.397	0.160	0.644	0.172	NA	0.014	0.028	0.009	0.004	0.000	1.432
1990	0.004	0.320	0.182	0.583	0.198	NA	0.038	0.015	0.010	0.008	0.001	1.359
1991	0.003	0.166	0.173	0.523	0.293	NA	0.035	0.018	0.012	0.011	0.001	1.237
1992	0.004	0.167	0.191	0.587	0.207	NA	0.039	0.028	0.013	0.004	0.001	1.241
1993	0.006	0.224	0.219	0.513	0.185	NA	0.038	0.024	0.013	0.004	0.001	1.227
1994	0.002	0.202	0.215	0.632	0.095	NA	0.028	0.025	0.012	0.004	0.002	1.217
1995	0.002	0.189	0.102	0.292	0.049	NA	0.016	0.013	0.006	0.001	0.001	0.672
1996	0.004	0.182	0.133	0.358	0.061	NA	0.019	0.013	0.014	0.015	0.003	0.800
1997	0.005	0.254	0.148	0.455	0.192	NA	0.031	0.019	0.023	0.023	0.005	1.157
1998	0.006	0.276	0.189	0.522	0.233	NA	0.048	0.035	0.018	0.018	0.003	1.347
1999	0.006	0.281	0.170	0.429	0.251	NA	0.033	0.046	0.015	0.016	0.002	1.249
2000	0.007	0.162	0.160	0.416	0.326	NA	0.066	0.036	0.004	0.004	0.001	1.183
2001	0.011	0.199	0.193	0.391	0.449	NA	0.099	0.047	0.007	0.008	0.002	1.407
2002	0.009	0.168	0.146	0.507	0.481	NA	0.083	0.020	0.003	0.004	0.001	1.423
2003	0.028	0.309	0.171	0.608	0.611	NA	0.085	0.026	0.004	0.008	0.002	1.852
2004	0.009	0.275	0.331	0.682	0.701	NA	0.063	0.022	0.005	0.009	0.002	2.100
2005	0.034	0.298	0.309	0.568	0.546	NA	0.127	0.011	0.005	0.025	0.004	1.927
2006	0.043	0.569	0.404	0.690	0.465	NA	0.095	0.009	0.006	0.031	0.005	2.318
2007	0.030	0.500	0.338	0.913	0.436	NA	0.127	0.019	0.009	0.045	0.010	2.427
2008	0.036	0.432	0.288	0.943	0.672	NA	0.138	0.018	0.018	0.063	0.015	2.623
2009	0.051	0.334	0.292	1.131	0.775	NA	0.145	0.011	0.015	0.050	0.010	2.813
2010	0.026	0.275	0.246	1.429	0.883	NA	0.130	0.030	0.020	0.053	0.010	3.102
2011	0.020	0.256	0.074	0.901	0.763	NA	0.134	0.035	0.041	0.112	0.024	2.359
2012	0.018	0.208	0.082	0.581	0.516	NA	0.090	0.035	0.017	0.044	0.011	1.602
2013	0.014	0.198	0.084	0.498	0.403	NA	0.062	0.032	0.015	0.029	0.009	1,344
2014	00.12	0.233	0.111	0.427	0.325	NA	0.033	0.046	0.016	0.028	0.006	1,345

[56] Williams, G.H. 2015. Incidental catch and mortality of Pacific halibut, 1962-2014. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 313-336.

Table B4.4. Estimates of Pacific halibut, in millions of net pounds, killed by lost or abandoned longline gear in the commercial halibut fishery, by IPHC regulatory area, 1985 – 2014.[57]

	Regulatory Area										
Year	2A	2B	2C	3A	3B	4A	4B	4C	4D	4E	Total
1985	0.002	0.111	0.236	1.019	0.219	0.065	0.046	0.025	0.027	0.001	1.749
1986	0.004	0.221	0.472	2.036	0.439	0.195	0.014	0.041	0.074	0.002	3.499
1987	0.003	0.188	0.401	1.732	0.373	0.147	0.058	0.037	0.029	0.004	2.974
1988	0.001	0.053	0.225	1.651	0.134	0.030	0.024	0.011	0.008	0.000	2.137
1989	0.007	0.050	0.211	1.599	0.212	0.029	0.072	0.017	0.020	0.000	2.217
1990	0.016	0.127	0.357	1.217	0.237	0.117	0.060	0.026	0.049	0.003	2.209
1991	0.002	0.078	0.378	1.253	0.458	0.098	0.064	0.031	0.066	0.004	2.434
1992	0.007	0.058	0.267	0.705	0.198	0.054	0.046	0.017	0.016	0.001	1.369
1993	0.009	0.104	0.209	0.374	0.069	0.049	0.036	0.017	0.017	0.001	0.886
1994	0.001	0.075	0.249	0.918	0.043	0.038	0.041	0.016	0.016	0.002	1.399
1995	0.003	0.042	0.059	0.138	0.009	0.009	0.009	0.003	0.003	0.001	0.276
1996	0.001	0.032	0.048	0.196	0.024	0.026	0.030	0.011	0.011	0.002	0.382
1997	0.006	0.042	0.044	0.082	0.061	0.028	0.031	0.011	0.011	0.002	0.318
1998	0.001	0.060	0.046	0.173	0.063	0.022	0.018	0.008	0.009	0.001	0.400
1999	0.007	0.045	0.074	0.129	0.079	0.036	0.030	0.015	0.016	0.002	0.433
2000	0.007	0.031	0.042	0.067	0.065	0.028	0.024	0.009	0.010	0.002	0.286
2001	0.003	0.051	0.042	0.072	0.037	0.037	0.031	0.011	0.012	0.003	0.301
2002	0.005	0.039	0.029	0.157	0.040	0.022	0.016	0.005	0.007	0.002	0.323
2003	0.002	0.041	0.028	0.079	0.043	0.022	0.017	0.004	0.008	0.002	0.246
2004	0.000	0.041	0.037	0.089	0.019	0.017	0.013	0.004	0.007	0.001	0.228
2005	0.006	0.042	0.038	0.177	0.033	0.015	0.007	0.002	0.010	0.001	0.330
2006	0.002	0.044	0.026	0.059	0.014	0.008	0.004	0.001	0.005	0.001	0.166
2007	0.003	0.036	0.036	0.064	0.023	0.010	0.004	0.002	0.009	0.002	0.190
2008	0.001	0.026	0.015	0.075	0.006	0.014	0.007	0.003	0.011	0.002	0.163
2009	0.001	0.024	0.014	0.058	0.030	0.016	0.007	0.003	0.011	0.002	0.168
2010	0.001	0.033	0.012	0.030	0.031	0.011	0.008	0.003	0.009	0.001	0.139
2011	0.005	0.031	0.006	0.040	0.012	0.013	0.009	0.004	0.012	0.003	0.134
2012	0.004	0.014	0.013	0.016	0.016	0.007	0.003	0.001	0.001	0.001	0.077
2013	0.002	0.015	0.027	0.027	0.002	0.010	0.003	0.001	0.001	0.001	0.089
2014	0.003	0.014	0.011	0.012	0.003	0.001	0.007	0.000	0.002	0.000	0.053

[57] Williams, G.H. 2015. Incidental catch and mortality of Pacific halibut, 1962-2014. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 313-336.

Table B4.5. Total wastage, millions of pounds net weight, in the commercial halibut fishery, 1974-2014.[58]

	Regulatory Area											
Year	2A	2B	2C	3A	3B	4	4A	4B	4C	4D	4E	Total
1974	0.002	0.081	0.042	0.061	0.013	0.002	NA	NA	NA	NA	NA	0.201
1975	0.004	0.143	0.048	0.091	0.021	0.002	NA	NA	NA	NA	NA	0.309
1976	0.002	0.164	0.044	0.107	0.025	0.002	NA	NA	NA	NA	NA	0.344
1977	0.002	0.135	0.026	0.093	0.032	0.004	NA	NA	NA	NA	NA	0.292
1978	0.001	0.113	0.036	0.115	0.014	0.004	NA	NA	NA	NA	NA	0.283
1979	0.001	0.119	0.039	0.130	0.004	0.004	NA	NA	NA	NA	NA	0.297
1980	0.000	0.136	0.029	0.132	0.003	0.002	NA	NA	NA	NA	NA	0.302
1981	0.002	0.152	0.036	0.147	0.006	NA	0.004	0.002	0.002	0.000	0.000	0.351
1982	0.002	0.163	0.033	0.124	0.067	NA	0.010	0.000	0.002	0.000	0.000	0.401
1983	0.003	0.192	0.064	0.117	0.114	NA	0.023	0.009	0.004	0.000	0.000	0.526
1984	0.005	0.363	0.065	0.162	0.104	NA	0.010	0.008	0.006	0.001	0.000	0.724
1985	0.008	0.542	0.345	1.213	0.398	NA	0.082	0.056	0.031	0.028	0.001	2.702
1986	0.011	0.695	0.606	2.374	0.591	NA	0.231	0.016	0.048	0.077	0.002	4.652
1987	0.010	0.686	0.543	2.105	0.513	NA	0.188	0.071	0.047	0.031	0.005	4.201
1988	0.006	0.557	0.385	2.158	0.267	NA	0.052	0.039	0.019	0.009	0.000	3.492
1989	0.011	0.443	0.353	2.102	0.366	NA	0.041	0.098	0.024	0.022	0.000	3.460
1990	0.019	0.437	0.509	1.693	0.414	NA	0.148	0.073	0.033	0.052	0.004	3.382
1991	0.005	0.238	0.520	1.666	0.711	NA	0.127	0.080	0.040	0.070	0.005	3.464
1992	0.011	0.220	0.436	1.230	0.388	NA	0.090	0.072	0.028	0.018	0.002	2.495
1993	0.021	0.320	0.411	0.854	0.248	NA	0.084	0.059	0.028	0.019	0.002	2.047
1994	0.009	0.271	0.443	1.477	0.134	NA	0.064	0.065	0.026	0.018	0.004	2.511
1995	0.009	0.228	0.156	0.420	0.058	NA	0.024	0.022	0.009	0.004	0.002	0.932
1996	0.011	0.211	0.177	0.535	0.083	NA	0.043	0.042	0.024	0.025	0.005	1.154
1997	0.014	0.291	0.188	0.529	0.246	NA	0.057	0.049	0.033	0.033	0.007	1.448
1998	0.019	0.329	0.230	0.676	0.289	NA	0.068	0.052	0.025	0.026	0.004	1.717
1999	0.018	0.321	0.237	0.546	0.322	NA	0.067	0.074	0.029	0.031	0.004	1.649
2000	0.025	0.190	0.198	0.475	0.384	NA	0.092	0.059	0.013	0.014	0.003	1.453
2001	0.026	0.245	0.230	0.456	0.481	NA	0.132	0.076	0.018	0.020	0.005	1.690
2002	0.023	0.204	0.172	0.646	0.515	NA	0.103	0.036	0.008	0.011	0.003	1.722
2003	0.046	0.344	0.196	0.676	0.646	NA	0.105	0.042	0.008	0.016	0.004	2.083
2004	0.017	0.311	0.362	0.758	0.716	NA	0.078	0.034	0.009	0.016	0.003	2.305
2005	0.040	0.335	0.341	0.724	0.572	NA	0.139	0.018	0.007	0.034	0.005	2.215
2006	0.050	0.605	0.425	0.741	0.476	NA	0.102	0.013	0.007	0.036	0.006	2.463
2007	0.041	0.529	0.367	0.966	0.454	NA	0.135	0.023	0.011	0.053	0.012	2.591
2008	0.045	0.454	0.300	1.004	0.676	NA	0.149	0.025	0.021	0.073	0.017	2.764
2009	0.052	0.354	0.302	1.175	0.796	NA	0.157	0.018	0.018	0.060	0.012	2.944
2010	0.028	0.302	0.255	1.450	0.903	NA	0.138	0.037	0.023	0.061	0.011	3.208
2011	0.025	0.283	0.079	0.930	0.770	NA	0.144	0.043	0.044	0.121	0.026	2.464
2012	0.025	0.220	0.093	0.593	0.526	NA	0.095	0.038	0.018	0.045	0.012	1.666
2013	0.025	0.211	0.107	0.519	0.404	NA	0.070	0.035	0.016	0.030	0.010	1.429
2014	0.023	0.245	0.120	0.436	0.327	NA	0.034	0.052	0.016	0.030	0.006	1.289

[58] Ibid.

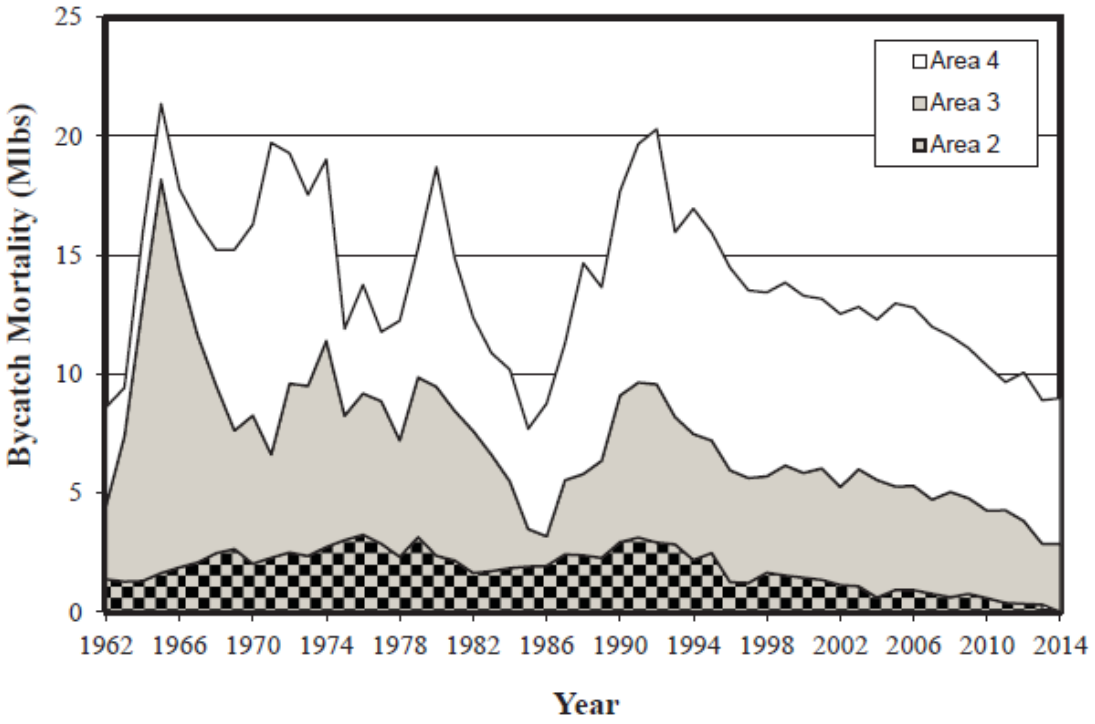


Fig B4.13. Bycatch mortality of Pacific halibut by IPHC regulatory area (millions of pounds, net weight), 1962-2014. [59]

Sport catch

The IPHC depends on state and federal agencies for estimates of P. halibut sport fishery harvests. Management and data collection methods vary by area. For the sport fishery in Area 2A, dockside sampling by state agencies supplies information for catch estimation needed for in-season management and post-season harvest estimation. Harvest estimates for the Canadian sport fishery are based on a combination of self-reporting by some lodges, overflights conducted by the Canadian DFO, lodge logbooks, and creel monitoring programs conducted by DFO or First Nations. For the Alaska sport fishery, different methodologies are used for estimating harvests in the current year versus the previous year, and also between the unguided (private) and guided (charter) fisheries. Charter vessel operators are required to record client catches in a daily logbook to assist in providing timely catch estimates. In addition, a sample of licensed anglers receives a post-season mail survey, administered by the Alaska Department of Fish and Game (ADF&G), for estimating sport fishery harvests of all species, including halibut. Data on the size of halibut caught are collected through an ADF&G dockside creel sampling program in major ports, which excludes many lodges in Area 2C due to the remoteness of their locations[60].

Preliminary coast-wide sport harvest estimates for 2014 indicate a decrease (7.2%) from the sport harvest in 2013, to 6.90 million pounds (Table B4.6). Coastwide harvest remains below the historic high levels seen during 2004-2008. Harvests in Areas 2B, 3B, and 4 increased, whereas decreases were observed in Areas 2A, 2C, and 3A. Harvests in Area 2B and by the Area 2C and 3A guided fishery were managed with size limit restrictions in 2014.

[59] Williams, G.H. 2015. Incidental catch and mortality of Pacific halibut, 1962-2014. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 313-336.

[60] Kaimmer, S. 2015. 2014 halibut sport fishery review. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 37-46.
http://www.iphc.int/publications/rara/2014/rara2014_04sportfishery.pdf

Table B4.6. Harvest of Pacific halibut by sport fishers (millions of pounds, net weight) by IPHC regulatory area, 1977-2014. Estimates for 2014 are preliminary.[61]

Year	Area 2A	Area 2B	Area 2C	Area 3A	Area 3B	Area 4	Total
1977	0.013	0.008	0.072	0.196	-	-	0.289
1978	0.010	0.004	0.082	0.282	-	-	0.378
1979	0.015	0.009	0.174	0.365	-	-	0.563
1980	0.019	0.006	0.332	0.488	-	-	0.845
1981	0.019	0.012	0.318	0.751	-	0.012	1.112
1982	0.050	0.033	0.489	0.716	-	0.011	1.299
1983	0.063	0.052	0.553	0.945	-	0.003	1.616
1984	0.118	0.062	0.621	1.026	-	0.013	1.840
1985	0.193	0.262	0.682	1.210	-	0.008	2.355
1986	0.333	0.186	0.730	1.908	-	0.020	3.177
1987	0.446	0.264	0.780	1.989	-	0.030	3.509
1988	0.249	0.252	1.076	3.264	-	0.036	4.877
1989	0.327	0.318	1.559	3.005	-	0.024	5.233
1990	0.197	0.381	1.330	3.638	-	0.040	5.586
1991	0.158	0.292	1.654	4.264	0.014	0.127	6.509
1992	0.250	0.290	1.668	3.899	0.029	0.043	6.179
1993	0.246	0.328	1.811	5.265	0.018	0.057	7.725
1994	0.186	0.328	2.001	4.487	0.021	0.042	7.065
1995	0.236	0.887	1.751	4.511	0.022	0.055	7.462
1996	0.229	0.887	2.129	4.740	0.021	0.077	8.083
1997	0.355	0.887	2.172	5.514	0.028	0.069	9.025
1998	0.383	0.887	2.501	4.702	0.017	0.096	8.586
1999	0.338	0.859	1.843	4.228	0.017	0.094	7.379
2000	0.344	1.021	2.251	5.305	0.015	0.073	9.009
2001	0.446	1.015	1.923	4.675	0.016	0.029	8.104
2002	0.399	1.260	2.090	4.202	0.013	0.048	8.012
2003	0.404	1.218	2.258	5.427	0.009	0.031	9.347
2004	0.487	1.613	2.937	5.606	0.007	0.053	10.703
2005	0.484	1.841	2.798	5.672	0.014	0.050	10.859
2006	0.516	1.752	2.526	5.337	0.014	0.046	10.191
2007	0.504	1.556	3.049	6.283	0.025	0.044	11.461
2008	0.481	1.536	3.264	5.320	0.026	0.040	10.667
2009	0.490	1.098	2.382	4.758	0.030	0.024	8.782
2010	0.393	1.156	1.971	4.285	0.024	0.016	7.845
2011	0.401	1.220	1.029	4.408	0.014	0.017	7.089
2012	0.455	1.156	1.583	3.626	0.022	0.028	6.870
2013	0.502	0.822	2,123	3.966	0.015	0.009	7.437
2014[a]	0.402	0.915	1.940	3.591	0.019	0.023	6.890
2013-2014 change							
Pounds	-0.1	0.093	-0.183	-0.375	0.004	0.014	-0.547
Percent	-19.92%	11.31%	-8.62%	-9.46%	26.67%	155.56%	-7.36%

[a] Preliminary

Personal use harvest

Pacific halibut is taken throughout its range as a personal use harvest by several fisheries. Personal use categories are: (1) ceremonial and subsistence removals in Area 2A treaty Indian fishery, (2) the sanctioned First Nations Food, Social and Ceremonial (FSC) fishery conducted in British Columbia, (3) federal subsistence fishery in Alaska, and (4) U32 halibut retained in Areas 4D and 4E under IPHC regulations. The coastwide personal use estimate for 2014 is 1.1 million pounds.

[61] Kaimmer, S. 2015. 2014 halibut sport fishery review. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 37-46.

New estimates for all areas are not available so the allocation was used for the treaty Indian ceremonial and subsistence fishery and the previous year's estimate was used for Alaska, with the exception the Area 4D/E Community Development Quota U32 fishery is current. The estimate for Area 2B remains unchanged[62] .

Table B4.7. Estimates of the personal use harvest (thousands of pounds, net weight) of Pacific halibut by IPHC regulatory area since 2003.

Year	2A[a]	2B	2C	3A	3B	4A	4B	4C	4D	4E	4D/4E CDQ	Total
2003	19.4	300.0	628.0	279.6	27.6	20.7	2.5	23.8	4.4	54.5	14.3	1,374.8
2004	38.0	300.0	677.1	403.6	33.5	28.9	0.9	9.7	10.9	28.5	16.2	1,547.3
2005	36.0	300.0	598.1	429.3	46.2	35.6	1.4	7.7	5.8	54.0	23.2	1,537.3
2006	33.0	300.0	580.1	381.9	48.6	27.0	2.8	8.5	8.3	70.7	19.7	1,480.6
2007	30.0	405.0	524.9	372.2	47.7	14.9	2.0	15.0	3.2	52.1	19.0	1,486.0
2008	30.0	405.0	458.4	337.4	42.2	19.6	4.7	5.7	3.1	15.9	21.8	1,343.8
2009	30.4	405.0	457.0	328.5	25.5	33.5	1.2	6.3	0.6	8.7	10.3	1,307.0
2010	25.3	405.0	424.8	312.7	23.0	14.5	0.5	10.9	1.2	10.1	9.5	1,237.5
2011	25.3	405.0	387.0	266.1	22.0	13.6	0.5	1.6	0.6	6.2	16.9	1,144.8
2012	32.0	405.0	396.0	253.5	16.0	9.5	1.7	1.2	0.7	8.4	20.2	1,144.2
2013[b]	28.5	405.0	396.0	253.5	16.0	9.5	1.7	1.2	0.7	8.4	10.0	1,130.5
2014[b]	28.5	405.0	396.0	253.5	16.0	9.5	1.2	1.2	0.7	8.4	5.3	1,125.3

[a] Some of Area 2A numbers were updated in 2014, also changing total
[b] 2013 Alaska and 2014 estimates are preliminary.

Observer program in regards to non-halibut bycatch in the directed halibut fishery

Beginning January 1, 2013, amendment 86 (BSAI) and amendment 76 (GOA) were added to the Federal Fisheries Regulations 50 CFR Part 679: Fisheries of the Exclusive Economic Zone Off Alaska. There are new partial coverage observer requirements for halibut vessels fishing hook and line gear. Halibut vessels are registered with the NMFS and can be selected on a vessel or trip basis. The program is covered by fees assessed on landings from both the CDQ and IFQ fisheries.
Information on the observer program can be found in the NOAA/NMFS North Pacific Groundfish and Halibut Observer Program Annual Report (2015[63]).

Methods used to estimate catch which incorporate the new observer data can be found in Cahalan et al (2015)[64]. Giant grenadier (Albatrossia pectoralis) is one of the key by-catch species in halibut longline fisheries. Other common by-catches include sharks, skate, sculpins, and rockfish species.

Ecosystem considerations

To better understand factors driving fluctuations in growth and recruitment of fish populations, researchers are paying increasing attention to climatic and oceanic conditions. In 2014, each of the

[62] Gilroy, H.L. and G.H. Williams. 2015. The personal use harvest of Pacific halibut through 2014. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 37-46. http://www.iphc.int/publications/rara/2014/rara2014_06personaluse.pdf
[63] http://alaskafisheries.noaa.gov/sustainablefisheries/observers/annualrpt2014.pdf
[64] Cahalan, J., J. Gasper, and J. Mondragon. Catch sampling and estimation in the federal groundfish fisheries off Alaska, 2015 edition. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-286, 46 p. http://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-286.pdf

11 fishing vessels chartered to complete the IPHC setline survey was outfitted with a profiling unit collecting oceanographic data (dissolved oxygen, temperature, salinity, pH, chlorophyll concentration). This was the sixth consecutive year of such sampling. Coupling oceanographic observations with catch estimates from the IPHC setline survey over time is a necessary step in understanding the impacts of the environmental changes on the halibut resource[65]. There is evidence that both dissolved oxygen and temperature play a role in halibut distribution within the survey area.

In addition, ecosystem characteristics of the BS, AI and the GOA are assessed annually by the NMFS in the Ecosystem Considerations appendix to the BSAI and GOA SAFE report. Since 1995, this document has been prepared in order to provide information about effects of fishing from an ecosystem perspective, and the effects of environmental change on fish stocks. An ongoing study funded by the North Pacific Research Board, and involving principal researchers from IPHC, is investigating candidate causes for size-at-age (SAA) changes in Pacific halibut, as well as an integrated approach to incorporating SAA dynamics into the assessment and management of the halibut stock.[66] It builds on existing information (particularly the unique historical archive of halibut otoliths maintained by the IPHC), develops new understanding of ecosystem influences on growth, assesses the impact of fishery-induced changes, and creates a flexible modeling framework to integrate SAA changes into development of optimum harvest policies for Pacific halibut. This pattern of change in SAA is of considerable biological interest but is of equal significance to the management of halibut fisheries, because it affects available estimates of halibut biomass and resultant fishery yield. Failure to understand and account for this pressing issue could lead to conservation concerns. Recent research on bioenergetics by Holsman et al. [67] has found support for environmentally driven spatial changes to growth that may impact halibut size-at-age.

Tagging studies

IPHC has conducted a number of tagging studies on P. halibut over many decades, including the use of PAT (pop-up archival transmitting) tags in 2014. Data from historical tagging studies continues to be analysed. For details on some of these tagging programs and ongoing analyses, see various papers in the 2014 IPHC RARA [68],[69],[70].

[65] Sadorus, L.L. and J. Walker. 2015. IPHC oceanographic monitoring program 2014. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 351-358. http://www.iphc.int/publications/rara/2014/rara2014_22oceanmonitoring.pdf

[66] http://project.nprb.org/view.jsp?id=c17f5c29-a9bd-4619-a239-b02b0464a23c

[67] http://access.afsc.noaa.gov/pubs/posters/pdfs/pHolsman03_bioenergetics-model-halibut.pdf

[68] Forsberg, J.E. 2015. Tagging studies. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 465-468. http://www.iphc.int/publications/rara/2014/rara2014_28taggingstudies.pdf

[69] Webster, R.A. 2015. Trawl tag releases of small halibut in the Bering Sea. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014:475-510. http://www.iphc.int/publications/rara/2014/rara2014_30trawltagging.pdf

[70] Webster, R.A. 2015. Modelling mortality and migration as functions of age using PIT tagging data. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014:511-522. http://www.iphc.int/publications/rara/2014/rara2014_31mortmigrationpit.pdf

5. There shall be regular stock assessment activities appropriate for the fishery, its range, the species biology and the ecosystem, undertaken in accordance with acknowledged scientific standards to support its optimum utilization.

FAO CCRF 7.2.1/12.2/12.3/12.5/12.6/12.7/12.17
FAO Eco 29-29.3

Evidence adequacy rating:

☑ High **☐Medium** **☐Low**

Rating determination

For 2014, there was a full review of the data, specific model formulations and general approach used to assess the stock in recent years. Stock assessments in 2014 were also guided by comments from a Scientific Review Board, appointed by IPHC. The results of the 2014 stock assessment indicate that the stock declined rapidly from the late 1990s through 2011, as a result of the decline in the exceptionally strong 1987 year-class, recruitment strengths that are generally smaller than those observed through the 1980s and 1990s, as well as decreasing size-at-age. In the last few years, female spawning biomass is estimated to have stabilized around 200 million pounds. For the 2014 assessment, the final ensemble included four individual models, each of both short and long time-series models based on coastwide and Areas-As-Fleets data structures. As in recent years, forecast projections were conducted for a range of alternative management actions, and probabilities of various risk metrics are reported in a decision-making table framework. Work continued in 2014 on development of Management Strategy Evaluation (MSE) for this stock, with assistance and guidance from an Advisory Board (MSAB).

2014 Pacific Halibut Stock Assessment by the IPHC
Overview

The 2014 stock assessment reports the status of the Pacific halibut resource in the northeastern Pacific Ocean including the territorial waters of the United States and Canada[71] . As in recent assessments, the resource is modeled as a single stock extending from northern California to the Aleutian Islands and Bering Sea, including all inside waters of the Strait of Georgia and Puget Sound. Potential connectivity with the western Pacific Ocean resource is considered slight and is unaccounted for. The halibut fishery has been closely managed for nearly 100 years, and much is known about the history of fishery removals, population trends, and biological characteristics. The 2014 assessment continues to make use of the extensive historical time-series, as well as integrating both structural and estimation uncertainty via an ensemble of individual models. These models now include implicit treatment of spatial structuring in the data sources and properties of the fishery and setline survey.[72]

The 2014 scientific review process produced a number of important recommendations that were incorporated into this assessment, including the development and evaluation of several alternative models. Two of these, using the Areas-As-Fleets (AAF) approach were included along with two coastwide models in the 2014 ensemble. The 2014 results therefore represent the integration of four separate stock assessment models, accounting for the uncertainty within each model and among models to generate the final decision table.

[71] Stewart, I.J. and S. Martell, 2015. Assessment of the Pacific halibut stock at the end of 2014. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 161-180.
http://www.iphc.int/publications/rara/2014/rara2014_11stockassessment.pdf
[72] Ibid.

The 2014 assessment results indicate that the stock declined rapidly from the late 1990s through 2011, as a result of the decline in the exceptionally strong 1987 year-class, recruitment strengths that are generally smaller than those observed through the 1980s and 1990s, as well as decreasing size-at-age. In the last few years, female spawning biomass is estimated to have stabilized near 200 million pounds, with trends varying among the four assessment models. The median 2015 estimate of exploitable biomass, consistent with the IPHC's current harvest policy, is 181 million pounds. The two long time-series models provided a differing perception of current vs. historical stock sizes. The AAF model suggests that the stock is currently increasing gradually and at 35% of the equilibrium unfished stock size; however the model estimates that current spawning biomass is at only 133% of the minimum values estimated for the 1970s. The coastwide model suggests that the stock is currently stable at 37% of the equilibrium unfished stock size; however the model estimates that current spawning biomass is at 211% of the minimum values estimated for the 1970s. These differences represent considerable uncertainty in both the current stock size and trend. Three-year projections were conducted for a range of alternative management actions; and probabilities of various risk metrics are reported in a decision-making table framework.

Data sources/summary

During 2014 summary datasets were provided by geographic region: Area 2 (2A, 2B, and 2C), Area 3 (3A and 3B), Area 4 (Area 4A and 4CDE), and Area 4B. Halibut removals (including all sources of mortality: target fishery landings and discards, bycatch in non-target fisheries, research, sport, and personal use) have totaled 7 billion pounds, ranging annually from 34 to 100 million pounds over the last 100 years; all weights in this document are reported as 'net' weights, head and guts removed; this is approximately 75% of the round weight. The average removal over this period has been 64 million pounds. Annual removals were above the 100-year average from 1985 through 2010. After a peak in 2004, annual removals have decreased each year due to management actions in response to declining survey and commercial catch rates and stock assessment estimates. Total removals in 2014 were estimated to be 43 million pounds, down from 48 million pounds in 2013. The 2014 setline survey total WPUE increased by 6% relative to 2013, and the legal-size (O32) WPUE by 2%. Commercial catch-rates increased in 2014 by 7% at the coastwide level; however, these records were unverified and incomplete at the time of this assessment. Survey and fishery age distributions continue to indicate a relatively stable stock, with no clear evidence of particularly strong recruitments in recent years. Individual size-at-age remains low relative to levels observed in the past several decades, although comparable to those estimated for the early portion of the 20th century.

2014 stock assessment model

The 2013 stock assessment adopted the ensemble approach for this stock, and this was continued in the 2014 assessment, where several alternative models were evaluated for inclusion into the stock assessment ensemble. The IPHC's Scientific Review Board (SRB) met to evaluate modelling progress on 23 June, 2014, and again to review the final set of models for the 2014 ensemble on 22-23 October, 2014[73]. These meetings guided the development of a simple stock production model, a Virtual Population Analysis (VPA), and two alternative statistical catch-at-age models, as well as a number of supplementary analyses that provided insight into the dynamics of the halibut population and fishery. The VPA model estimated a slightly smaller stock size, but very similar trends over the recent and longer time-series. The surplus production model suggested that the

[73] Cox, S.P., J. Ianelli, and M. Mangel, 2015. Reports of the IPHC Scientific Review Board, 2014. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 267-276.
http://www.iphc.int/publications/rara/2014/rara2014_11stockassessment.pdf

surplus production in recent years had been between 40 and 45 million pounds. These values are consistent with both the decision table and harvest policy calculations, and therefore generally corroborate the ensemble results. Neither of these models was included in the 2014 ensemble results.

For the 2014 assessment, the final ensemble included four individual models: each of both short and long time-series models based on coastwide and AAF data structures. All of these four models were implemented using the Stock Synthesis software, a widely used modeling platform developed at the National Marine Fisheries Service. This combination of models included a broad suite of structural and parameter uncertainty, including natural mortality rates (estimated in the long time-series models, fixed in the short time-series models), environmental effects on recruitment (estimated in the long time-series models), fishery and survey selectivity (by region in the AAF models) and other model parameters. These sources of uncertainty have historically been very important to the understanding of the stock, as well as the annual assessment results. The benefits of the long time-series models include historical perspective on recent trends and biomass levels; however these benefits come at a computational and complexity cost. The short time-series models make fewer assumptions about the properties of less comprehensive historical data, but they suffer from much less information in the short data series as well as little context for current dynamics. In aggregate, these models provide for a risk analysis that is more robust to changes to a single model, or the addition of new models in the future than a single assessment model.[74]

As was the case in 2013, each of the models in the ensemble was equally weighted, and differences in uncertainty within models propagated in the integration of results. The risk analysis and decision table include the full probability distribution from the assessment. Therefore, key quantities such as reference points and stock size are reported as cumulative distributions, such that the entire plausible range can be evaluated. Where necessary, point estimates reported in this assessment correspond to median values from the ensemble. Comparison with previous stock assessments indicates that the 2014 spawning biomass results are very similar to those from 2012 and 2013, which lie inside the 50% interval of the ensemble in recent years. Models prior to 2012, which had shown a problematic retrospective pattern, suggested terminal stock sizes in the mid-2000s that are no longer considered plausible. The estimates from these models for the late 1990s now occur at the lower edge of the plausible range: all four of the current models suggest a larger spawning biomass during that period. Point estimates from the 2013 ensemble for 2014 were extremely similar to the current results given the degree of uncertainty.

During the site visit to IPHC as part of this surveillance audit, it was noted that a document is being prepared to respond to a number of requests from the SRB, including details on the stock assessment modeling, goodness of fit, residual plots, etc. This document was not yet available during the site visit. (B. Leaman, IPHC, pers. comm.).

Biomass, recruitment, and reference points results

The results of the 2014 stock assessment indicate that the stock has been declining continuously over much of the last decade (Fig. B5.1). The differences among the individual models contributing to the ensemble are most pronounced prior to the early 2000s (Fig. B5.2). However, current stock size estimates also differ substantially among the four models.

[74] Stewart, I.J. and S. Martell, 2015. Assessment of the Pacific halibut stock at the end of 2014. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 161-180.

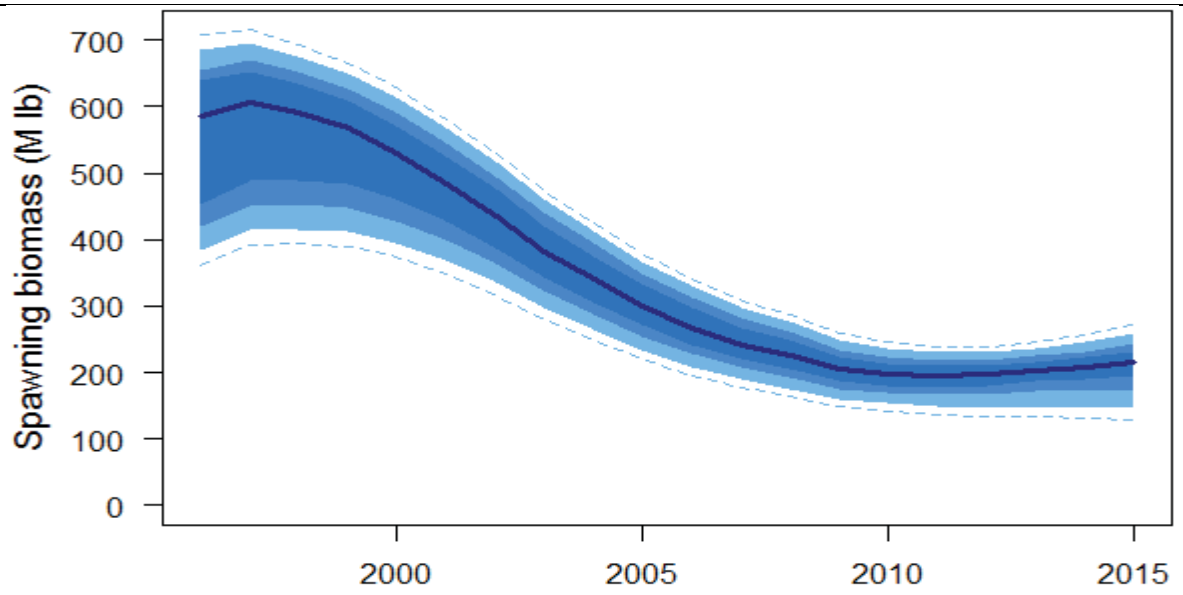


Figure B5.1. Trend in spawning biomass estimated in the 2014 stock assessment. The dark line indicates the median (or "50:50 line") with an equal probability of the estimate falling above or below that level; colored bands moving away from the median indicate the intervals containing 50/100, 75/100, and 95/100 estimates; outer dashed lines indicating the 99/100 interval.[75]

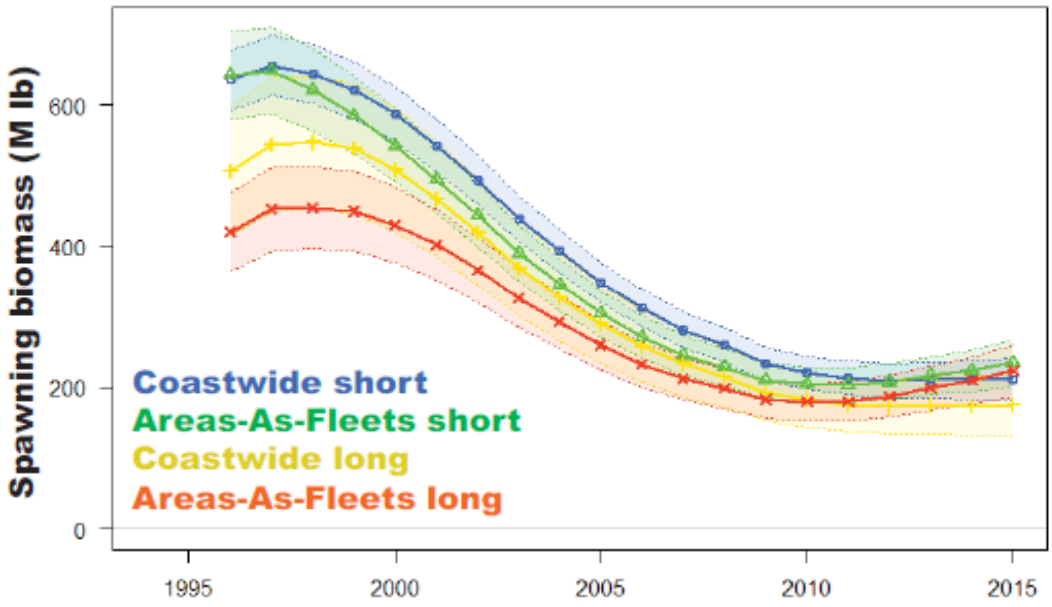


Figure B5.2. Comparison of models included in the 2014 stock assessment. Solid lines with points Indicate point estimates, dashed lines and shading approximate 95% confidence intervals reflecting within-model uncertainty.[76]

[75] Stewart, I.J. and S. Martell, 2015. Assessment of the Pacific halibut stock at the end of 2014. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 161-180.
[76] Ibid.

Differences are also apparent in the recent recruitment estimates, which suggest larger recruitments in 1999, 2002 and 2004-2005 than in other recent years (Fig. B5.3). These recent recruitments are much lower than the 1987 year class, and (in the coastwide model) substantially below those in the late 1970s and early 1980s (Fig. B5.3). Recruitments after 2008 do not yet have information available in the fishery or survey data, and therefore remain highly uncertain.

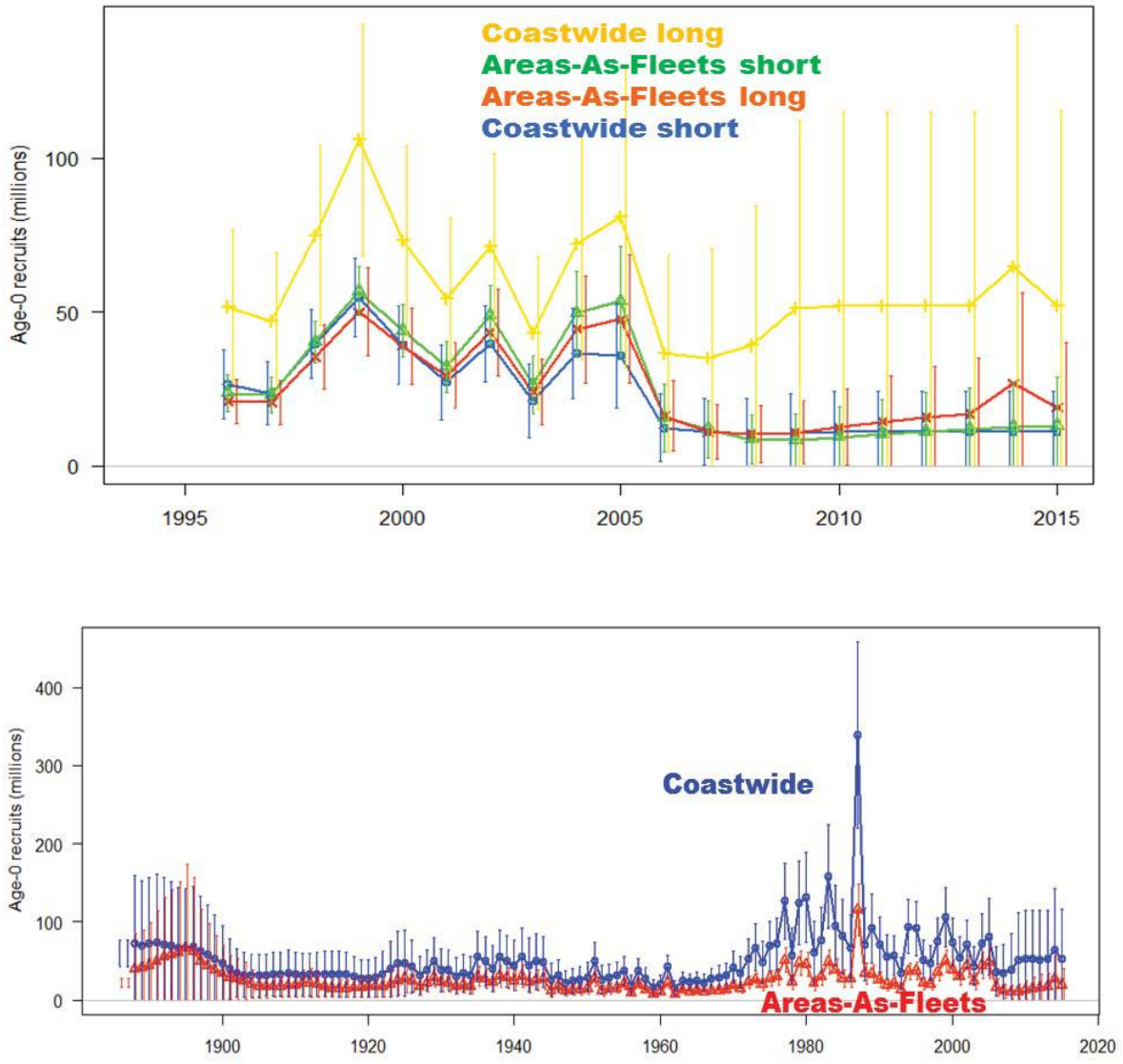


Fig. B5.3 Trend in recruitment strengths (by birth year) estimated by all four ensemble models (upper panel), and by the two long-time series models (lower panel). Note that estimates after 2008 are highly uncertain, as they are not yet informed by any direct observations.[77]

In addition to recruitment trends, observed decreases in size-at-age have also been an important contributor to recent stock declines. In the last few years, the estimated female spawning biomass appears to have stabilized near 200 million pounds, with plausible values ranging from 150 Mlb to 250 Mlb (Fig. B5.4). The estimate of exploitable biomass consistent with the IPHC's current harvest policy is 181 Mlb at the beginning of 2015. The current level of spawning biomass is

[77] Stewart, I.J. and S. Martell, 2015. Assessment of the Pacific halibut stock at the end of 2014. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 161-180.

estimated to be 42% of the equilibrium condition in the absence of fishing, with a 10 out of 100 chance that the stock is below the 30% relative spawning biomass harvest policy threshold. All sources of estimated removals for 2014 correspond to a fishing intensity point estimate of F43% (Fig. 9). Harvest levels of this magnitude are generally consistent with target rates for many similar stocks.[78]

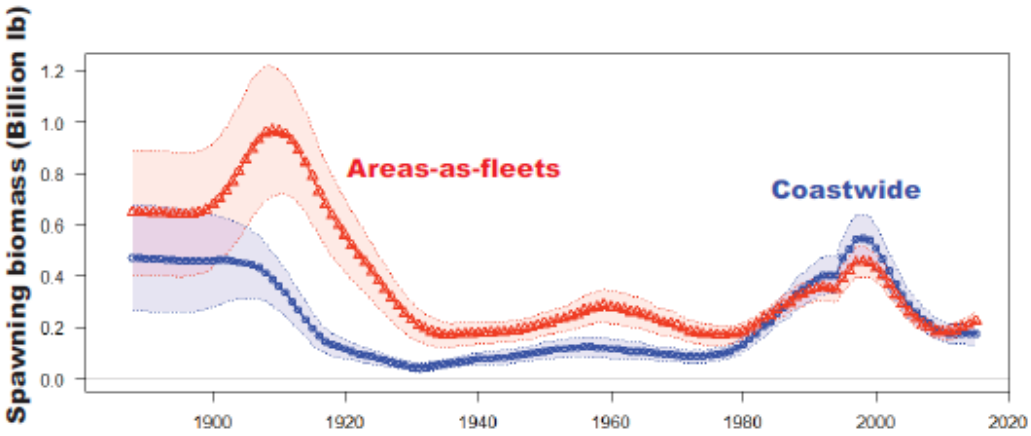


Figure B5.4. Spawning biomass estimates from the two long time-series models. Shaded region indicates the approximate 95% within-model confidence interval.[79]

Major Sources of Uncertainty in the Assessment

This stock assessment includes significant 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 a substantial improvement over previous assessments, there are important sources of uncertainty that are not included. These include further spatial considerations such as the distribution of juvenile halibut, the sex-ratio of fish in the commercial catch, the link between halibut recruitment strengths and environmental conditions, and by-catch estimation. Future expansion of the ensemble approach will continue to improve uncertainty estimates, and create assessment results that are robust to changes in individual models, data sets and other sources of historical changes in stock assessment results from year to year. [80]

The wide range of sensitivity analyses conducted during the 2013 process remain relevant to the 2014 results, as these were all conducted with the coastwide long time-series model. The most influential source of uncertainty uncovered among sensitivity analyses conducted for 2013 was the sex-ratio of the commercial catch. Three sensitivity analyses were conducted in 2013 to investigate the relative importance of uncertainty in several sources of halibut removals. The results indicated that significantly higher (doubled) and lower (halved) levels of bycatch did not change the relative stock trends, but that adding additional removals suggested a larger stock.

[78] Stewart, I.J. and S. Martell, 2015. Assessment of the Pacific halibut stock at the end of 2014. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 161-180.
[79] Ibid.
[80] Ibid.

A retrospective analysis was performed for each of the individual models contributing to the 2014 assessment. Both coastwide models showed little pattern in the most recent years, but slightly higher estimates as additional data were removed from each. The AAF models showed even less retrospective pattern. All models estimates for the terminal three years of the retrospective analysis were included in the currently estimated confidence intervals.[81]

Future research

Based on data and model exploration completed during 2014, and recommendations from the SRB, future research on this stock assessment will focus on the following topics.[82]

1) Continued expansion of the ensemble of models used in the stock assessment. Specifically, explicit spatial models will be developed that may allow for improved incorporation of the uncertainty due to spatial processes such as migration and recruitment distribution among regulatory areas.
2) As development of additional models for the ensemble is reduced, there will be more emphasis on evaluation and diagnosis of each individual model. A document describing in detail the technical specifications, fits to the data sources and results will be developed for review during 2015.
3) Continued development of methods for sampling the sex-ratio of the commercial catch. The results of the stock assessment are sensitive to the sex-ratio, and therefore this source of uncertainty is a high priority for future data collection.
4) Further investigation of the factors contributing to recruitment strength, recruitment distribution, and the information available from trawl surveys, particularly in the Bering Sea.
5) Explore methods for including uncertainty in wastage and bycatch estimates in the assessment in order to better capture these sources uncertainty.
6) Bayesian methods for fully integrating parameter uncertainty may provide improved uncertainty estimates within the models contributing to the assessment.
7) Integration of the assessment analyses with ongoing development of the harvest policy and Management Strategy Evaluation process.

Management Strategy Evaluation and Management Strategy Advisory Body

The IPHC's Management Strategy Evaluation (MSE) process is a formal process in which to evaluate the performance of alternative management procedures for the Pacific halibut stock against a range of scenarios that encompass observation and process uncertainty in stock assessments, alternative hypotheses about stock dynamics and structural assumptions. To assist and help guide this process the Commission formed a Management Strategy Advisory Board (MSAB) comprised of harvesters (commercial, sport, and subsistence), fisheries managers (DFO and NMFS), processors, IPHC staff and IPHC commissioners. The MSAB works interactively with analysts on the Commission staff to initially define clear measurable objectives for this fishery, define candidate management procedures (MP) for testing within the MSE framework, and define the performance measures to evaluate alternative MPs.[83]

The MSAB held two meetings in 2014, in May and October. In May, the meeting provided

[81] Stewart, I.J. and S. Martell, 2015. Assessment of the Pacific halibut stock at the end of 2014. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 161-180.
[82] Ibid.
[83] Martell S.J.D., B.M. Leaman, S.W. Keith, and I.J. Stewart. 2015. Developments in Management Strategy Evaluation/Management Strategy Advisory Board. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 277-298. http://www.iphc.int/publications/rara/2014/rara2014_17msab.pdf

feedback on objectives based on use of a simulation tool, as well as dialogue with stakeholders. In addition the objectives of the May meeting included modifying candidate procedures based on feedback, reporting on progress in development of coastwide operating model for halibut, and demonstrating integrated coastwide modelling framework with bycatch and size limit examples, if progress is sufficient. The MSAB requested that the staff supply a ranking of objectives, scenarios, and procedures to be evaluated, based on the Board's discussions.

The objectives for the October 2014 MSAB meeting were:
- Update on the status of the MSE objectives.
- Current status of the coast-wide Operating Model.
- A new tool for exploring alternative policy options.
- Compare notes with the Pacific hake MSE process.
- Set research priorities.
- Selection of chairs and co-chairs, and develop procedures for reporting to IPHC

Full details of both MSAB meetings, including summary minutes can be found in the IPHC Report of Assessment and Research and Activities for 2014.[84]

[84] Ibid.

C. The Precautionary Approach

6.	**The current state of the stock shall be defined in relation to reference points or relevant proxies or verifiable substitutes allowing for effective management objectives and targets. Remedial actions shall be available and taken where reference point or other suitable proxies are approached or exceeded.** **FAO CCRF 7.5.2/7.5.3** **Eco 29.2/29.2bis/30-30.2**

Evidence adequacy rating:

☑ High **☐Medium** **☐Low**

Rating determination

IPHC's harvest policy is to harvest 20% of the coastwide exploitable biomass when the spawning biomass is estimated to be above 30% (B30 threshold level) of a level defined as the unfished level. The harvest rate is linearly decreased towards a rate of zero as the spawning biomass approaches 20% (B20 limit level) of this estimated unfished level. That is, fishing ceases completely if the stock is below 20% of the unfished biomass. Since 1985, the IPHC has followed a constant harvest rate policy to determine annual available yield, termed the Constant Exploitation Yield (CEY). A biological target level for total removals from each regulatory area is calculated yearly by applying a fixed area-specific harvest rate to the estimate of exploitable biomass in each IPHC regulatory area. This combination of harvest rate and precautionary levels of biomass protection have, in simulation model studies, provided a large fraction of maximum available yield, minimizing risk to the spawning biomass, while allowing for the quickest stock recovery to at least, threshold levels. The minimum observed spawning biomasses for the three IPHC core areas all occurred in the mid-1970s, approximately 9 million pounds in 2B, 13 million pounds in 2C and 42 million pounds in 3A. By definition, these become the observed spawning biomass limits. The current harvest policy for Pacific halibut utilizes a ramp from target harvest rates to no fishing between 30% relative spawning biomass and 20% relative spawning biomass. Catch forecasts are presented in decision tables, showing yield alternatives and risk metrics, where the probability of a particular risk (e.g. of biomass being below B30 or B20) can be determined for a given catch forecast.

Stock Assessment Summary

The 2014 stock assessment results indicate that the stock declined continuously from the late 1990s to around 2010. That trend is estimated to have been a result of decreasing size-at-age, as well as recent recruitment strengths that are much smaller than those observed through the 1980s and 1990s. Since that time period, the estimated female spawning biomass appears to have stabilized near 200 million pounds, with flatter trajectories estimated in coastwide models and slightly increasing trends estimated in AAF models. The estimate of exploitable biomass consistent with the IPHC's current harvest policy is 181 million pounds at the beginning of 2015. The current level of spawning biomass is estimated to be 42% of the equilibrium condition in the absence of fishing, with a 10 out of 100 chance that the stock is below the 30% relative spawning biomass harvest policy threshold. All sources of estimated removals for 2014 correspond to a fishing intensity point estimate of F43%. [85]

[85] Stewart, I.J. and S. Martell, 2015. Assessment of the Pacific halibut stock at the end of 2014. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 161-180.

IPHC Harvest Policy and Harvest Control Rule

Since 2007, the IPHC has used the setline survey mean weight per unit effort (WPUE) index of density for O32 halibut weighted by bottom area to estimate the distribution of the stock among regulatory areas, a process known as apportionment[86]. The current harvest policy for Pacific halibut is based on two harvest targets: the apportionment of harvest among regulatory areas, and the scale of that harvest at the coastwide level. Target harvest rates are area-specific: 21.5% in Areas 2A, 2B, 2C and 3A, and 16.125% in Areas 3B, 4A, 4B, and 4CDE. The apportionment results combined with the target harvest rates yields a target distribution for the coastwide TCEY (Table C6.1).

Table C6.1. Results of survey-based apportionment calculations for 2015 target harvest rates and target TCEY distribution from the current harvest policy.[87]

	2A	2B	2C	3A	3B	4A	4B	4CDE	Total
Apportionment	2.2%	14.8%	15.1%	33.5%	12.1%	6.7%	3.8%	11.9%	100.0%
Target harvest rate	21.5%	21.5%	21.5%	21.5%	16.1%	16.1%	16.1%	16.1%	19.6%
Target TCEY Distribution	2.4%	16.2%	16.5%	36.6%	9.9%	5.5%	3.1%	9.8%	100.0%

Because the harvest policy is defined at the area-specific level, the results of apportionment calculations are needed to evaluate the harvest intensity, even though the assessment is conducted at a coastwide scale. Specifically, exploitable biomass is first apportioned to area, and then area-specific catch limits aggregated back to the coastwide level (Fig. C6.1). The harvest policy also includes a Harvest Control Rule (HCR), which does not change the distribution of harvest among regulatory areas, but reduces the target harvest rates linearly if the stock is estimated to have fallen below 30% of the equilibrium stock size threshold in the absence of fishing, such that there would be no fishing mortality below 20% relative spawning biomass limit (Fig. C6.2).[88]

[86] Webster, R.A. and I.J. Stewart. 2015 Setline survey-based apportionment estimates. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 181-194.
[87] Stewart, I.J. 2015. Regulatory area harvest policy calculations and catch tables. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 195-212.
[88] Ibid.

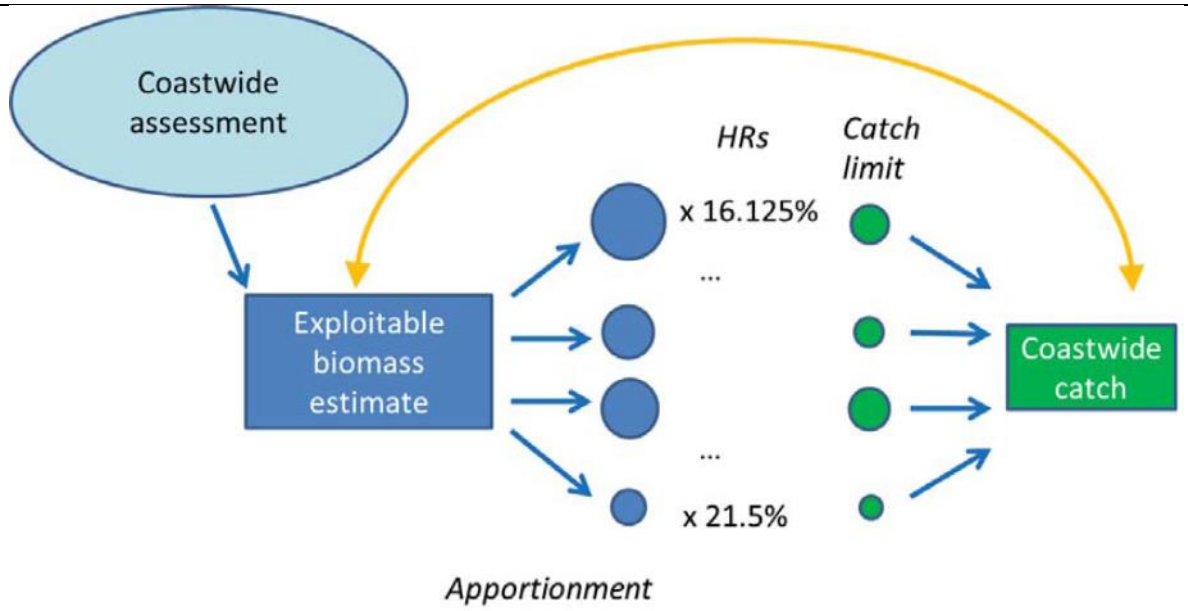


Fig. C6.1. Schematic showing the method for calculating the coastwide harvest rate target based on the IPHC's harvest policy.

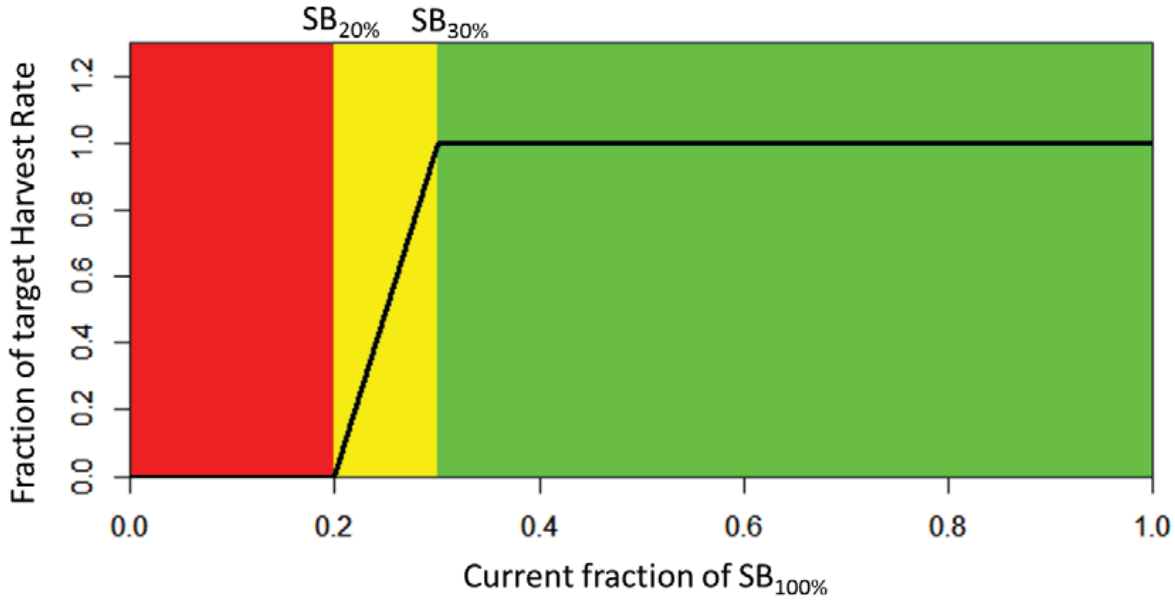


Figure C6.2. Current IPHC harvest control rule for determining the relative target harvest rate to apply in each Regulatory Area, as a function of the coastwide relative spawning biomass.[89]

Catch Projections and Forecast Tables

In 2012, the IPHC began to more transparently delineate the results of scientific analyses (apportionment and the stock assessment) and the application of harvest policy and management decisions resulting in annual catch limits. To that end, the stock assessment now reports estimates of current stock size, recent trends, and projections based on a range of alternative harvest levels and distributions. These results are summarized in a risk assessment, based on the response of

[89] Stewart, I.J. 2015. Regulatory area harvest policy calculations and catch tables. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 195-212.

several stock and fishery metrics to these management alternatives. Forecast projections were conducted for a range of alternative management actions and probabilities of various risk metrics were reported in a decision-making table framework. The steps included: 1) apportioning the coastwide estimate of exploitable biomass according to the survey catch rates in each regulatory area, 2) applying the area-specific harvest rates to estimate the total CEY, and all other removals associated with a given level of harvest, and 3) calculating the total mortality and projecting the stock trends one and three years into the future assuming constant values for all sources of removals.[90]

To provide consistency with previous year's catch advice, the Blue Line alternative represents the application of the IPHC's current harvest policy to the results of the survey-based apportionment and stock assessment analyses. In addition to the Blue Line, alternative harvest levels representing lower and higher levels of removals are also presented. The application of the current harvest policy results in the Blue Line of the decision table with a 2015 coastwide TCEY of 38.7 million pounds (Table C6.2). The stock is projected to increase gradually over 2016-2018 in the absence of any removals, and for removals of up to 20 Mlb. For removals around 40 Mlb, projections are relatively flat (Fig. C6.3). The risk of stock declines in 2016 and 2018 increases relatively rapidly for levels of harvest above 40 million pounds of total mortality in 2015, becoming more pronounced by 2018 (Table C6.2). The Blue Line (38.7 Mlb total removals) corresponds to a 19/100 chance of stock decline in 2016 and a 23/100 chance in 2018, somewhat more optimistic than recent assessment results.[91]

For projections with 2015 total removals below 43 million pounds, there is less than 31% chance of stock decline in 2016, <= 8% chance that Spawning biomass will be less than B30, and <=1% chance that Spawning biomass will be less than B20.

Table C6.2. Decision table of yield alternatives (rows) and risk metrics (columns). Values in the table represent the probability, in "times out of 100" of a particular risk.[92]

				Stock Trend				Stock Status				Fishery Trend				Fishery Status
				Spawning biomass				Spawning biomass				Fishery CEY from the harvest policy				Harvest rate
				in 2016		in 2018		in 2016		in 2018		in 2016		in 2018		in 2015
2015 Alternative	Total removals (M lb)	Fishery CEY (M lb)	Fishing intensity	is less than 2015	is 5% less than 2015	is less than 2015	is 5% less than 2015	is less than 30%	is less than 20%	is less than 30%	is less than 20%	is less than 2015	is 10% less than 2015	is less than 2015	is 10% less than 2015	is above target
No removals	0.0	0.0	$F_{100\%}$	<1/100	<1/100	<1/100	<1/100	5/100	<1/100	1/100	<1/100	<1/100	<1/100	<1/100	<1/100	0/100
FCEY = 0	13.1	0.0	$F_{73\%}$	<1/100	<1/100	<1/100	<1/100	5/100	<1/100	2/100	<1/100	<1/100	<1/100	<1/100	<1/100	<1/100
	20.0	7.7	$F_{64\%}$	<1/100	<1/100	1/100	<1/100	6/100	<1/100	3/100	<1/100	<1/100	<1/100	<1/100	<1/100	<1/100
	30.0	16.5	$F_{54\%}$	3/100	<1/100	17/100	4/100	7/100	<1/100	5/100	<1/100	3/100	2/100	3/100	2/100	4/100
Blue Line	38.7	25.0	$F_{46\%}$	19/100	<1/100	40/100	23/100	8/100	<1/100	8/100	<1/100	37/100	22/100	36/100	23/100	50/100
status quo	41.4	27.5	$F_{40\%}$	26/100	1/100	47/100	30/100	8/100	<1/100	9/100	1/100	57/100	37/100	51/100	38/100	50/100
Maintain 2014 SPR	43.3	29.5	$F_{43\%}$	31/100	1/100	56/100	36/100	8/100	<1/100	10/100	1/100	73/100	51/100	63/100	49/100	88/100
	50.0	36.0	$F_{39\%}$	44/100	5/100	75/100	51/100	9/100	1/100	13/100	1/100	99/100	91/100	95/100	84/100	>99/100
	60.0	45.8	$F_{34\%}$	65/100	22/100	96/100	82/100	11/100	1/100	23/100	2/100	>99/100	>99/100	>99/100	>99/100	>99/100

[90] Stewart, I.J. and S. Martell, 2015. Assessment of the Pacific halibut stock at the end of 2014. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 161-180.

[91] Ibid.

[92] Ibid.

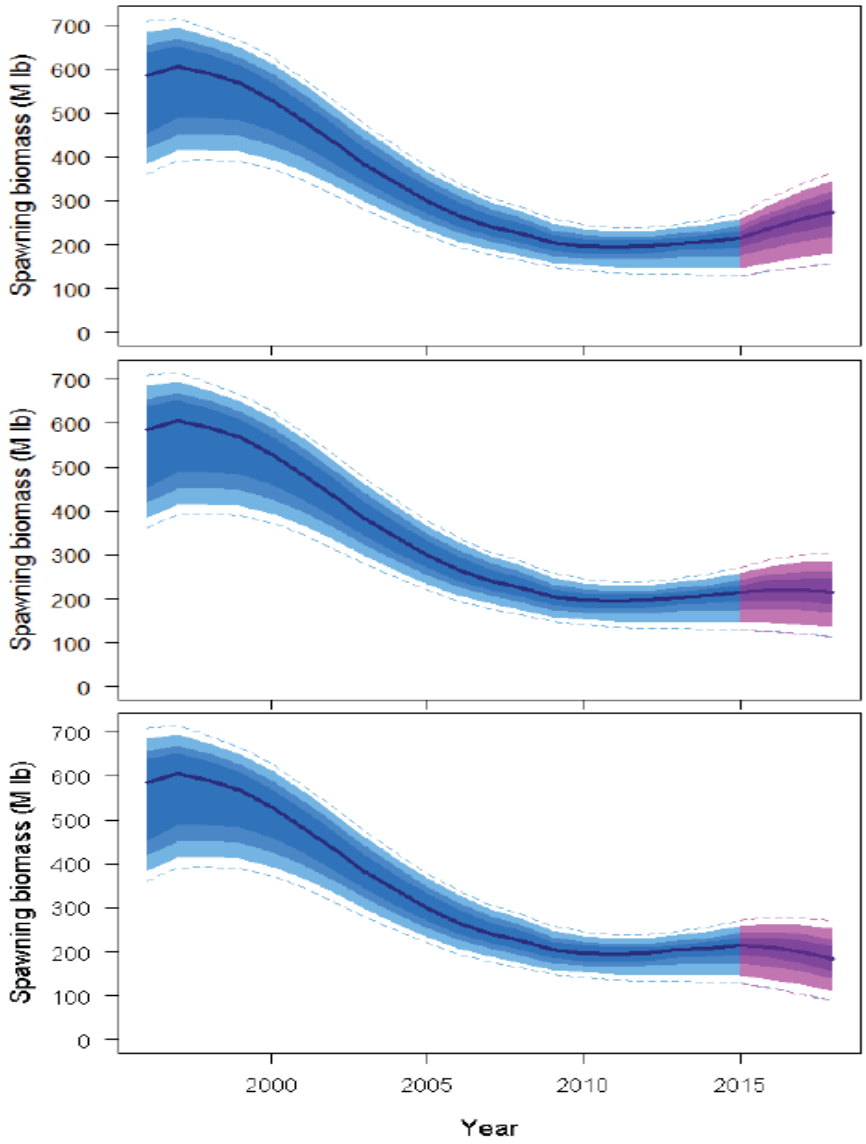


Fig. C6.3. Three-year projections of stock trend (coastwide) under alternative levels of mortality: no removals (upper panel), Blue Line removals (middle) and 60 Mlb of total removals (lower panel).[93]

Application of the current harvest policy to the apportionment and assessment results produces area-specific TCEY values consistent with the Blue Line. After accounting for changes in bycatch, wastage, and other sources of removals, the 2015 Blue Line results in increases in target FCEY values for four regulatory areas (2A, 2C, 3A, and 4A) relative to the 2014 results. When compared to the status quo (2014 adopted FCEYs), the total 2015 Blue Line TCEY is lower; however larger FCEY values are still projected for three regulatory areas (2C, 3A, and 4A). The differences between these alternatives for the TCEY vs. the FCEY estimates reflect the contributions of both the updated apportionment and non-directed removals.[94]

[93] Stewart, I.J. and S. Martell, 2015. Assessment of the Pacific halibut stock at the end of 2014. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 161-180.
[94] Ibid.

7. Management actions and measures for the conservation of stock and the aquatic environment shall be based on the Precautionary Approach. Where information is deficient a suitable method using risk assessment shall be adopted to take into account uncertainty.

FAO CCRF 7.5.1/7.5.4/7.5.5

FAO ECO 29.6/32

Evidence adequacy rating:

☑ High **☐Medium** **☐Low**

Based on the 2014 stock assessment results, IPHC adopted a 2015 fishery CEY of 29.2 million pounds, with an associated total mortality of 42.8 million pounds. At this level of catch, there is an 8% chance that spawning biomass in 2016 will be less than the B30 threshold, and <1% chance that it will be less than the B20 limit, which are the Precautionary Approach reference points for this stock. Various options with associated risk levels were presented and considered by IPHC in the decision making process. The 2014 stock assessment results represent the integration of four separate stock assessment models, accounting for the uncertainty (structural and estimation) within each model and among models to generate the final decision table. This stock assessment includes significant 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. This represents an improvement over previous assessments, although some sources of uncertainty remain, such as the link between environmental factors and halibut recruitment, and the sex ratio of halibut in the commercial catches.

The IPHC has expressed concern over continued declining catch rates in several areas and has taken aggressive action leading to reduced harvests. IPHC recommended to the governments of Canada and the United States catch limits (Fishery CEY) for 2015 totalling 29.2 million pounds. This represents a 6% increase from the 2014 catch limit, but is still about 6% below the 2013 catch limit.

The halibut fleet is highly regulated and subjected to defined fishery data collection systems, operating under an IFQ system, with conservatively defined catch quotas, gear specifications and restrictions, size limits, and closed seasons and areas. In addition, if halibut bycatch limits (Prohibited Species Catch) are reached in the groundfish fisheries, or if areas with high concentrations of juvenile halibut are recorded, fishery and area closure measures are adopted respectively.

Major Sources of Uncertainty in the Assessment

The 2014 stock assessment includes significant 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.[95] Although this is a substantial improvement over previous assessments, there are important sources of uncertainty that are not included. These include further spatial considerations such as the distribution of juvenile halibut, the sex-ratio of fish in the commercial catch, the link between halibut recruitment strengths and environmental conditions, and by-catch estimation. Future expansion of the ensemble approach will continue to improve uncertainty

[95] Stewart, I.J. and S. Martell, 2015. Assessment of the Pacific halibut stock at the end of 2014. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 161-180.

estimates, and create assessment results that are robust to changes in individual models, data sets and other sources of historical changes in stock assessment results from year to year.

The authors of the 2014 assessment state that sensitivity analyses conducted during the 2013 process remain relevant to the 2014 results. The most influential source of uncertainty uncovered among sensitivity analyses conducted for 2013 was the sex-ratio of the commercial catch. Three sensitivity analyses conducted in 2013 to investigate the relative importance of uncertainty in several sources of halibut removals indicated that significantly higher (doubled) and lower (halved) levels of bycatch did not change the relative stock trends, but that adding additional removals suggested a larger stock.

A retrospective analysis was performed for each of the individual models contributing to the 2014 assessment. Both coastwide and AAF models showed little pattern in the most recent years. All model estimates for the terminal three years of the retrospective analysis were included in the estimated confidence intervals. [96]

Risk-based Format for IPHC Staff Harvest Advice

The IPHC staff harvest advice was restructured for 2013 to present more information and more options for consideration by Commissioners as they set the annual catch limits. This change was in response to the IPHC direction at the 2012 IPHC Annual Meeting, reinforced by the 2012 Performance Review and stakeholder feedback. This procedural approach provides a more transparent delineation between scientific results and management/policy decisions, ultimately enabling a better understanding of the risks associated with different fishery harvest options. Since 2013, harvest advice from IPHC staff has been summarized in a table (see Table C6.2 above) which integrates uncertainty surrounding the stock assessment as it relates outcomes to estimates of risk. This new format gives the Commissioners a wider range of advice to consider as they set catch limits for subsequent years. For example, different catch levels (outcomes) can be evaluated and presented in terms of their impact (risk) on the stock and harvest rates. With this new management tool, Commissioners are able to examine a range of harvest options and the probable impacts on the stock, such as risks of exceeding various Precautionary Approach reference points.

Prior to the adoption of the risk-based format for presenting harvest advice, a “slow-up full-down” harvest policy had been used by IPHC in addition to the Precautionary Approach control rules. This harvest policy allowed a full decrease in catch limits when the stock is projected to decline, but only a one-third increase in catches (from the previous year) when the stock was projected to increase.

Management Actions under the Precautionary Approach

Based on the 2014 stock assessment results, the current level of spawning biomass is estimated to be 42% of the equilibrium condition in the absence of fishing, with a 10 out of 100 chance that the stock is below the 30% relative spawning biomass harvest policy threshold. IPHC at its annual meeting in 2015, adopted a 2015 fishery CEY of 29.2 million pounds, with an associated total mortality of 42.8 million pounds. At this level of catch, there is an 8% chance that spawning biomass in 2016 will be less than the B30 threshold, and <1% chance that it will be less than the B20 limit, which are the Precautionary Approach reference points for this stock. Various options with

[96] Ibid.

associated risk levels, in the short and medium term, were presented and considered by IPHC in the decision-making process, as noted in the following table.[97]

Final decision table of 2015 yield alternatives (rows) and risk metrics (columns). Values in the table represent the probability, in "times out of 100" of a particular risk. Table produced following the IPHC Annual Meeting on 30 January, 2015.

				Stock Trend				Stock Status				Fishery Trend				Fishery Status
				Spawning biomass				Spawning biomass				Fishery CEY from the harvest policy				Harvest rate
				in 2016		in 2018		in 2016		in 2018		in 2016		in 2018		in 2015
2015 Alternative	Total removals (M lb)	Fishery CEY (M lb)	Fishing intensity	is less than 2015	is 5% less than 2015	is less than 2015	is 5% less than 2015	is less than 30%	is less than 20%	is less than 30%	is less than 20%	is less than 2015	is 10% less than 2015	is less than 2015	is 10% less than 2015	is above target
No removals	0.0	0.0	$F_{100\%}$	<1/100	<1/100	<1/100	<1/100	5/100	<1/100	1/100	<1/100	<1/100	<1/100	<1/100	<1/100	0/100
FCEY = 0	13.1	0.0	$F_{72\%}$	<1/100	<1/100	<1/100	<1/100	5/100	<1/100	2/100	<1/100	<1/100	<1/100	<1/100	<1/100	<1/100
	20.0	7.7	$F_{64\%}$	<1/100	<1/100	1/100	<1/100	6/100	<1/100	3/100	<1/100	<1/100	<1/100	<1/100	<1/100	<1/100
	30.0	16.5	$F_{54\%}$	3/100	<1/100	17/100	4/100	7/100	<1/100	5/100	<1/100	3/100	2/100	3/100	2/100	4/100
Blue Line	38.7	25.0	$F_{46\%}$	19/100	<1/100	40/100	23/100	9/100	<1/100	8/100	<1/100	37/100	22/100	36/100	23/100	50/100
status quo	41.4	27.5	$F_{43\%}$	26/100	1/100	47/100	30/100	8/100	<1/100	9/100	1/100	57/100	37/100	51/100	38/100	50/100
Final adopted	42.8	29.2	$F_{41\%}$	30/100	1/100	54/100	34/100	8/100	<1/100	10/100	1/100	69/100	47/100	60/100	46/100	78/100
Maintain 2014 SPR	43.3	29.5	$F_{43\%}$	31/100	1/100	56/100	36/100	8/100	<1/100	10/100	1/100	73/100	51/100	63/100	49/100	88/100
	50.0	36.0	$F_{29\%}$	44/100	5/100	75/100	51/100	9/100	1/100	13/100	1/100	99/100	91/100	95/100	84/100	>99/100
	60.0	45.8	$F_{34\%}$	65/100	22/100	96/100	82/100	11/100	1/100	23/100	2/100	>99/100	>99/100	>99/100	>99/100	>99/100

Values from the adopted catch level for 2015 were apportioned by Regulatory Area, using the methodology described previously, with just over one-third of the catch limit being in Area 3A.

[97] IPHC, 2015. http://www.iphc.int/meetings/2015am/Final_Adopted_catch_limits_1_30_15.pdf

D. Management Measures

8.	**Management shall adopt and implement effective measures including; harvest control rules and technical measures applicable to sustainable utilization of the fishery and based upon verifiable evidence and advice from available scientific and objective, traditional sources.** **FAO CCRF 7.1.1/7.1.2/7.1.6/7.4.1/7.6.1/7.6.9/12.3** **FAO Eco 29.2/29.4/30**

Evidence adequacy rating:

☑ **High** ☐ **Medium** ☐ **Low**

Rating determination

The IPHC has developed, refined, and utilized a constant harvest rate policy since the 1980's. The policy was initially designed to harvest 20% of the coastwide exploitable biomass when the spawning biomass is estimated to be above 30% of the unfished level. The harvest rate is linearly decreased towards a rate of zero as the spawning biomass approaches 20% of the unfished level. Harvest rates are applied in each of the Regulatory Areas. This combination of harvest rate and precautionary levels of biomass protection have, in simulation studies, provided a large fraction of maximum available yield while minimizing risk to the spawning biomass. There are numerous technical management measures aimed at sustainable utilization of the halibut resource. Under the individual fishing quota share system in place for the Pacific halibut fishery, fishing capacity (vessels and gear) has been reduced, seasons were extended and wastage was reduced. Longline is the principal gear utilized for this fishery. Regulations are in place to address discards. General spawning areas have been mapped in Alaska, and the halibut fishery is closed during peak spawning times, by regulation. The NPFMC has established Marine Protected Areas and additional trawl closures that benefit juvenile fish and adult spawners. Bycatch of seabirds has been addressed by specific regulations now including several technical measures. Management actions are in place with respect to increasing knowledge on the halibut and non-halibut bycatch dynamics in the directed halibut longline fishery. The NPFMC has taken recent action to reduce halibut bycatch in GOA groundfish fisheries.

IPHC Harvest Policy

A detailed review of the IPHC harvest policy development is contained in Stewart et al. 2015 [98], and excerpts from this paper are included in this section. The IPHC's harvest policy has evolved through many levels of target harvest rate, spatial complexity, and implementation strategy. Early harvest policy implementations used higher target rates of exploitation, including values of 35%, 30%, and finally 20% in 1996. These early rates were reduced as subsequent analyses showed the stock to be less productive and the objectives of the harvest policy were broadened from targeting Maximum Sustainable Yield (MSY), to also maintaining a reasonable stock size over a range of conditions.

The target harvest rate on which the current policy is based (20%) was generated via a simulation analysis that used data from the 'core' of the halibut stock including Areas 2B, 2C, and 3A. In order

101 Stewart, I.J., B.M. Leaman, and S.J.D. Martel. 2015. Accounting for and managing all Pacific halibut removals. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 221-266. http://www.iphc.int/publications/rara/2014/rara2014_15allremovalsmanagement.pdf

to account for lower productivity and greater uncertainty in Areas 3B and 4, target harvest rates were reduced in those areas (to 15%). During both the closed-area assessment period, and the coastwide assessment period (after 2006), these target harvest rates were used to generate regulatory area-specific Total Constant Exploitation Yield (TCEY) estimates.

The target rates have a number of important properties and assumptions embedded in them. Simulation analysis found that these rates would achieve a stock size that exceeds 30% of the equilibrium stock size in the absence of any fishing (SB30%) with at least an 80% probability over a sufficiently long time-horizon. Fluctuations in size-at-age and variable recruitment regimes were included in the original analysis, and subsequent sensitivity analyses, and it was acknowledged that a fixed harvest rate policy in combination with natural fluctuations in recruitment would lead to similar fluctuations in the fishery. In addition, the levels of bycatch and wastage occurring during the 1980s and 1990s contributed to the estimated productivity of the stock, and therefore the target rate of exploitation. In this way, an allowance for U32 (and later U26) mortality was built in to the original harvest rate targets.

Analyses conducted in 2010[99] used Spawning Biomass per Recruit (SBR) as a measure of total fishing intensity. Hare first found the SBR associated with the harvest policy at the time (20% and 15% harvest rates applied to O32 removals), and then solved for the TCEY values that would result in the same SBR if removals of O26 halibut were included directly in the TCEY. This extended accounting for O26 halibut was adopted in 2011, and subsequent harvest policy calculations have relied on the 21.5% and 16.125% (15% scaled up by the same factor as 20% to 21.5%) rates.[100] The higher rate (21.5%) applies in Areas 2A, 2B, 2C, and 3A, while the lower rate has been applied in all other areas.

Stewart et al. (2015) extended the analysis of Hare (2011) to include U26 halibut, and looked at Spawning Potential Ratio (SPR) as a metric. They noted that because the SPR metric includes all sources and sizes of mortality, it can be used to directly compare potential halibut fishery yield associated with different levels of total and U26 bycatch and can therefore be used to define a harvest target for the stock. This conceptual extension to the current harvest policy allows for quantification of the impacts of bycatch on the halibut stock via the yield estimates, rather than in terms of adult equivalents or equilibrium spawning biomass units. SPR is also a logical choice for defining fishing intensity for Management Strategy Evaluation (MSE) where trade-offs among fisheries and size-limits within fisheries need to be directly evaluated in a common framework. Benefits of the extended accounting include no further need for the concept of exploitable biomass, consistency in the target fishing intensity despite future changes in removals among fisheries and/or changes in the size structure of removals within fisheries, a clear understanding of the direct tradeoffs between all directed and non-directed removals, and the use of SPR which provides a direct link to future output from MSE analyses.[101]

Regulations for the 2014 fishery

The regulations for the 2014 fishery were adopted at the IPHC 2014 Annual Meeting, and were later approved by the Canadian and the United States governments, with the one exception that

[99] Hare, S.R. 2011. Potential modifications to the IPHC harvest policy. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2010. p. 177-200. http://www.iphc.int/publications/rara/2010/2010.177.PotentialmodificationstotheIPHCharvestpolicy.pdf

[101] Stewart, I.J., B.M. Leaman, and S.J.D. Martel. 2015. Accounting for and managing all Pacific halibut removals. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 221-266.

since 1999, the Canadian government has allowed the landing of live halibut caught in British Columbia waters.[102] IPHC Regulations[103] state that no person shall offload halibut from a vessel unless the gills and entrails have been removed.

NOAA Fisheries annually sets limits to minimize halibut bycatch in Federal groundfish fisheries in the Gulf of Alaska, and those limits are divided annually and seasonally among different groundfish sectors. A fishery management plan amendment, "Amendment 95," came into effect in 2014 and is intended to minimize halibut bycatch in the GOA groundfish fisheries. If a sector reaches its halibut bycatch limit before it catches the amount of groundfish available for it to harvest, vessels participating in the sector must stop fishing for groundfish. There are two broad sectors that harvest groundfish in the Gulf of Alaska that will be directly affected by the amendment — vessels using hook-and-line gear and vessels using trawl gear. The hook-and-line gear sector is further divided into catcher vessels and catcher/processor vessels. Under the amendment, the bycatch limit reductions for each sector are:
Hook-and-line catcher/processor — 7 percent; implemented in 2014;
Hook-and-line catcher vessel — 15 percent; phased in over 3 years by 2016;
Trawl vessel — 15 percent; phased in over 3 years by 2016.
The jig gear and pot gear sectors are not affected by this rule, as they historically have been exempt from halibut bycatch limits.[104]
Based on discussions during site visits, and preliminary data, it appears that the targeted reductions are being met.

Individual fishing quota program

Under the individual fishing quota (IFQ) share program in place for the Pacific halibut and sablefish fishery since 1995, fishing capacity (vessels and gear) has been significantly reduced in Alaska. With the implementation of IFQs in the fishery, the derby type fishery was eliminated, seasons were extended and wastage was reduced in the halibut fishery. Regulations in place address waste, discard, bycatch, and endangered species interactions in the halibut fisheries. The IPHC, the NMFS, and ADFG promulgate these regulations through the Commission, the NPFMC, and the Alaska Board of Fisheries.

In-season actions

The IPHC recommends for the establishment and authorization to establish or modify regulations during the season. In-season actions may include, but are not limited to, establishment or modification of the following:
(a) Closed areas;
(b) Fishing periods;
(c) Fishing periods limits
(d) Gear restrictions
(e) Recreational bag limits
(f) Size limits; or
(g) Vessel clearances[105]

[102] Heather L. Gilroy, H.L. , L. M. Erikson, and K. A. MacTavish. 2015. 2014 commercial fishery and regulation changes. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 23-36. http://www.iphc.int/publications/rara/2014/rara2014_03commercialfishery.pdf
[103] IPHC, 2015. Pacific halibut fishery regulations. http://www.iphc.int/publications/regs/2015iphcregs3.pdf
[104] NOAA Fisheries NEWS RELEASE February 19, 2014
http://alaskafisheries.noaa.gov/newsreleases/2014/amd95halibut021914.htm
[105] IPHC, 2015. Pacific halibut fishery regulations.

Gear

Fishing gear is regulated to longline gear, except that vessels licensed to catch sablefish in Area 2B using sablefish trap can retain halibut caught as bycatch under regulations promulgated by DFO. In the early 1980s the IPHC conducted research on capture efficiency of circle vs J hooks and determined that use of circle hooks lowered the mortality of undersized halibut caught and released during fishing. In 1983, the commercial fishing industry made the operational switch from J-hooks to circle hooks.

Bycatch of seabirds was addressed by specific regulations put in place to reduce the incidental mortality of the short-tailed albatross, a listed species under the Endangered Species Act (ESA), and other seabird species in 1998, then revised in 2008. These measures now include the use of streamer (tory) lines, night setting, lineshooters and lining tubes, have been shown to reduce seabird interactions when setting or retrieving gear.[106]

In a NMFS report on a working group reviewing ghost fishing, the group determined that longline fishing under IFQ management garnered a "Low Priority Recommendations" when compared to pot and net gears.

Size limits, Time restrictions, Geographical closures[107]

The commercial halibut fishery is limited to retention of fish, with head on, of 32 inches (81.3 cm) or greater in length (with head removed, 24 inches or 61 cm). It has been reported previously that this is the preferred portion of the spawning population available for harvest, in terms of halibut maturity at age.

Seasons are recommended in regulation by the IPHC. Open and closed periods, as well as fishing period limits are set in regulation. The halibut fishery is closed during peak spawning times. The fishing period in Areas 2B, 2C, 3A, 3B, 4A, 4B, 4C, 4D, and 4E usually begins around March 17 and terminates around November 7, with the Commission deciding on the specific dates each year.

Regulations are in place to address discards. General spawning areas have been mapped in Alaska, and the NPFMC has established Marine Protected Areas that benefit juvenile fish and adult spawners. The Halibut Longline Closure Area is 36,300 square miles in size. Additional trawl closures for areas in the waters of Bristol Bay (19,000 sq mi), the Pribilof Island Habitat Conservation Area (7,000 sq mi), the Aleutian Island (277,000 sq mi), the Northern Bering Sea Research Area (85,000 sq mi), the Eastern Gulf of Alaska (53,000 sq miles) and Cook Inlet (7,000 sq mi) closed thousands of square miles of sea bottom to bottom trawling which provides a significant degree of refuge for juvenile halibut.[108]

Observer program

In the directed longline fisheries for Pacific halibut, bycatch of other fish species is not well documented. However, management actions are in place in respect to increasing knowledge on the bycatch dynamics of the directed halibut longline fishery. Beginning January 1, 2013,

[106] NOAA Fisheries' (NMFS) Seabird Program page. Accessed 2015. http://www.fakr.noaa.gov/protectedresources/seabirds/national.htm

[107] IPHC, 2015. Pacific halibut fishery regulations.

[108] North Pacific Fisheries Management Council. Habitat protections webpage accessed 2015. http://www.npfmc.org/habitat-protections/

amendment 86 (BSAI) and amendment 76 (GOA) were added to the Federal Fisheries Regulations 50 CFR Part 679: Fisheries of the EEZ Off Alaska. There are new partial coverage observer requirements for halibut vessels fishing hook and line gear. Halibut vessels are registered with the NMFS and can be selected on a vessel or trip basis. The program is covered by fees assessed on landings from both the CDQ and IFQ fisheries. At the beginning of 2014, one year of reliable data accrued from the restructured observer program and will help understand the halibut and non-halibut bycatch dynamics in the directed halibut IFQ fleet of Alaska. Until now this was only estimated from survey bycatch and later extrapolated to commercial catches in the various IPHC regulatory areas.

The NMFS/NOAA North Pacific Groundfish and Halibut Observer Program 2014 Annual Report[109] provided detailed observations, analyses, and recommendations based on the observer program in 2014. The budget for observer deployment in 2014 in the partial coverage category was $4,937,414 and 4,368 days, with the budget being made up of $3,044,606 in fees (from 2013 landings) and $1,892,808 in federal money. The breakdown in contribution to the 2014 observer fee liability by species was: 30% halibut, 22% sablefish, 26% Pacific cod, 19% pollock, and 2% all other groundfish species. The program met expected rates of coverage for the full-coverage regulatory and full-coverage voluntary strata, the trip selection stratum, four of six time-periods within vessel selection, and the partial coverage no selection. Observer coverage was higher than the expected 12% selection rate in two of the six time periods within vessel selection.

Discard information was estimated using bycatch rates derived from haul-specific at-sea observer information. Halibut that are incidentally caught in federally managed groundfish trawl, hook-and-line, and pot fisheries are required by regulations to be discarded, regardless of whether the fish is living or dead. A document is being prepared that describes Observer Program Pacific halibut data collections along with the catch/bycatch estimation routines used to estimate the at-sea discard of halibut in the IFQ halibut fishery.

Most halibut fisheries had partial observer coverage under the Observer Program, including:

- catcher vessels when fishing for halibut individual fishing quota (IFQ) or sablefish IFQ (there are no PSC limits for these fisheries);
- catcher vessels when fishing for halibut CDQ, fixed gear sablefish CDQ, or groundfish CDQ using pot or jig gear (because any halibut discarded in these CDQ fisheries does not accrue against the CDQ group's transferable halibut PSC allocation.

Electronic monitoring

It is the intention of NMFS to initiate a program for the implementation of electronic monitoring of the Alaska fleets (including halibut and sablefish) to improve data collection. The NMFS Policy on Electronic Monitoring Technologies and Fishery Dependent Data Collection published in May 2013 provides guidance on the adoption of electronic technology solutions in fishery-dependent data collection programs. Electronic technologies include the use of vessel monitoring systems (VMS), electronic logbooks, video cameras for electronic monitoring (EM), and other technologies that provide EM and electronic reporting (ER). The policy also includes guidance on the funding for electronic technology use in fishery-dependent data collection programs.

The implementation of fisheries management regulations that require near real-time monitoring of catch by species at the vessel level have challenged the methodological and budgetary limits of data collection methods such as self-reporting, at-sea monitoring, and dockside monitoring. A policy and process to consider the adoption of electronic technology options may help ensure the

[109] NMFS (National Marine Fisheries Service). 2015. North Pacific Groundfish and Halibut Observer Program 2014 Annual Report. http://alaskafisheries.noaa.gov/sustainablefisheries/observers/annualrpt2014.pdf

agency's fishery-dependent data collection programs are cost-effective and sustainable.

The NPFMC, at its meeting in December 2014, reviewed its Electronic Monitoring Workgroup's progress in developing a cooperative research plan for 2015, and moving towards pre-implementation of EM in 2016. 2015 fieldwork will focus both on operational testing of EM camera systems in the under 58 ft longline fleet, as well as further research on all EM systems to evaluate whether they will successfully achieve the Council's goal to integrate EM used for catch estimation into the Observer Program. The Workgroup outlined a timeframe for how the fieldwork and pre-implementation years will intersect with the Council's analytical process and EM's eventual integration into the Annual Deployment Plan process. The Workgroup also reported on the budget and funding for the 2015 fieldwork, and opportunities for funding for the 2016 pre-implementation year.[110]

Halibut Prohibited Species Catch (PSC)

Interception of halibut often occurs in trawl fisheries targeting other groundfish species (such as rock sole, pollock, yellowfin sole, and Pacific cod). Incidental catch of halibut also occurs in groundfish hook and line and pot fisheries. Regulations require that all halibut caught incidentally must be discarded, regardless of whether the fish is living or dead. As noted above, Amendment 95 was introduced to reduce the halibut bycatch cap in the GOA groundfish fisheries. Amendments to FMPs have also been introduced in the BSAI fisheries to reduce halibut PSC levels there as well.

Halibut excluder device to reduce halibut bycatch in the groundfish trawl fisheries

Research has shown that the groundfish trawl industry in Alaska can deploy halibut excluder devices in their gear with success. A project, implemented in Oregon and California, entitled "Improving the Selectivity of Bottom Trawls to Reduce Bycatch of Pacific Halibut in the West Coast Groundfish Trawl Fishery" responded to fishermen's concern for Pacific halibut bycatch. The NMFS, in collaboration with the Pacific States Marine Fisheries Commission (PSMFC) and the Alaska Whitefish Trawlers Association, tested the efficacy of a flexible sorting grate bycatch reduction device (BRD) designed to reduce halibut bycatch. The results showed that halibut bycatch was reduced numerically by 57% and by 62% by weight. Target species loss ranged from 9% to 22%.[111]

[110] North Pacific Fisheries Management council News& Notes December 2014. http://www.npfmc.org/wp-content/PDFdocuments/newsletters/news1214.pdf

[111] The Marine Conservation Alliance. Accessed 2015. http://marineconservationalliance.org/seafacts-the-development-of-halibut-excluders/

9. There shall be defined management measures designed to maintain stocks at levels capable of producing maximum sustainable levels.

FAO CCRF 7.1.8/7.6.3/7.6.6/8.4.5/8.4.6/8.5.1/8.5.3/8.5.4/8.11.1/12.10

FAO Eco 29.2bis

Evidence adequacy rating:

☑ High **☐ Medium** **☐ Low**

Rating determination

The IPHC and NPFMC objectives for fisheries management are based on the long term maintenance of MSY levels. The policy for achieving this includes setting biological reference points that are used in determining the annual CEY for the Pacific halibut stock. Under the individual fishing quota share system in place for the Pacific halibut fishery, fishing capacity (vessels and gear) has been reduced and is now relatively stable. In 1983, industry made the operational switch from J-hooks to circle hooks in the commercial fishery, lowering the mortality of undersized halibut caught and released during commercial fishing. Discards of Pacific halibut, considered a Prohibited Species Catch (PSC) by the groundfish fisheries in Alaska are regulated, and the NPFMC voted in June 2012 to further reduce the halibut bycatch cap in the GOA groundfish fisheries. A fishery management plan amendment, "Amendment 95," came into effect in 2014 and is intended to minimize halibut bycatch in the GOA groundfish fisheries. Similar measures have been introduced to lower by-catch levels in the BSAI groundfish fisheries.

The IPHC and NPFMC objectives for fisheries management are based on the long term maintenance of MSY levels. The harvest policy includes a Harvest Control Rule (HCR), which reduces the target harvest rates linearly if the stock is estimated to have fallen below 30% of the equilibrium stock size in the absence of fishing (a threshold reference point), and such that there would be no fishing mortality below 20% relative spawning biomass (a limit reference point). This combination of harvest rate and precautionary levels of biomass protection have, in simulation studies, provided a large fraction of maximum available yield while minimizing risk to the spawning biomass. Before the adoption of the risk-based advice, a slow-up, full-down (SUFullD) harvest policy allowed only a 33% rise in catch limit from the previous year when the exploitable biomass is projected to increase, but a full 100% decrease when the projections are for a biomass decrease. This was done to assist with a long term increase in available biomass, and therefore toward MSY levels.

In addition to the harvest policy mechanisms, there are numerous other technical measures in place[112] to minimize halibut mortality in line with achieving MSY levels. Details on these can be found in Section D8 above. In 1983, the halibut fishing industry made the operational switch from J-hooks to circle hooks in the commercial fishery, lowering the mortality of undersized halibut caught and released during commercial fishing.[113]

Under the IFQ share program in place for the Pacific halibut fishery[114], fishing capacity (vessels and gear deployed) has been reduced, and fewer longline sets have been lost (reducing ghost fishing of halibut and other species). The elimination of derby-style fishing generally allowed the fishery to proceed at a slower pace, thus allowing for increased selectivity and decreased bycatch and discards. The number of vessels, and the class of those vessels, established qualifications for a fishing fleet with less capacity and with ownership in the resource.

Discards of Pacific halibut, considered a Prohibited Species Catch (PSC) by the groundfish fisheries

[112] IPHC, 2015. Pacific halibut fishery regulations. http://www.iphc.int/publications/regs/2015iphcregs3.pdf
[113] http://www.iphc.int/publications/bulletins/ib0028.pdf
[114] http://www.fakr.noaa.gov/regs/679d42.pdf

in Alaska, are regulated. When PSC limits are reached, groundfish target species closures result. In the most recent change in regulation, the NPFMC voted in June 2012 to reduce the halibut bycatch cap in the GOA groundfish fisheries (see Clause 7 above, for details on Amendment 95). Halibut PSC limits are also set in the BSAI fisheries.[115]

Extensive analysis has been done on the impact of reducing by-catch and discards, and its effect on stock size and fishery yields. These results are regularly incuded in the IPHC stock assessments. The Halibut Bycatch Work Group (HBWG II) was re-established by IPHC in 2010 to review progress on reduction of halibut bycatch mortality, bycatch management programs, and to examine how best to incorporate halibut bycatch mortality into halibut assessment and management. HBWG II compiled a comprehensive report on successful bycatch management programs and identified areas for improvement, accompanied by recommendations[116] . More recent findings of the WG, completed in late 2014, were summarized in Section A1.[117]

[115] http://www.npfmc.org/bsai-halibut-bycatch/

[116] Karim, T., Keizer, A., Busch, S., DiCosimo, J., Gasper, J., Mondragon, J., Culver, M., and Williams, G. 2012. Report of the 2010 halibut bycatch work group. Int. Pac. Halibut Comm. Tech. Rep. 57. 64p. http://www.iphc.int/publications/techrep/tech0057.pdf

[117] Report of the Halibut Bycatch Work Group II (5 September 2014)

10. Fishing operations shall be carried out by fishers with appropriate standards of competence in accordance with international standards and guidelines and regulations.

FAO CCRF 8.1.7/8.1.10/8.2.4/8.4.5

Evidence adequacy rating:

☑ **High** ☐ **Medium** ☐ **Low**

Rating determination

Any aspirant halibut fisherman must have 150 days of halibut fishing experience before being able to purchase halibut IFQs. Obtaining halibut IFQ share most often will require the purchaser to enter into loan capital arrangements with banks that will require comprehensive fishing business plans supported by competent, professional fishermen with demonstrable fishing experience. Several training opportunities are available to train crewmembers in Alaska.

To increase communications and understanding between the regulated users and enforcement personnel and to minimize harm to fishery resources, the Alaska Enforcement Division (AKD) of NOAA Fisheries Office of Law Enforcement (OLE) strives to maintain a positive and productive relationship with all harvesters and industry personnel. In addition to daily personal interactions on the water, docks, and in processing facilities, AKD contacted thousands of harvesters and industry personnel at organized events, including trade shows, and responded to email and telephone inquiries, providing current regulatory information and guidance to promote compliance and communications.

Any aspirant halibut fisherman must have 150 days of halibut fishing experience before being able to purchase halibut IFQs. Obtaining halibut IFQ share most often will require the purchaser (aspirant halibut fisherman) to enter into loan capital arrangements with banks that will require comprehensive fishing business plans supported by competent, professional fishermen with demonstrable fishing experience. This competence and professionalism is a learned experience with the culmination of entrants into the fishery starting at deck hand level working their way up through proof of competence. [118]

The State of Alaska, Department of Labor & Workforce Development (ADLWD) includes AVTEC (formerly called Alaska Vocational Training & Education Center, now called Alaska's Institute of Technology). One of AVTEC's main divisions is the Alaska Maritime Training Center. The goal of the Alaska Maritime Training Center is to promote safe marine operations by effectively preparing captains and crewmembers for employment in the Alaskan maritime industry.[119]

The Alaska Maritime Training Center is a United States Coast Guard (USCG) approved training facility located in Seward, Alaska, and offers USCG/STCW-compliant maritime training (STCW is the international Standards of Training, Certification, & Watchkeeping). In addition to the standard courses offered, customized training is available to meet the specific needs of maritime companies. Courses are delivered through the use of their world-class ship simulator, state of the art computer

[118] NOAA. Alaska IFQ Halibut and Sablefish Program. Accessed 2015. http://www.nmfs.noaa.gov/sfa/management/catch_shares/about/documents/ak_halibut_sablefish.pdf

[119] State of Alaska, Department of Labor & Workforce Development AVTEC- Alaska's Institute of Technology. Accessed 2015 http://www.avtec.edu/

based navigational laboratory, and modern classrooms equipped with the latest instructional delivery technologies.[120]
The Center's mission is to provide Alaskans with the skills and technical knowledge to enable them to be productive in Alaska's continually evolving maritime industry. Supplemental to their on-campus classroom training, the Alaska Maritime Training Center has a partnership with the Maritime Learning System to provide mariners with online training for entry-level USCG Licenses, endorsements, and renewals.

The University of Alaska Sea Grant Marine Advisory Program (MAP) provides education and training in several sectors, including fisheries management, in the forms of seminars and workshops. [121]
In addition, MAP conducts sessions of their Alaska Young Fishermen's Summit (AYFS). Each Summit is an intense, 2/3-day course in all aspects of Alaska fisheries, from fisheries management & regulation, to seafood markets & marketing. The target audience for these Summits is young Alaskans from coastal communities. The 2013 AYFS was held in December 10 through December 15 in Anchorage. The conference aimed at providing crucial training and networking opportunities for fishermen entering the business or wishing to take a leadership role in their industry. The next Summit is due to take place in Juneau 27-29th January 2016.[122]
Only one gear type may be used to harvest halibut in the GOA and BSAI – benthic longline (a passive gear type). All longline fishing gear must be marked and operated in accordance with federal fisheries regulations – 50 CFR Part 679: Fisheries of the Exclusive Economic Zone off Alaska.[123]

Finally, the Alaska Marine Safety Education Association (AMSEA) provides courses on small boating safety, drill conductor training, stability and damage control, ergonomics, dredger safety and survival at sea training. [124]

[120] State of Alaska, Department of Labor & Workforce Development AVTEC- Alaska's Institute of Technology. Alaska Maritime Training Center. Accessed 2015 http://www.avtec.edu/department/alaska-maritime-training-center
[121] MAP. 2015. Marine Advisory Program, Fisheries. Alaska Sea Grant College Program, PO Box 755040, Fairbanks, Alaska, 99775-5040 http://seagrant.uaf.edu/map/fisheries/
[122] SEAGRANT. 2015. Alaska Young Fishermen's Summit. Marine Advisory Program main office 1007 West 3rd Ave, Suite 100; Anchorage, AK 99501. https://seagrant.uaf.edu/map/workshops/2013/ayfs/
[123] Department of Labor and Workforce Development. AVTEC. Maritime Home Page. Accessed 2015. http://www.avtec.edu/AMTC.htm
Standards of Training Certification and Watchkeeping. Home Page. Accessed 2015. http://www.stcw.org/
Sea Grant. 2015. Alaska Sea Grant Marine Advisory Program. Fish Biz . Accessed 2015.http://seagrant.uaf.edu/map/fishbiz/index.php
University of Alaska. School of Fisheries and Ocean Science. Accessed 2015 http://www.sfos.uaf.edu/fitc/academicprograms/
Sea Grant. 2015. Alaska Sea Grant Marine Advisory Program. Workshops. Accessed 2015.http://seagrant.uaf.edu/map/workshops/2013/ayfs/
[124] AMSEA. 2014. ALASKA MARINE SAFETY EDUCATION ASSOCIATION HOMEPAGE. 2924 Halibut Point Road ~ Sitka, AK 99835 http://www.amsea.org/

E. Implementation, Monitoring and Control

11. An effective legal and administrative framework shall be established and compliance ensured through effective mechanisms for monitoring, surveillance, control and enforcement for all fishing activities within the jurisdiction.

FAO CCRF 7.1.7/7.7.3/7.6.2/8.1.1/8.1.4/8.2.1
FAO Eco 29.5

Evidence adequacy rating:

☑ **High** ☐ **Medium** ☐ **Low**

Rating determination

The Northern Pacific Halibut Act, governs the commercial, sport, charter, and subsistence halibut fisheries in the U.S. The U.S. Coast Guard (USCG) and NMFS Office of Law Enforcement (OLE) enforce Alaska fisheries laws and regulations, especially 50CFR679. The Alaska Wildlife Troopers enforce halibut regulations in state waters. The violations in this fishery are reported to and investigated by NOAA's Office of Law Enforcement's Alaska Division and prosecuted by NOAA's Office of General Counsel's Enforcement Section. OLE Special Agents and Enforcement Officers conduct complex criminal and civil investigations, board vessels fishing at sea, inspect fish processing plants, review sales of wildlife products on the internet and conduct patrols on land, in the air and at sea. NOAA Agents and Officers can assess civil penalties directly to the violator in the form of Summary Settlements (SS) or can refer the case to NOAA's Office of General Counsel for Enforcement and Litigation (GCEL).

The U.S. Coast Guard (USCG) and NMFS Office of Law Enforcement (OLE) enforce Alaska fisheries laws and regulations, especially 50CFR679.

The *Northern Pacific Halibut Act* governs the commercial, sport, charter, and subsistence halibut fisheries in the U.S. The violations in this fishery are reported to and investigated by NOAA's Office of Law Enforcement's Alaska Division and prosecuted by NOAA's Office of General Counsel's Enforcement Section. The maximum civil penalty under the *Northern Pacific Halibut Act* is $200,000 for each violation.

Patrols, Partnerships, and Inspections

The U.S. Coast Guard and NMFS's OLE enforce the regulations that govern fishing under the IFQ Program. The Alaska Division patrols provide compliance inspections, a visible deterrent to would-be violators, and availability to stakeholders to receive information and guidance. NOAA OLE works closely with the State of Alaska Wildlife Troopers (AWT) and the US Coast Guard to maximize compliance by sharing information, intelligence, knowledge, and resources. The formalized Cooperative Enforcement Agreement and Joint Enforcement Agreement with the Alaska Wildlife Troopers provide the state with federal funding for personnel, equipment, operations, and authorization for State Troopers to enforce federal fishing regulations while engaged in their regular duties.

USCG

The U.S. Coast Guard (USCG) is the lead federal maritime law enforcement agency for enforcing national and international law on the high-seas, outer continental shelf and inward from the U.S. Exclusive Economic Zone (EEZ) to inland waters. The USCG also patrols US waters to reduce foreign poaching, and inspects fishing vessels for compliance with safety requirements. The U.S. Coast Guard now focuses its efforts at sea. Since 2006 NMFS'OLE Alaska Division (AKD) has monitored

offloads and provided after-hours surveillance.

State Enforcement Efforts for 2014.

Sport/Charter/Subsistence Halibut

- 966.5 dedicated hours toward sp/ch/sub halibut enforcement
- 54 at-sea patrols dedicated to sp/ch/sub halibut enforcement
- 4127 contacts (not boardings)
- 49 noted violations
    - 20 state citations issued
    - 18 state warnings issued
    - 1 federal referred to NMFS
        - 10 boating safety
        - 1 faded buoy
        - 1 false statement
        - 6 misc halibut violations (disfiguring halibut/leaving skin on halibut)
        - 3 permit/sharc violations
        - 2 Sportfish guide aid client in violation
        - 3 sportfish guide log violation
        - 2 sportfish guide misc violation
        - 19 sportfish without license in possession
        - 1 illegal possession of halibut
        - 1 sportfish with more than one line

IFQ Halibut

- 263 Boardings
- 39 noted violations
    - 7 State citations issued
    - 2 state warnings issued
    - 30 federal referred to NMFS
        - 6 faded/failed to mark buoy
        - 3 crab pot onboard
        - 3 employed unlicensed crew
        - 4 failure to have crewmember license
        - 1 exceed IFQ quota
        - 5 failure to maintain logbook
        - 8 failure to have IFQ permit onboard
        - 4 failure to have FFP permit onboard
        - 1 seabird avoidance gear violation
        - 1 overage of groundfish
        - 2 failure to remain at landing site

1 failure to have CFEC card in possession[125]

For fiscal year 2014, the active vessel fleet size for IFQ halibut was 1879 vessels, and the USCG had a goal to board 386 of these vessels. For the most part (GOA) IFQ halibut vessels are not on VMS, so determining their locations is difficult, and requires a significant amount of effort from law enforcement assets to facilitate at-sea boardings. From fiscal year 2008 through the end of fiscal year 2013, the USCG conducted 690 boardings on IFQ/CDQ halibut vessels, noting 39 violations on

[125] Communication post site visit from Lieutenant Jon Streifel Deputy Commander, Alaska Wildlife Troopers, Southeast Alaska

32 vessels resulting in a detected violation rate for this fleet of 4.64%. Also, details of the boardings and violations detected by fiscal year 2010/14 is provided below.

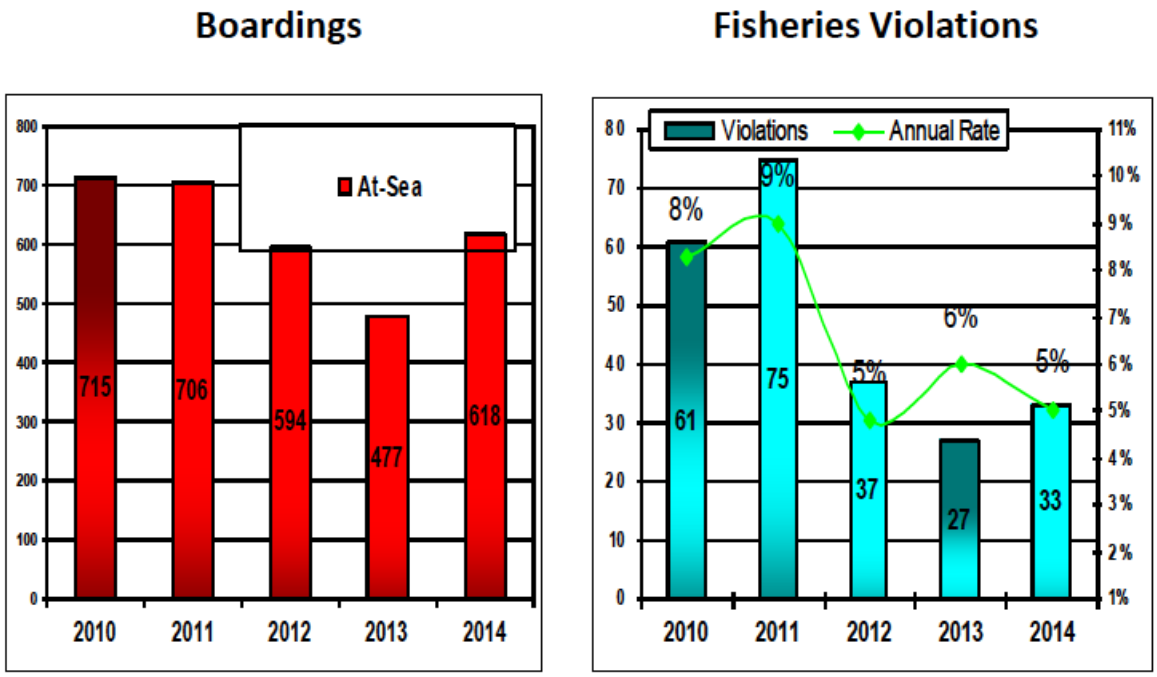


Figure E11.1 Number of boardings and violations [126]

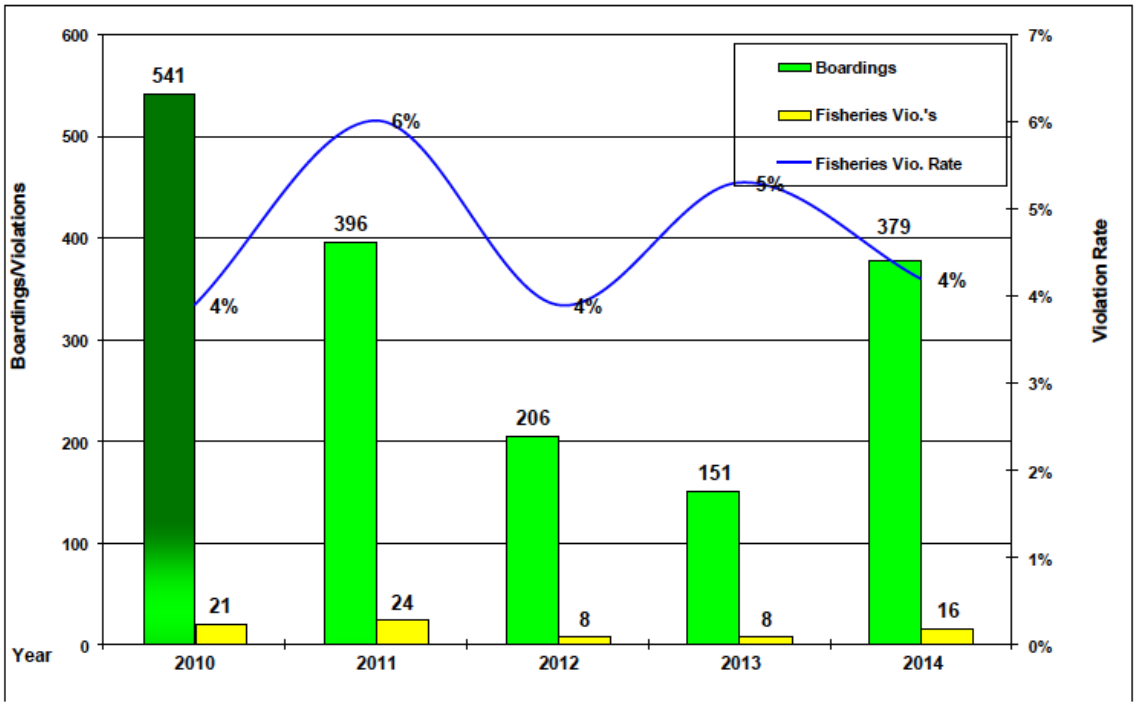


Figure E11.2 IFQ Halibut Enforcement.[127] http://www.npfmc.org/committees/enforcement-committee/

[126] North Pacific Fisheries Management Council. Enforcement Committee. Accessed 2015. USCG 2014 Year in Review. Accessed 20.15 http://www.npfmc.org/committees/enforcement-committee/

NMFS OLE

NOAA Office of Law Enforcement Special Agents and Enforcement Officers perform a variety of tasks associated with the protection and conservation of Alaska's living marine resources. In order to enforce these laws, OLE special agents and enforcement officers use OLE patrol vessels to board vessels fishing at sea, and conduct additional patrols on land, in the air and at sea in conjunction with other local, state and Federal agencies.

In any given year, OLE Agents and Officers spend an average 10,000-11,000 hours conducting patrols and investigations, and an additional 10,000-11,000 hours on outreach activities. The OLE maintains 19 patrol boats around the country to conduct a variety of patrols including Protected Resources Enforcement Team (PRET) boardings, protection of National Marine Sanctuaries and various undercover operations.[128]

OLE Special Agents and Enforcement Officers conduct complex criminal and civil investigations, board vessels fishing at sea, inspect fish processing plants, review sales of wildlife products on the internet and conduct patrols on land, in the air and at sea. NOAA Agents and Officers can assess civil penalties directly to the violator in the form of Summary Settlements (SS) or can refer the case to NOAA's Office of General Counsel for Enforcement and Litigation (GCEL). GCEL can then assess a civil penalty in the form of a Notice of Permit Sanctions (NOPs) or Notice of Violation and Assessment (NOVAs), or they can refer the case to the U.S. Attorney's Office for criminal proceedings. [129]

For perpetual violators or those whose actions have severe impacts upon the resource criminal charges may range from severe monetary fines, boat seizures and/or imprisonment levied by the United States Attorney's Office.

All landings of halibut must be reported to NMFS via its mandatory "e-landings" reporting system. Commercial harvests of halibut are the primary enforcement responsibilities of OLE. Commercial harvests of pollock, halibut and sablefish are the primary enforcement responsibilities of OLE. The IFQ, Observer and Record Keeping/Reporting programs are the foundations of the Alaska Division program responsibilities. Endangered Species Act and Marine Mammal Protection Act priorities include the Steller sea lion and Cook Inlet beluga populations in addition to many other protected resources.

Alaska Division: NMFS OLE 2015 Enforcement Priorities

Magnuson-Stevens Act

HIGH PRIORITY

• Observer assault, harassment, or interference violations.
• Felony and major civil cases involving significant damage to the resource or the integrity of management schemes.
• Commercialization of sport-caught or subsistence halibut.

[127] IFQ Halibut Enforcement. http://www.npfmc.org/committees/enforcement-committee/

[128] NOAA's Office of Law Enforcement Workforce Analysis and Staffing Allocation Plan May 2012 http://www.nmfs.noaa.gov/ole/docs/2012/ole_workforce_analysis_plan.pdf

[129] Policy for the Assessment of Civil Administrative Penalties and Permit Sanctions NOAA Office of the General Counsel – Enforcement Section. Accessed 2015 http://www.gc.noaa.gov/documents/Penalty%20Policy_FINAL_07012014_combo.pdf

• Maritime Boundary Line incursions by foreign fishing or transport vessels.
• Outreach and education.

MEDIUM PRIORITY

• Misdemeanor and civil cases involving observer coverage violations.
• Closed Area/VMS Violations, ongoing.
• Commercial vessel incursions into closure areas or other Marine Protected Areas.
• Recordkeeping and reporting violations that impact data consistency or integrity.
• Violations involving lesser damage to the resource or the integrity of management schemes.

LOW PRIORITY

• Catch Reporting and Trip Limits.
• Noncompliance with trip and cumulative limits, and record keeping requirements for landings of federally managed marine species, and specifically catch share programs.
• Gear Violations.
• Deployment of unlawful gear utilized in commercial fisheries under NOAA's jurisdiction.
• Lesser permit violations.

Endangered Species Act and Marine Mammal Protection Act

HIGH PRIORITY

• Violations wherein responsible subject and species are identifiable.
• Lethal Takes, Level "A" Harassment with the potential to injure marine mammal stock.
• Species of interest are Cook Inlet Beluga, other whale species, Northern fur seal, or Steller sea lion.
• Any violation involving injury or potential injury to people, such as a vessel-whale collision.
•Outreach and education.

MEDIUM PRIORITY

• Non-lethal takes, Level "B" Harassment with the potential to disturb a marine mammal stock in the wild by causing a disruption of behavioral patterns including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering.
• Species is threatened rather than endangered.

LOW PRIORITY

• Violations wherein responsible subject is not identifiable.
• Injured or dead animal cannot be located.
• Objective evidence is not obtainable.
• Takes of individual marine mammal species that appear consistent with legal harvest by Alaska Natives.

International/Lacey Act

HIGH PRIORITY

• Felony and major civil violations. For example, interstate or foreign trafficking of commercial quantities of illegally harvested fish or marine resources.
• Harvest or transhipment of marine resources by foreign fishing vessels.
• Domestic or international violations involving seafood safety; substantive mislabeling of product in domestic or international commerce.
• IUU listed vessels.

MEDIUM PRIORITY

• Misdemeanor and civil violations. For example, interstate or foreign trafficking of small quantities of illegally harvested fish or marine resources.
• Mislabeling violations.
• IUU identified product.

LOW PRIORITY

• Minor mislabeling violations.
• Violations wherein responsible subject/vessel not identifiable.

In addition to enforcing legislation for the commercial halibut fishery, OLE has responsibility for enforcement of the crab rationalization program, subsistence halibut fishing and charter halibut fishing. In addition, OLE's officers inspect and cross check landings and processors records for reconciliation, and closely monitor Prohibited Species Catch in non halibut fisheries.[130]

The Alaska Enforcement Division (AKD) uses Enforcement Officers (EO's), Special Agents (SA's) and partnerships with other agencies to provide effective enforcement for over 842,000 square miles of ocean, 6,600 miles of coastline and 2,690 islands off of Alaska. EO's conduct patrols and inspections and provide compliance assistance and SA's investigate civil and criminal violations of marine resource laws.

Compliance Assistance

During FY2014, AKD personnel spent over 1,550 hours providing compliance assistance, outreach/education and public relations with marine resource users. This is a decrease from 2,280 hours in 2013. This includes staffing booths at major organized events in Alaska and Washington as well as daily contacts in communities, ports and harbors and at-sea to ensure that the most current and accurate regulatory information is widely distributed and understood.

Patrol, Monitoring, and Inspections

During this reporting period, AKD personnel spent over 4,600 hours conducting patrols to provide a visible deterrence to potential violators; to monitor fishing and other marine activities; to detect violations; to conduct compliance inspections, and to provide compliance assistance. This is an increase from 3,515 hours in 2013.

Investigations

During this reporting period, AKD personnel opened approximately 547 cases that documented approximately 1,313 violations. Of the 1,313 violations documented, about 340 of the violations (16%) were halibut related.

Halibut Related Violations documented by AKD in 2014:

[130] NOAA's Office of Law Enforcement National and Division Enforcement Priorities for 2012-2017 February 2015 http://www.nmfs.noaa.gov/ole/docs/2015/noaa_ole_priorities_web.pdf

20 Subsistence halibut fishing violations were documented.

- Unqualified person apply for SHARC
- Improperly or unmarked subsistence halibut fishing gear
- Subsistence halibut fishing without SHARC
- Subsistence halibut fishing with too many hooks
- Unlawful sale of, or attempted unlawful sale of subsistence halibut
- Exceeding bag and/or possession limits

166 Commercial IFQ or CDQ halibut violations were documented.

- 27 IFQ halibut overages. There were 10 overages in 2014, 24 in 2012, 31 in 2011 and 41 in 2010.
- Area 4 clearance violations
- Record keeping or reporting violations (PNOL, Landing Report, Logbook)
- Gear marking violations
- Retain undersized halibut
- Filleting halibut onboard commercial vessel
- Hired Skipper and Permit Holder violations
- Vessel Cap Overages
- Misreporting IFQ area fished or fishing in area with no IFQ available

99 Charter halibut fishing violations were documented.

- Logbook violations
- GAF reporting violations
- Filleting, mutilating or skinning halibut onboard a vessel
- Exceeding bag / possession / size limits
- Reports of high-grading

19 Sport halibut fishing violations were documented.

- Sale of, or attempted sale of sport caught halibut
- Exceeding bag and/or possession limits
- Filleting, mutilating or skinning halibut onboard a vessel

36 Commercial fishing violations involving halibut in the ground fish fishery were documented.

- Failed to carefully release or allowed halibut to contact a crucifier or hook stripper before being released.

Halibut Violations

Halibut Related Violations

	2010 Violations Documented by NOAA OLE in Alaska	2011 Violations Documented by NOAA OLE in Alaska	2012 Violations Documented by NOAA OLE in Alaska	2013 Violations Documented by NOAA OLE in Alaska	2014 Violations Documented by NOAA OLE in Alaska
Subsistence Halibut Fishing	15	21	39	37	20
Commercial Halibut Fishing	122	156	95	176	166
Charter Halibut Fishing	25	59	75	47	99
Sport Halibut Fishing	14	24	13	18	19
Other Halibut Related Commercial Fishing	22	19	22	26	36
TOTAL	**198**	**279**	**244**	**304**	**340**

Figure E11.3 Halibut Related Violations[131]

AWT

The Department of Public Safety, Division of Alaska Wildlife Troopers (AWT) is the primary state fish and wildlife resource enforcement agency in the state of Alaska. AWT is the only state enforcement agency with jurisdiction of state and federal lands as well as state waters. AWT also has a Joint Enforcement Agreement (JEA) with NOAA Fisheries Office of Law Enforcement (NOAA/OLE).

Halibut Enforcement:

AWT actively enforces commercial, sport and subsistence halibut fisheries through vessel patrols, dockside monitoring and other investigative processes. AWT conducts boardings at sea for all three halibut fisheries; mostly checking for proper licenses, registrations, logbooks, size and limit restrictions. Dockside monitoring focuses on license and registration verification, size requirements, logbooks and accuracy of catch reports. Public Safety Technicians (PSTs) are the primary resource used to monitor commercial fish off-loads. With the restructuring of the JEA an increased effort was made to monitor sport fish off-loads using AWT troopers.

The Alaska Wildlife Troopers conduct undercover operations in the sport charter fleet. Fines are high and revocation of sport fishing license as well as sport guide licence for several years are occuring penalties in this program.[132]

[131] NOAA Fisheries Office of Law Enforcement Alaska Enforcement Division Report to the International Pacific Halibut Commission January – November 2014
http://iphc.int/meetings/2015am/bb/1306_2_NOAA_OfficeofEnforcement_Alaska.pdf

[132] Alaska Fishery Regulations and Notices. Accessed 2015 www.fakr.noaa.gov/regs/default.htm
US Coast Guard Home page. Accessed 2015 www.uscg.mil/d17/
NOAA. 2015. Individual Fishing Quota (IFQ) Program. Accessed 2015.www.fakr.noaa.gov/ram/ifq.htm
NOAA. 2015. eFISH, eLandings and Subsistence Halibut Permits. Accessed 2015.
www.fakr.noaa.gov/ram/webapps.htm
ADF&G. 2015. eLandings. Home Page. Accessed 2015.http://elandings.alaska.gov/
NOAA. Federal Register / Vol. 76, No. 51 / Wednesday, March 16, 2011 / Rules and Regulations. Accessed 2015.http://www.fakr.noaa.gov/frules/76fr14300.pdf
NOAA Penalty Policy Schedules. Accessed 2015 http://www.gc.noaa.gov/enforce-office3.html

12. There shall be a framework for sanctions for violations and illegal activities of adequate severity to support compliance and discourage violations.

FAO CCRF 7.7.2/8.2.7

Evidence adequacy rating:

☑ **High** ☐ **Medium** ☐ **Low**

Rating determination

The Magnuson-Stevens Act (50CFR600.740 Enforcement policy) provides four basic enforcement remedies for violations: ***1)*** *Issuance of a citation (a type of warning), usually at the scene of the offense,* ***2)*** *Assessment by the Administrator of a civil money penalty,* ***3)*** *for certain violations, judicial forfeiture action against the vessel and its catch,* ***4)*** *Criminal prosecution of the owner or operator for some offenses. In some cases, the Magnuson-Stevens Act requires permit sanctions following the assessment of a civil penalty or the imposition of a criminal fine. The 2011 Policy for the Assessment of Civil Administrative Penalties and Permit Sanctions issued by NOAA Office of the General Counsel – Enforcement and Litigation, provides guidance for the assessment of civil administrative penalties and permit sanctions under the statutes and regulations enforced by NOAA.*

The *Northern Pacific Halibut Act* governs the commercial, sport, charter, and subsistence halibut fisheries in the U.S. The violations in this fishery are reported to and investigated by NOAA's Office of Law Enforcement's Alaska Division and prosecuted by NOAA's Office of General Counsel's Enforcement Section. The maximum civil penalty under the *Northern Pacific Halibut Act* is $200,000 for each violation

The Magnuson-Stevens Act provides four basic enforcement remedies for violations (50CFR600.740 Enforcement policy).

(1) Issuance of a citation (a type of warning), usually at the scene of the offense (see 15 CFR part 904, subpart E).

(2) Assessment by the Administrator of a civil money penalty.

(3) For certain violations, judicial forfeiture action against the vessel and its catch.

(4) Criminal prosecution of the owner or operator for some offenses.

In some cases, the Magnuson-Stevens Act requires permit sanctions following the assessment of a civil penalty or the imposition of a criminal fine. In summary, the Magnuson-Stevens Act treats sanctions against the fishing vessel permit to be the carrying out of a purpose separate from that accomplished by civil and criminal penalties against the vessel or its owner or operator.

Alaska Troopers Reports. Accessed 2015 http://www.alaskawaypoints.com/trooper-report

Magnuson-Stevens Penalty Matrix

	Level of Intent			
Harm to the Resource or Regulatory Program, Offense Level	A Unintentional	B Negligent	C Reckless	D Willful
I	Written warning-$1,000	Written warning-$1,500	Written warning-$2,000	Written warning-$2,500
II	Written warning-$2,000	$2,000-$5,000	$5,000-$10,000	$10,000-$15,000
III	$2,000-$5,000	$5,000-$10,000	$10,000-$15,000	$15,000-$25,000
IV	$5,000-$15,000	$15,000-$25,000	$25,000-$50,000 and permit sanction of 10-20 days*	$50,000-$80,000 and permit sanction of 20-60 days*
V	$15,000-$25,000	$25,000-$50,000 and permit sanction of 10-20 days*	$50,000- $80,000 and permit sanction of 20-60 days*	$60,000- $100,000 and permit sanction of 60-180 days*
VI	$25,000-$50,000	$50,000-$80,000 and permit sanction of 20-60 days*	$60,000-$100,000 and permit sanction of 60-180 days*	$100,000-statutory maximum and permit sanction of 1 year-permit revocation*

Figure E12.1. Magnuson-Stevens Penalty Matrix[133]

On March 16, 2011, NOAA issued a new Penalty Policy that provided guidance for the assessment of civil administrative penalties and permit sanctions under the statutes and regulations enforced by NOAA. In that Policy, the NOAA General Counsel's Office committed to periodic review of the Penalty Policy to consider revisions or modifications as appropriate.

The July 2014 revised version of the Penalty Policy is a result of that review. The purpose of the 2014 Policy is to ensure that: (1) civil administrative penalties and permit sanctions are assessed in accordance with the laws that NOAA enforces in a fair and consistent manner; (2) penalties and permit sanctions are appropriate for the gravity of the violation; (3) penalties and permit sanctions are sufficient to deter both individual violators and the regulated community as a whole from committing violations; (4) economic incentives for noncompliance are eliminated; and (5) compliance is expeditiously achieved and maintained to protect natural resources.

Under the new revised Policy, NOAA expects to continue to promote consistency at a national level, provide greater predictability for the regulated community and the public, maintain transparency in enforcement, and more effectively protect natural resources. The effective date of this Policy was July 1, 2014. This Policy supersedes all previous guidance regarding the assessment of penalties or permit sanctions, and all previous penalty and permit sanction schedules issued by the NOAA Office of the General Counsel. Currently pending cases charged under the March 16, 2011 Penalty Policy,

[133] Magnuson-Stevens Penlty Matrixhttp://www.nmfs.noaa.gov/sfa/reg_svcs/Councils/ccc_2011/Tab%20L%20-%20Enforcement%20Issues/Enforcement%20Issues.pdf

will continue to be governed by that Policy until those cases have been finally adjudicated.
While the overall approach to this revised Penalty Policy remains largely the same, notable changes to the previous Penalty Policy issued on March 16, 2011 include:
(1) Addition of more detail in some penalty schedules to better describe the most commonly occurring violations;
(2) Clearer distinctions among multiple-level violations to ensure consistent application of the Penalty Policy;
(3) Revision of the treatment of prior violations so that prior adjudicated violations older than 5 years are no longer considered an aggravating factor;
(4) Ensuring consistent application of the Penalty Policy to recreational offenses by replacing the commercial/recreational distinction as a penalty adjustment factor with the additional Level I and II penalties that capture recreational violations;
(5) Creating a new penalty adjustment for "such other matters as justice may require" by combining the "Activity After Violation" factor with new considerations.

The new 2014 revised Policy provides guidance for the NOAA Office of the General Counsel, but does not, nor is it intended to, create a right or benefit, substantive or procedural, enforceable at law or in equity, in any person or company. The basis for penalties calculated under this Policy, however, will be included in charging documents filed by the Agency. Further, although this Policy provides guidance regarding the assessment of proposed penalties and permit sanctions, NOAA retains discretion to assess the full range of penalties authorized by statute in any particular case.

For significant violations, the NOAA attorney may recommend charges under NOAA's civil administrative process (*see* 15 C.F.R. Part 904), through issuance of a Notice of Violation and Assessment of a penalty (NOVA), Notice of Permit Sanction (NOPS), Notice of Intent to Deny Permit (NIDP), or some combination thereof. Alternatively, the NOAA attorney may recommend that there is a violation of a criminal provision that is sufficiently significant to warrant referral to a U.S. Attorney's office for criminal prosecution.[134]

The Alaska Region Summary Settlement and fix-it schedule is available at this page http://www.gc.noaa.gov/enforce-office3.html[135] under the Alaska region tab.

The Alaska Wildlife troopers enforce state water regulations. Here below are presented some of the statutes that enable the government to fine, imprison, and confiscate equipment for violations and restrict an individual's right to fish if convicted of a violation.

AS 16.05.165. Form and issuance of citations
AS 16.05.170 Power to execute warrant
AS 16.05.180 Power to search without warrant

[134] Policy for the Assessment of Civil Administrative Penalties and Permit Sanctions NOAA Office of the General Counsel – Enforcement Section
http://www.gc.noaa.gov/documents/Penalty%20Policy_FINAL_07012014_combo.pdf
[135] NOAA Penalty Policy and Schedules. Accessed 2015. http://www.gc.noaa.gov/enforce-office3.html

AS 16.05.190 Seizure and disposition of equipment
AS 16.05.195 Forfeiture of equipment
AS 16.05.332 Wildlife Violator Compact
AS.16.05.410 Revocation of license
AS 16.05.710 Suspension of Commercial License and Entry Permit
AS 16.05.722 Strict liability commercial fishing penalties
AS 16.05.723 Misdemeanor commercial fishing penalties
AS 16.05.896 Penalty for causing material damage
AS 16.05.901 Penalty for violations of AS 16.05.871 – AS 16.05.896.
AS 16.05.030 Penalty for violation of 16.10.010-16.10.050
AS 16.10.090 Penalty for violation of AS 16.10.090
AS 16.10.220 Penalty for violation of AS 16.10-200-16.1-.210
AS 16.10.790 Fines
AS 16.40.290 Penalty
AS 16.43.960 Commission revocation or suspension of permits
AS 16.43.970 Penalties

These are under Alaska Statutes Title 16 (laws); Alaska Administrative Code Title 5 (regulations).[136]

Finally, the cooperation of citizens and industry is cultivated through programs such as AWT's Fish & Wildlife Safeguard program, which encourages the reporting of violations, and "leverages" the range of enforcers.

At each of the five annual Council meetings, representatives of the USCG, OLE, NMFS, ADFG and AWT meet in an Enforcement Meeting where enforcement concerns with plan amendments are discussed and materials relating to those concerns are prepared for the Council. During staff reports to the Council the USCG and the OLE present information about vessel boardings and enforcement violations by the fishing industry that occurred since the last Council meeting.[137]

[136] The Alaska State Legislature. Accessed 2015 http://www.legis.state.ak.us/basis/aac.asp#TitleTable
[137] 50CFR600.740 Enforcement policy
NOAA. Update of NOAA Fisheries Enforcement Programs and Operations. Accessed 2015.http://www.nmfs.noaa.gov/sfa/reg_svcs/Councils/ccc_2011/Tab%20L%20-%20Enforcement%20Issues/Enforcement%20Issues.pdf

F. Serious Impacts of the Fishery on the Ecosystem

13. Considerations of fishery interactions and effects on the ecosystem shall be based on best available science, local knowledge where it can be objectively verified and using a risk based management approach for determining most probable adverse impacts. Adverse impacts on the fishery on the ecosystem shall be appropriately assessed and effectively addressed.

FAO CCRF 7.2.3/8.4.7/8.4.8/12.11
Eco 29.3/31

Evidence adequacy rating:

☑ **High** ☐ **Medium** ☐ **Low**

Rating determination

The IPHC, NPFMC and NOAA/NMFS conduct assessments and research related to fishery impacts ecosystems and habitats and how environmental factors affect the fishery. Findings and conclusions are published in the Ecosystem section of the SAFE document, annual Ecosystem Considerations documents, and the various other research reports. The Essential Fish Habitat Environmental Impact Statement (EFH EIS) (NMFS, 2005) concluded that the benthic longline fishery has minimal or temporary impacts on halibut habitat. Various studies have applied ecosystem models to food webs and impacts of climate change. Halibut have low discard rates, but high PSC rates in other fisheries and discussions are underway between the agencies to put inplace additional regulatory measures to avoid halibut and further minimize halibut bycatch mortality. The directed halibut fishery takes significant amounts of grenadiers, arrowtooth flounder, spiny dogfish, sharks and some rockfish; but the fishery does not pose a threat to bycatch species. Management measures limit interactions with seabirds and the fishery has minimal impact on the short-tailed albatross, the only seabird listed as endangered under the ESA. Interactions with whales remain a problem as they take fish off longline gear, but the fishery does not adversely affect whale populations.

1. Research and Institutional capacity

The International Pacific Halibut Commission (IPHC), originally called the International Fisheries Commission, was established in 1923 by a Convention between the governments of Canada and the United States of America. Its mandate is research on and management of the stocks of Pacific halibut (*Hippoglossus stenolepis*) within the Convention waters of both nations. The IPHC conducts numerous projects annually to support both major mandates: stock assessment and basic halibut biology. Current projects include standardized stock assessment fishing surveys from northern California to the end of the Aleutian Islands, as well as field sampling in major fishing ports to collect scientific information from the halibut fleet. In conjunction with these ongoing programs, the IPHC conducts numerous biological and scientific experiments to further the understanding and information about Pacific halibut.

NPFMC and NOAA/NMFS conduct research on environmental factors as affected by the commercial halibut fishery and associated species and their habitats. Findings and conclusions are published annually in the Ecosystem Considerations section of the SAFE report. [138]

2. Ecosystem considerations

The North Pacific Fisheries Management Council gathered data from the North Pacific atmosphere-

[138] NPFMC. Ecosystem Consideration Report 2014. Accessed 2015. http://www.afsc.noaa.gov/REFM/Docs/2014/ecosystem.pdf

ocean system during 2013-2014 and reported on Ecosystem considerations for the area. Physical and Environmental Trends, Ecosystem Trends, and Fishing and Fisheries Trends were reported on. [139]

3. Fishery Interaction with the ecosystem

a. Gear habitat interactions

Benthic longline is considered a passive gear (not towed). There are no serious, irreversible concerns of halibut gear interaction on the habitat that are presented in the recent (2010) NPFMC Essential Fish Habitat review. [140]

b. Ecosystem modeling

Earlier ecosystem research (NOAA, 2002) developed ECOPATH trophic web models that included halibut and applied ecosystem modeling for fishery sustainability (NOAA/ AFSC, 2006). These models primarily use a food web approach with dynamic equations describing predator-prey interactions as has been used in many other fished marine ecosystems. Other scientists evaluated impacts of climate change on West Coast sablefish. They used models to include environmental variability directly into stock assessments and to demonstrate how it can affect estimation of recruitment parameters, stock status, and conservation benchmarks (Shrippa, et al. 2009).

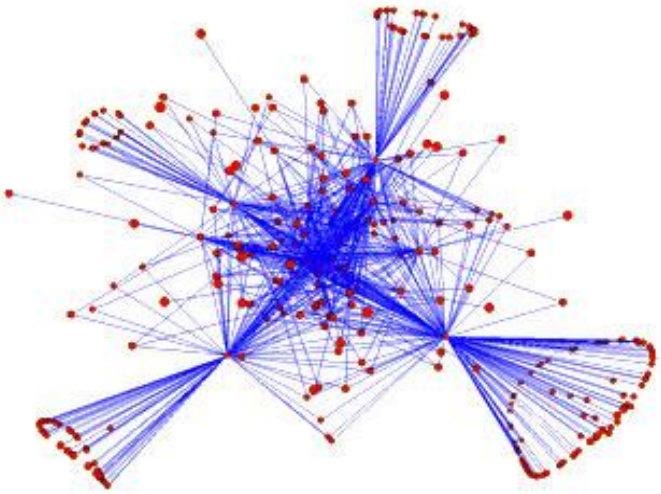


Figure F13.1 Food web constructed from the GOA food habits database, where each species is a node (dots) and each predator-prey interaction is a link (lines). The four "hubs" apparent in the figure are cod, pollock, halibut, and arrowtooth flounder. (NOAA / AFSC, 2006).[141]

c. Discards

The removals of Pacific halibut accounted for in the International Pacific Halibut Commission (IPHC) stock assessment include commercial and sport catch, personal use (ceremonial and subsistence), and the incidental mortality of halibut from the commercial halibut fisheries (wastage) and other commercial fisheries (bycatch). Commercial fishery wastage includes 1) halibut that are smaller than the commercial minimum size (≤81.3 cm or or <32 inches) that must be released by regulation but subsequently die, 2) fish of all sizes estimated to have been captured by fishing gear that was

[139] NPFMC. Ecosystem Consideration Report 2014. Accessed 2015. http://www.afsc.noaa.gov/REFM/Docs/2014/ecosystem.pdf

[140] NPFMC Essential Fish Habitat (EFH) 5-year Review for 2010 Summary Report FINAL http://www.fakr.noaa.gov/habitat/efh/review/efh_5yr_review_sumrpt.pdf

[141] NOAA Technical Memorandum NMFS-AFSC-130 A Comparison of the Eastern Bering and Western Bering Sea Shelf and Slope Ecosystems Through the Use of Mass-Balance Food Web Models http://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-130.pdf

subsequently lost or abandoned during fishing operations, 3) fish that are discarded for regulatory reasons (e.g., the vessels trip limit has been exceeded). The methods applied to produce each of these estimates differ due to the amount and quality of the information available. The wastage mortality of halibut 26 inches and longer, including O32 halibut and halibut between 26 and 32 inches (U32/026), are directly deducted to determine the fishery CEY; and the mortality of halibut under 26 inches is accounted for in the removals in the stock assessment and in the exploitation rates in the harvest policy. The intent of the division of U26/O26 is to standardize the treatment of removals, given that sport and personal use fishery removals are directly deducted when setting catch limits.[142] Refer to page 49 Table B4.3 for more details on Halibut discard mortality [143].

d. Bycatch

Prohibitied Species Catches

Halibut exploitable biomass and yield to the halibut fishery has declined substantially in the Bering Sea/Aleutian Islands (BSAI) since 2000, however bycatch mortality has not declined by comparable magnitude (Fig. 1). By individual IPHC regulatory areas, the bycatch mortality in the central and western Bering Sea (IPHC Areas 4A, 4B) has declined but in the eastern Bering Sea (IPHC Area 4CDE) has increased substantially since 2011 (Fig. 2). The halibut PSC limits for the BSAI have not been reduced in any significant way over this period and as a result, the Commission has been forced to reduce the catch limits for the directed halibut fishery, particularly in Area 4CDE (Fig. 3). This has been necessary to accommodate an increasing proportion of the available halibut yield being taken through bycatch mortality and to achieve the necessary conservation goals for this area.[144]

At its June 2015 meeting, the NPFMC tasked the Council Chair and the Executive Director to evaluate ways to integrate the variety of halibut management and research activities underway by the Council and the IPHC, to develop a framework for improving coordination between the two bodies, and to come back with recommendations for next steps at its October 2015 meeting. The Council also requested that the Amendment 80 sector provide halibut bycatch management plans for 2016 at its December 2015 meeting.[145]

[142] Incidental mortality of halibut in the commercial halibut fishery (Wastage) Gilroy and Stewart IPHC REPORT OF ASSESSMENT AND RESEARCH ACTIVITIES 2014
http://www.iphc.int/publications/rara/2014/rara2014_05incidentalmortality.pdf

[143] Gilroy, H.L. and Stewart, I.J. 2015. Incidental mortality of halibut in the commercial halibut fishery (Wastage). Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 87-160.http://www.iphc.int/publications/rara/2014/rara2014_05incidentalmortality.pdf

[144] IPHC letter to North Pacific Fishery Management Council regarding PSC limitshttp://www.iphc.int/documents/bycatch/IPHC2NPFMC_PSClimitJune2015b.pdf

[145] National Marine Fisheries Service response to IPHC letter http://www.iphc.int/nr/2015/nr20150704_1.pdf

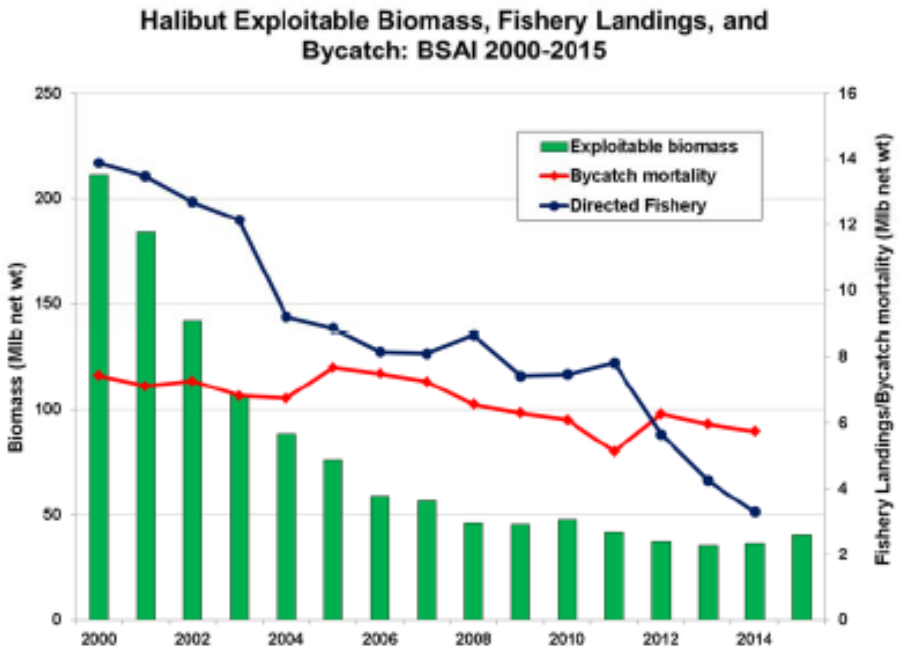


Figure 1. Trends in halibut exploitable biomass, bycatch mortality and directed halibut fishery catch limits in the BSAI, 2000-2015.

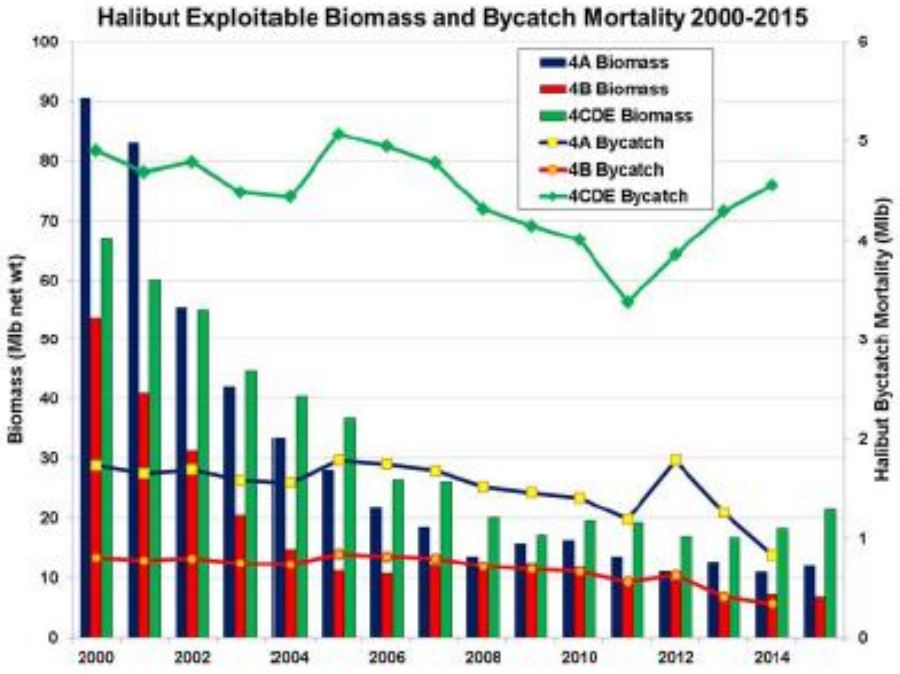


Figure 2. Trends in halibut exploitable biomass, bycatch mortality and directed halibut fishery catch limits by IPHC Regulatory Area, 2000-2015.

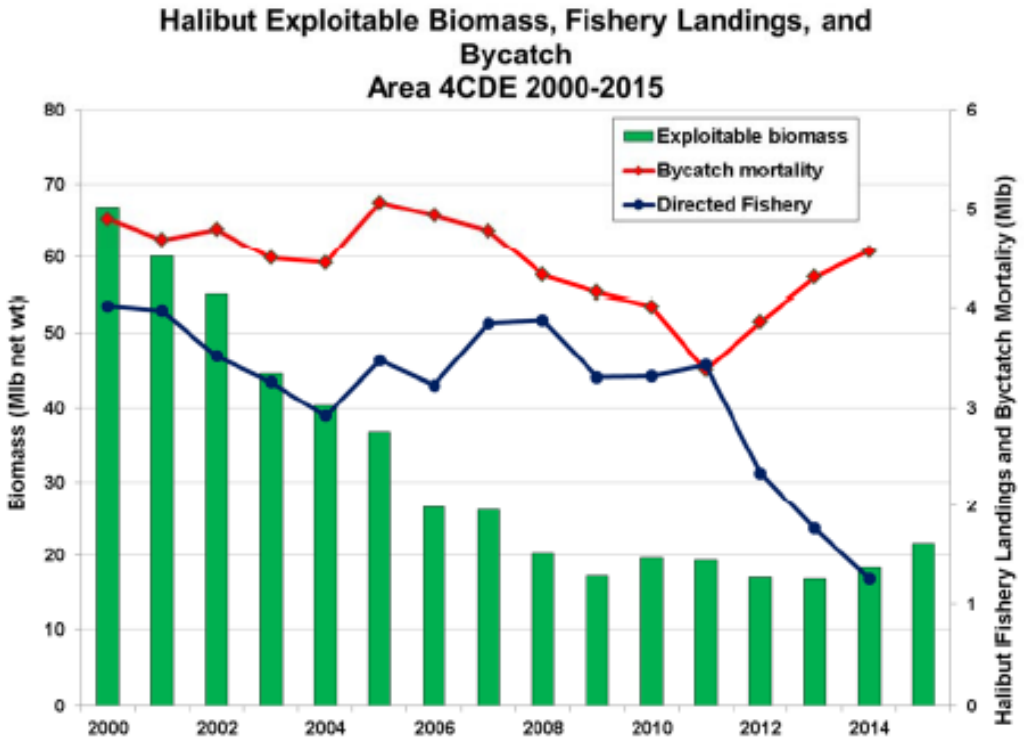


Figure 3. Trends in halibut exploitable biomass, bycatch mortality and directed halibut fishery catch limits in IPHC Regulatory Area 4CDE, 2000-2015.

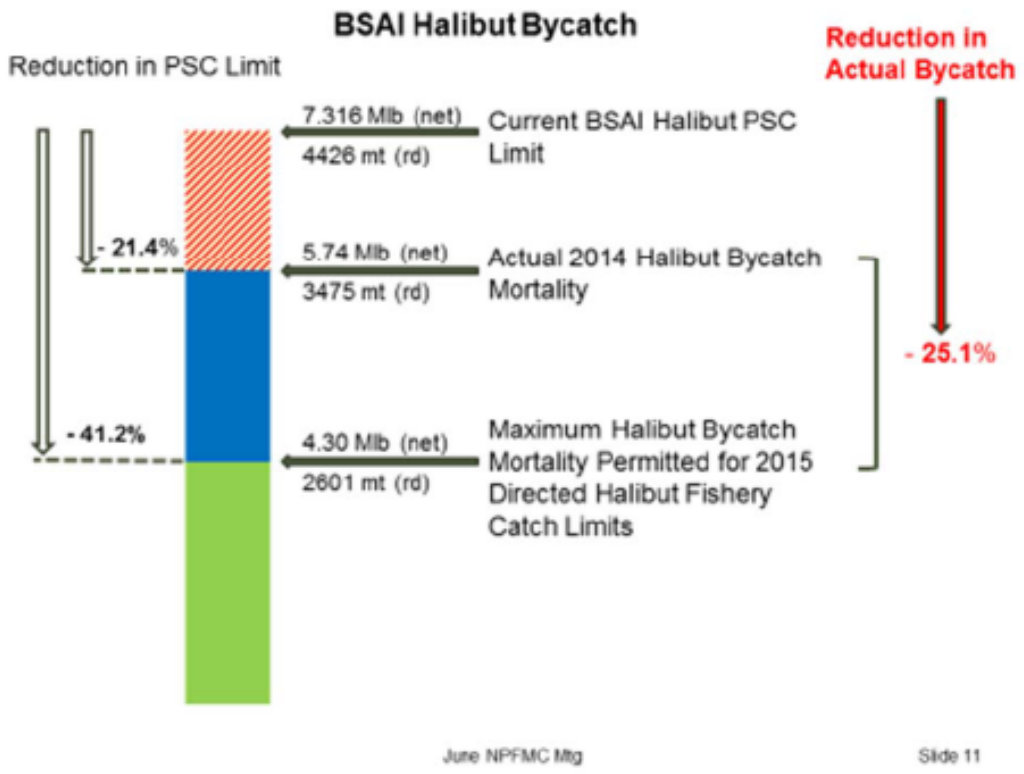


Figure 4. Relationship of BSAI halibut PSC limits, actual 2014 bycatch mortality, and reduction of bycatch mortality required to support 2015 IPHC directed fishery catch limits.

Setline survey

Approximately 121 species of fish and invertebrates were caught as bycatch during the survey. Though skippers on survey vessels take precautions to avoid marine mammal and bird catch, one black-footed albatross (*Phoebastria nigripes*) was captured in 3B and was provided to the Oikonos organization for genetic sampling. No marine mammals were caught on survey. Hook occupancy of species-groups varied by regulatory area (Fig. 14). Halibut was the most commonly-caught species coastwide. The most frequently incidentally-captured species overall was sharks, followed by Pacific cod (Fig. 14). The most common bycatch in Areas 2A and 2B was sharks, primarily dogfish. The most frequent bycatch in Areas 3B, 4A, 4C, and 4D was Pacific cod. In Areas 2C, 3A, and 4B, the "other species" category was most common, and was comprised primarily of Aleutian skates (*Bathyraja aleutica*), arrowtooth flounder (*Atheresthes stomias*), big skates (*Raja binoculata*), longnose skates (*Raja rhina*), white-blotched skates (*Bathyraja maculata*), grenadiers (*Corypaenoididae spp.),* and yellow Irish lord sculpins (*Hemilepidotus jordani*).

Dogfish were the largest component of the shark species category in Areas 2A (96%), 2B (99%), 2C (94%), and 3A (98%). Sleeper sharks were the largest component of the shark species category in Areas 3B (53%), 4A (57%), and 4D (100%).

Trends in bycatch NPUE are presented in Figures F13.4 through F13.5. Bocaccio (*Sebastes paucispinus*), canary rockfish (*S. pinniger*), and yelloweye rockfish (*S. ruberrimus*) populations are of concern in Areas 2A, 2B, and 2C, and their numbers often drive catch regulations. Catch rates of bocaccio and canary rockfish are so low on IPHC surveys (Fig. F13.4) that it is difficult to make any inferences from them. Trends in bycatch NPUE over the last ten years for the other major incidentally-captured species and species groups show that the encounter rate for most remained relatively constant over time (Figs. F13.4-F13.5).

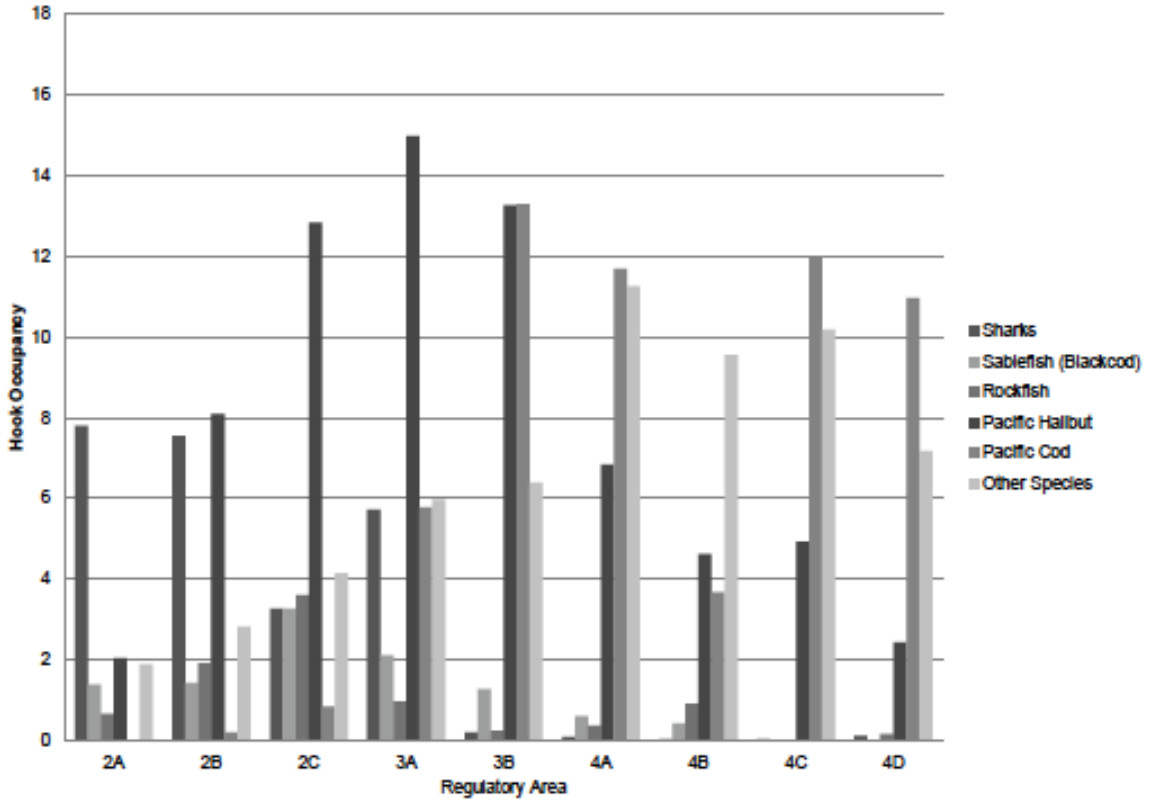


Figure F13.3 Percent hook occupancy by major species categories from catches in the 2014 setline survey by regulatory area.

Bocaccio

Regulatory Area	Trend	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
2A		0	0	0	0.012	0	0	0.009	0	0	0
2B		0.013	0.036	0.019	0.038	0.02	0.011	0.023	0.014	0.0049	0.011
2C		0.012	0.014	0.008	0.012	0	0	0.054	0	0.0066	0

Canary rockfish

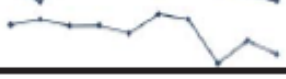
Regulatory Area	Trend	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
2A		0.043	0.012	0.024	0.024	0	0.037	0.017	0.006	0.0049	0.009
2B		0.058	0.062	0.024	0.044	0.058	0.026	0.034	0.017	0.0588	0.029
2C		0.036	0.02	0.106	0.089	0.071	0.144	0.047	0.048	0.0863	0.097

Yelloweye rockfish

Regulatory Area	Trend	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
2A		0.238	0.238	0.238	0.346	0.163	0.179	0.14	0.204	0.1711	0.19
2B		1.007	1.016	0.823	1.004	1.158	1.286	0.952	0.861	0.8479	0.601
2C		2.149	1.699	1.496	0.997	1.325	1.614	1.173	1.381	1.2874	1.389
3A		0.377	0.374	0.212	0.609	0.421	0.51	0.427	0.501	0.3189	0.456

Figure 13.4 Ten-years of NPUE (numbers per standardized 100-hook skate) for bocaccio, canary rockfish, and yelloweye rockfish on SSA surveys in Regulatory Areas 2A, 2B, 2C, and 3A. No bocaccio or canary rockfish were captured in Regulatory Area 3A.

Arrowtooth flounder

Regulatory Area	Trend	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
2A		0.06	0.13	0.12	0.16	0.13	0.11	0.05	0.26	0.25	0.07
2B		1.38	1.03	0.83	1.31	1.59	1.46	1.18	0.94	0.72	0.76
2C		1.27	1.45	1.18	1.53	1.69	1.36	0.96	0.96	0.88	0.87
3A		1.2	1.07	1.42	1.32	1.73	1.2	1.25	1.17	0.95	1.07
3B		3.67	2.97	2.21	2.32	1.23	1.45	1.34	0.5	0.76	1.24
4A		1.07	1.44	0.97	1.92	2.02	0.97	1.14	1.07	0.58	0.83
4D		1.68	0.68	2.42	3.26	1.69	1.4	2.48	1.4	1.05	0.74
4B		1.11	1.24	1.09	1.1	0.94	1.35	1.23	0.29	0.78	0.48

Sablefish (Blackcod)

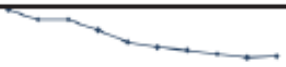
Regulatory Area	Trend	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
2A		6.81	5.58	5.59	4.34	2.8	2.19	1.81	1.36	0.92	1.08
2B		4.21	2.87	2.38	2.81	2.81	2.98	2.61	1.88	2.18	1.44
2C		5.05	4.84	3.7	3.84	2.92	3.31	4.36	3.26	3.96	3.2
3A		3.8	3.03	3.03	2.65	3.58	2.97	2.93	2.34	1.82	2.09
3B		3.56	2.9	2.84	2.71	2.57	2.11	3.03	1.91	1.04	1.27
4A		1.34	0.92	0.78	0.98	0.54	0.82	0.7	0.8	0.77	0.44
4D		0.12	0.1	0.05	0.1	0.14	0.02	N/A	0.03	0.1	0.02
4B		1.43	0.49	0.66	0.43	0.27	0.27	0.44	0.51	0.46	0.43

Figure F13.5 Ten-years of NPUE (numbers per standardized 100-hook skate) for arrowtooth flounder and sablefish on IPHC surveys.[146]

Status of bycatch species

Harbor seal (*Phoca vitulina*): IUCN Red list "Least Concern".[147]

[146] IPHC 2014 Standardized stock assessment survey http://www.iphc.int/publications/rara/2014/rara2014_33ssasurvey.pdf

[147] IUCN Redlist http://www.iucnredlist.org/details/17013/0

Pacific cod (*Gadus macrocephalus*): From NPFMC SAFE reports: BSAI and GOA stocks above B35% reference points, not overfished. [148]

The GOA shark complex (spiny dogfish, Pacific sleeper shark, salmon shark and other/unidentified sharks) in the Gulf of Alaska (GOA) is assessed on a biennial stock assessment schedule. For 2015 the NOAA recommend maximum allowable ABC of 5,989 t and an OFL of 7,986 t for the shark complex. Catch in 2013 was 2,165 t and in 2014 was 954 t (as of October 1, 2014). Prior to the 2013 Observer Restructuring, on average 23% of total shark catch occured after October 1. In 2013, 58% of the shark catch occurred after October 1. The complex was not subjected to overfishing last year. The ABC/OFL for the shark complex is the sum of the computations for the individual species. A Tier 5 approach is used for calculations of spiny dogfish, where exploitable biomass (B) is equal to the average of the biomass estimates from the last three trawl surveys (2009, 2011, 2013), the OFL = M*B, and the ABC = 0.75*OFL. The remaining shark species follow a traditional Tier 6 approach with the OFL = average historical catch (1997 – 2007) and the ABC = 0.75*OFL.

[148] NPFMC. 2014. 2. Assessment of the Pacific cod stock in the Gulf of Alaska. Accessed 2015. SAFE http://www.afsc.noaa.gov/REFM/Docs/2014/GOApcod.pdf
NPFMC. 2014. 2. Assessment of the Pacific cod stock in the Aleutian Islands. Accessed 2015. SAFE http://www.afsc.noaa.gov/REFM/Docs/2014/aipcod.pdf
NPFMC. 2014. 2. Assessment of the Pacific cod stock in the Eastern Bearing Sea. Accessed 2015. SAFE http://www.afsc.noaa.gov/REFM/Docs/2014/EBSpcod.pdf

Spiny Dogfish Quantity	As estimated or *specified last* year for: 2014	 2015	As estimated or *recommended this* year for: 2015	 2016
M (natural mortality rate)	0.097	0.097	0.097	0.097
Tier	6*	6	6	6
Biomass (t)	76,452	76,452	76,452	76,452
F_{OFL}	0.097	0.097	0.097	0.097
$maxF_{ABC}$	0.073	0.073	0.073	0.073
F_{ABC}	0.073	0.073	0.073	0.073
OFL (t)	7,416	7,416	**7,416**	7,416
maxABC (t)	5,562	5,562	5,562	5,562
ABC (t)	5,562	5,562	**5,562**	5,562
Status	As determined *last* year for: 2012	 2013	As determined *this* year for: 2013	 2014
Overfishing		n/a		n/a

*While spiny dogfish are a Tier 6 species, a Tier 5 approach is used. They are not in Tier 5 because the trawl survey biomass is not considered reliable for the species.

Pacific sleeper, salmon and other sharks Quantity	As estimated or *specified last* year for: 2014	 2015	As estimated or *recommended this* year for: 2015	 2016
Tier	6	6	6	6
OFL (t)	571	571	**571**	571
maxABC (t)	427	427	427	427
ABC (t)	427	427	**427**	427
Status	As determined *last* year for: 2012	 2013	As determined *this* year for: 2013	 2014
Overfishing		n/a		n/a

Summaries for Plan Team

Species	Year	Biomass[1]	OFL[2]	ABC[2]	TAC	Catch[3]
Shark Complex	2013	76,979	8,037	6,028	6,028	2,165
	2014	76,452	7,986	5,989	5,989	954
	2015	76,452	7,986	5,989		
	2016	76,452	7,986	5,989		

[1]This is spiny dogfish biomass only, because the biomass estimates for the remaining shark species in the complex are not used for ABC and OFL calculations. The biomass used for the spiny dogfish ABC and OFL calculations for 2014 - 2016 is the average of the 3 most recent trawl survey biomasses (2009, 2011, and 2013).
[2]ABC and OFL are the sum of the individual species recommendations, Tier 6 (avg catch 1997-2007) for Pacific sleeper shark, salmon shark and other/unidentified sharks and a modified Tier 6 (biomass * M) for spiny dogfish.
[3]Catch as of October 1, 2014.

Figure F13.6 GOA Shark Complex reference points [149]

BSAI Shark Complex

For 2014 NOAA recommend the maximum allowable ABC of 454 t and an OFL of 605 t for the shark complex. Catch in 2013 was 116 t and 118 t in 2014 as of November 20, 2014. The stock complex was not subject to overfishing last year, and data do not exist to determine if the species in the complex are overfished.

ABC and OFL calculations and Tier 6 recommendations for 2014 - 2015. OFL = average shark catch from 1997 - 2007. ABC = OFL*0.75.

[149] NPFMC. 2014. 2. Assessment of the Shark complex in the Gulf of Alaska. Accessed 2015. SAFE http://www.afsc.noaa.gov/REFM/Docs/2014/GOAshark.pdf

Quantity	As estimated or *specified last* year for: 2014	2015	As estimated or *recommended this* year for: 2015	2016
Tier	6	6	6	6
OFL (t)	1,363	1,363	**605**	605
maxABC (t)	1,022	1,022	454	454
ABC (t)	1,022	1,022	**454**	454
Status	As determined *last* year for: 2012	2013	As determined *this* year for: 2013	2014
Overfishing	No	n/a	No	n/a

Summaries for Plan Team

Species	Year	Biomass[1]	OFL	ABC	TAC	Catch[2]
Shark Complex	2013		1,363	1,022	100	116
	2014		1,363	1,022	125	118
	2015		605	454		
	2016		605	454		

[1]The shark complex in the BSAI is a Tier 6 complex with no reliable estimates of biomass
[2]Catch as of November 20, 2014

Figure F13.7 BSAI Shark complex reference points [150]

Arrowtooth flounder (*Atheresthes stomias)*: From NPFMC SAFE reports: BSAI and GOA stocks above B35% reference points, not overfished.[151]

GOA Skate Complex

The Gulf of Alaska (GOA) skate complex is managed as three units. Big skate (*Beringraja binoculata*) and longnose skate (*Raja rhina*) have separate harvest specifications, with gulfwide overfishing levels (OFLs) and Acceptable Biological Catches (ABCs) specified for each GOA regulatory area (western, central, and eastern). All remaining skate species are managed as an "Other Skates" group, with gulfwide harvest specifications. All GOA skates are managed under Tier 5, where OFL and ABC are based on survey biomass estimates and natural mortality rate. Normally, only an executive summary is prepared in even years; because the federal shutdown in 2013 resulted in a truncated stock assessment process, a full assessment was prepared in 2014.

Summary of Results

1) The 2013 survey biomass estimates for longnose skate and "other skates" increased substantially relative to the 2011 estimate, with CVs similar to earlier years. The estimate for longnose skates is the highest in the 1984-2013 time series.

2) The 2013 survey biomass estimate for big skate was down considerably from 2011, when the biomass estimate was inflated by an anomalous single large tow of big skates in the EGOA during the 2011 survey. The 2013 estimate for the WGOA was the highest since 1999, while the estimate for

[150] NPFMC. 2014. 2. Assessment of the Shark Complex in the Bearing Sea and Aleutian Islands. Accessed 2015. SAFE http://www.afsc.noaa.gov/REFM/Docs/2014/BSAIshark.pdf

[151] NPFMC. 2014. 2. Assessment of the Arrowtooth flounder stock in the Bearing Sea and Aleutian Islands. Accessed 2015. SAFE http://www.afsc.noaa.gov/REFM/Docs/2014/BSAIatf.pdf
NPFMC. 2014. 2. Assessment of the Arrowtooth flounder stock in the Gulf of Alaska. Accessed 2015. SAFE http://www.afsc.noaa.gov/REFM/Docs/2014/GOAatf.pdf

the CGOA, where the majority of big skate biomass is typically observed, decreased by almost half.

3) Application of the RE model to the survey data for big, longnose, and "other skates" provided reliable estimates of biomass that the author considers superior to the 3-survey averages used in previous assessments. Therefore, the RE estimates were used in developing harvest recommendations.

4) Estimates of incidental catches increased substantially for longnose skates and "other skates" in 2013, mainly in the IFQ halibut target fishery. It is likely that this increase in estimated catch is due to the addition of observer coverage in the IFQ halibut fishery in 2013.

5) In 2013 the catch of big skates in the CGOA exceeded the ABC for that area, as it has every year since 2010.

6) Catches in 2014 are on track to be much lower than in the preceding years. This is likely due to the fact that skates were placed on prohibited status early in 2014 as a result of the catch overages in earlier years.

big skate (*Beringraja binoculata*)					
		As estimated or *specified last* year for		As estimated or *recommended this* year for:	
Quantity		*2014*	*2015*	**2015**	2016
M (natural mortality)		*0.1*	*0.1*	**0.1**	0.1
Specified/recommended Tier		*5*	*5*	**5**	5
Biomass (t) *2015/2016 recommendations are made using the random effects model; 2014/2015 recommendations used the 3-survey average*	W	*7,857*	*7,857*	**9,775**	9,775
	C	*20,421*	*20,421*	**16,810**	16,810
	E	*21,877*	*21,877*	**16,954**	16,954
	GOA-wide[1]	*50,155*	*50,155*	**43,398**	43,398
F_{OFL} (F=M)		*0.1*	*0.1*	**0.1**	0.1
$maxF_{ABC}$		*0.075*	*0.075*	**0.075**	0.075
F_{ABC}		*0.075*	*0.075*	**0.075**	0.075
OFL (t)	GOA-wide	*5,016*	*5,016*	**4,340**	4,340
ABC (t; equal to maximum ABC)	W	*589*	*589*	**731**	731
	C	*1,532*	*1,532*	**1,257**	1,257
	E	*1,641*	*1,641*	**1,267**	1,267
Status		As determined *last* year for: 2012	2013	As determined *this* year for: **2013**	2014
Overfishing?		*no*	*na*	**no**	na
(for Tier 5 stocks, data are not available to determine whether the stock is in an overfished condition)					

[1] The GOA-wide biomass estimate was made using a separate GOA-wide random-effects model, so the sum of the area-specific estimates does not equal the GOA-wide estimate.

longnose skate (*Raja rhina*)					
		As estimated or *specified last* year for		As estimated or *recommended this* year for:	
Quantity		*2014*	*2015*	**2015**	2016
M (natural mortality)		*0.1*	*0.1*	**0.1**	0.1
Specified/recommended Tier		*5*	*5*	**5**	5
Biomass (t) *2015/2016 recommendations are made using the random effects model; 2014/2015 recommendations used the 3-survey average*	W	*1,427*	*1,427*	**2,009**	2,009
	C	*25,806*	*25,806*	**27,575**	27,575
	E	*11,116*	*11,116*	**12,873**	12,873
	GOA-wide[1]	*38,349*	*38,349*	**42,911**	42,911
F_{OFL} (F=M)		*0.1*	*0.1*	0.1	0.1
$maxF_{ABC}$		*0.075*	*0.075*	0.075	0.075
F_{ABC}		*0.075*	*0.075*	0.075	0.075
OFL (t)	GOA-wide	*3,835*	*3,835*	**4,291**	4,291
ABC (t; equal to maximum ABC)	W	*107*	*107*	**152**	152
	C	*1,935*	*1,935*	**2,090**	2,090
	E	*834*	*834*	**976**	976
		As determined *last* year for:		As determined *this* year for:	
Status		2012	2013	**2013**	2014
Overfishing?		*no*	*n/a*	**no**	n/a
(for Tier 5 stocks, data are not available to determine whether the stock is in an overfished condition)					

[1] The GOA-wide biomass estimate was made using a separate GOA-wide random-effects model, so the sum of the area-specific estimates does not equal the GOA-wide estimate.

other skates (*Bathyraja* sp.)					
		As estimated or *specified last* year for		As estimated or *recommended this* year for:	
Quantity		*2014*	*2015*	**2015**	2016
M (natural mortality)		*0.1*	*0.1*	**0.1**	0.1
Specified/recommended Tier		*5*	*5*	**5**	5
Biomass (t)	GOA-wide	26,518	26,518	**29,797**	29,797
F_{OFL} (F=M)		0.1	0.1	**0.1**	0.1
$maxF_{ABC}$		0.075	0.075	**0.075**	0.075
F_{ABC}		0.075	0.075	**0.075**	0.075
OFL (t)	GOA-wide	2,652	2,652	**2,980**	2,980
ABC (t; equal to maximum ABC)	GOA-wide	1,989	1,989	**2,235**	2,235
		As determined *last* year for:		As determined *this* year for:	
Status		2012	2013	**2013**	2014
Overfishing?		*no*	*na*	**no**	na
(for Tier 5 stocks, data are not available to determine whether the stock is in an overfished condition)					

Figure F13. 8 GOA Skate complex reference points [152]

[152] NPFMC. 2014. 2. Assessment of the Skate complex in the Gulf of Alaska. Accessed 2015. SAFE http://www.afsc.noaa.gov/REFM/Docs/2014/GOAskate.pdf

BSAI Skate Complex

The Bering Sea and Aleutian Islands (BSAI) skate complex is managed in aggregate, with a single set of harvest specifications applied to the entire complex. However, to generate the harvest recommendations the stock is divided into two units. Harvest recommendations for Alaska skate *Bathyraja parmifera*, the most abundant skate species in the BSAI, are made using the results of an age structured model and Tier 3. The remaining species ("other skates") are managed under Tier 5 due to a lack of data. The Tier 3 and Tier 5 recommendations are combined to generate recommendations for the complex as a whole.

Alaska skate harvest recommendations

Quantity	As estimated or *specified last* year for: 2014	2015	As estimated or *recommended this* year for: 2015	2016
M (natural mortality rate)	*0.13*	*0.13*	**0.13**	0.13
Tier	*3a*	*3a*	**3a**	3a
Projected total (age 0+) biomass (t)	*603,520*	*579,785*	**528,391**	498,957
Female spawning biomass (t)				
Projected	*185,076*	*178,762*	**115,490**	112,195
$B_{100\%}$	*266,810*	*266,810*	**186,923**	186,923
$B_{40\%}$	*106,724*	*106,724*	**74,769**	74,769
$B_{35\%}$	*93,384*	*93,384*	**65,423**	65,423
F_{OFL}	*0.113*	*0.113*	**0.090**	0.090
maxF_{ABC}	*0.098*	*0.098*	**0.077**	0.077
F_{ABC}	*0.098*	*0.098*	**0.077**	0.077
OFL (t)	*32,381*	*30,278*	**39,883**	37,343
maxABC (t)	*28,282*	*26,444*	**34,389**	32,199
ABC (t)	*28,282*	*26,444*	**34,389**	32,199
Status	As determined *last* year for: 2012	2013	As determined *this* year for: 2013	2014
Overfishing	No	n/a	**No**	n/a
Overfished	n/a	No	**n/a**	No
Approaching overfished	n/a	No	**n/a**	No

other skate harvest recommendations

Quantity	As estimated or *specified last* year for: 2014	2015	As estimated or *recommended this* year for: 2015	2016
M (natural mortality rate)	*0.1*	*0.1*	**0.1**	0.1
Tier	*5*	*5*	**5**	5
Biomass (t)	*94,684*	*94,684*	**96,923**	96,923
F_{OFL}	*0.1*	*0.1*	**0.1**	0.1
maxF_{ABC}	*0.075*	*0.075*	**0.075**	0.075
F_{ABC}	*0.075*	*0.075*	**0.075**	0.075
OFL (t)	*9,468*	*9,468*	**9,692**	9,692
maxABC (t)	*7,101*	*7,101*	**7,269**	7,269
ABC (t)	*7,101*	*7,101*	**7,269**	7,269
Status	As determined *last* year for: 2012	2013	As determined *this* year for: 2013	2014
Overfishing	No	n/a	**No**	n/a

aggregate harvest recommendations for the BSAI complex

Quantity	As estimated or *specified last* year for: 2014	2015	As estimated or *recommended this* year for: 2015	2016
OFL (t)	**41,849**	39,746	**49,575**	47,035
ABC (t)	**35,383**	33,545	**41,658**	39,468

Figure F13.9 BSAI Skate complex reference points [153]

Grenadier

[153] NPFMC. 2014. 2. Assessment of the Skate complex in the Bearing Sea and Aleutian Islands. Accessed 2015. SAFE http://www.afsc.noaa.gov/REFM/Docs/2014/BSAIskate.pdf

For 2015, the maximum allowable ABC for the BSAI is 75,274 t and for the GOA is 30,691 t. This ABC is a 12% increase for the BSAI and a 12% decrease for the GOA. The corresponding reference values for grenadier are summarized in the following tables, with the recommended ABC and OFL values in bold. Overfishing is not occurring in either the BSAI or GOA.

Gulf of Alaska Grenadiers

Quantity	As estimated or specified *last* year for[a]: 2014	2015	As estimated or recommended *this* year for: 2015	2016
M (natural mortality)	0.078	0.078	0.078	0.078
Specified/recommended Tier	5	5	5	5
Biomass (t)	597,884	597,884	524,624	524,624
F_{OFL} (F=M)	0.078	0.078	0.078	0.078
$maxF_{ABC}$ (maximum allowable = 0.75x F_{OFL})	0.0585	0.0585	0.0585	0.0585
F_{ABC}	0.0585	0.0585	0.0585	0.0585
OFL (t)	**46,635**	46,635	**40,921**	40,921
maxABC (t)	34,976	34,976	**30,691**	30,691
ABC (t)	**34,976**	34,976	**30,691**	30,691
Status	As determined *last* year for: 2012	2013	As determined *this* year for: 2013	2014
Overfishing	No	n/a	No	n/a

[a]The values for biomass, OFL, and ABC in these two columns are based on Rodgveller and Hulson 2013. They are an average of the last three trawl surveys that sampled down to 1,000 m. The current values (for 2015 and 2016) are from the random effects model fit to survey biomass by region and depth strata.
These are unofficial ABC and OFL values since grenadier are an Ecosystem Component, which do not have ABCs or OFLs.

Bering Sea and Aleutian Islands Grenadiers

Quantity	As estimated or specified *last* year for[a]: 2014	2015	As estimated or recommended *this* year for: 2015	2016
M (natural mortality)	0.078	0.078	0.078	0.078
Specified/recommended Tier	5	5	5	5
Biomass (t)	1,152,284	1,152,284	1,286,734	1,286,734
F_{OFL} (F=M)	0.078	0.078	0.078	0.078
$maxF_{ABC}$ (maximum allowable = 0.75x F_{OFL})	0.0585	0.0585	0.0585	0.0585
F_{ABC}	0.0585	0.0585	0.0585	0.0585
OFL (t)	**89,878**	89,878	**100,365**	100,365
maxABC (t)	67,409	67,409	**75,274**	75,274
ABC (t)	**67,409**	67,409	**75,274**	75,274
Status	As determined *last* year for: 2012	2013	As determined *this* year for: 2013	2014
Overfishing	No	n/a	No	n/a

[a]The values for biomass, OFL, and ABC in these two columns are based on Rodgveller and Hulson 2013.
These are unofficial ABC and OFL values since grenadier are an Ecosystem Component, which do not have ABCs or OFLs.

Tier 5 computations for giant grenadier OFL and ABC are summarized as follows (AI = Aleutian Islands, EBS = Eastern Bering Sea, GOA = Gulf of Alaska; biomass, OFL, and ABC are in mt) for 2015:

BSAI and GOA grenadiers

Area	Biomass	Natural mortality *M*	OFL definition	OFL	ABC definition	ABC
EBS	553,557	0.078	biom x *M*	43,177	OFL x 0.75	32,383
AI	733,177	0.078	biom x *M*	57,188	OFL x 0.75	42,891
BSAI total	1,286,734			100,365		75,274
GOA	524,624	0.078	biom x *M*	40,921	OFL x 0.75	30,691
Grand total	1,811,358			141,286		105,965

These are unofficial ABC and OFL values since grenadier are an Ecosystem Component, which do not have ABCs or OFLs.

The specifications in the GOA for 2015 differ from last year because a random effects model fit to the survey biomass was used as a proxy for the exploitable biomass in this year's assessment (following the recommendation of the Survey Averaging Working group). In the BSAI the ABC and OFL include the AI biomass estimated using the method presented in the 2012 SAFE report (Rodgveller et al. 2012). Further discussion of this method is below under SSC comments and under the Survey Data section. Catches are not approaching unofficial OFLs.

Summaries for Plan Team

Species	Year	BSAI Biomass	BSAI ABC	BSAI Catch[1]	GOA Biomass	GOA ABC	GOA Catch[1]	Total Catch[1]
grenadiers	2013	1,733,797	101,427	4,164	597,884	34,976	11,339	15,504
	2014	1,152,284	89,878	2,627	597,884	34,976	5,236	7,863
	2015	1,286,734	75,274		524,624	30,691		
	2016	1,286,734	75,274		524,624	30,691		

[1]Current as of October 7, 2014. Source: NMFS Alaska Regional Office Catch Accounting System via the Alaska Fisheries Information Network (AKFIN) database (http://www.akfin.org).

Figure F13.10 BSAI and GOA Grenadier reference points [154]

Sculpins – GOA

The GOA trawl survey is conducted in odd years, and was not conducted in 2014. There is no new survey data. Complete catch is included for 2013, as well as partial catch for 2014 (through October 21, 2014).

[154] NPFMC. 2014. 2. Assessment of the Genadier stock in the Gulf of Alaska. Accessed 2015. SAFE http://www.afsc.noaa.gov/REFM/Docs/2014/GOAgrenadier.pdf
NPFMC. 2014. 2. Assessment of the Genadier stock in the Bearing Sea and Aleutian Islands. SAFE. Accessed 2015 http://www.afsc.noaa.gov/REFM/Docs/2014/BSAIgrenadier.pdf

Summary of Results

Quantity	As estimated or *specified last* year for: 2014	2015	As estimated or *recommended this* year for: 2015	2016
M (natural mortality rate)[1]	0.222	0.222	0.222	0.222
Tier	5	5	5	5
Biomass (t)	33,550	33,550	33,550	33,550
F_{OFL}	0.222	0.222	0.222	0.222
$maxF_{ABC}$	0.166	0.166	0.166	0.166
F_{ABC}	0.166	0.166	0.166	0.166
OFL (t)	7,448	7,448	7,448	7,448
maxABC (t)	5,569	5,569	5,569	5,569
ABC (t)	5,569	5,569	5,569	5,569
Status	As determined *last* year for: 2012	2013	As determined *this* year for: 2013	2014
Overfishing		n/a		n/a

[1] *This is a sculpin complex average mortality rate, a biomass-weighted average of the instantaneous natural mortality rates for the four most abundant sculpins in the GOA: bigmouth (Hemitripterus bolini), great (Myoxocephalus polyacanthocephalus), plain (Myoxocephalus jaok), and yellow Irish lord (Hemilepidotus jordani).*

Figure F13.11 GOA Sculpin complex reference points [155]

Sculpins –BSAI

Catch and retention data are updated with partial data for 2014. Biomass estimates and length compositions from the 2013 and 2014 Bering Sea shelf survey and the 2014 Aleutian Islands survey have been added.

[155] NPFMC. 2014. 2. Assessment of the Sculpin complex in the Gulf of Alaska. SAFE. Accessed 2015 http://www.afsc.noaa.gov/REFM/Docs/2014/GOAsculpin.pdf

Summary of Results

Quantity	As estimated or *specified last* year for: 2014	2015	As estimated or *recommended this* year for: 2015	2016
M (natural mortality rate)*	0.28	0.28	0.29	0.29
Tier	5	5	5	5
Biomass (t)	215,713	215,713	194,783	194,783
F_{OFL}	0.28	0.28	0.29	0.29
$maxF_{ABC}$	0.21	0.21	0.22	0.22
F_{ABC}	0.21	0.21	0.22	0.22
OFL (t)	56,424	56,424	56,487	56,487
maxABC (t)	42,318	42,318	42,852	42,852
ABC (t)	42,318	42,318	42,852	42,852
Status	As determined *last* year for: 2012	2013	As determined *this* year for: 2013	2014
Overfishing		n/a		n/a

** The sculpin complex mortality rate is a biomass-weighted average of the instantaneous natural mortality rates for the six most abundant sculpins in the BSAI: bigmouth (Hemitripterus bolini), great (Myoxocephalus polyacanthocephalus), plain (Myoxocephalus jaok), threaded (Gymnocanthus pistilliger), warty (Myoxocephalus verrucosus), and yellow Irish lord (Hemilepidotus jordani). The complex mortality rate may change as new survey data become available. See "results" section for more detail.*

Figure F13.12 BSAI Sculpin complex reference points [156]

Other Rockfish – GOA

For the 2015 fishery, NOAA recommended the maximum allowable ABC of 4,079 t for the Other Rockfish stock complex. Reference values for the Other Rockfish stock complex are summarized in the following table, with the recommended ABC and OFL values in bold. The stock was not being subjected to overfishing last year.[157]

[156] NPFMC. 2014. 2. Assessment of the Sculpin complex in the Bearing Sea and Aleutian Islands. SAFE. Accessed 2015 http://www.afsc.noaa.gov/REFM/Docs/2014/BSAIsculpin.pdf

[157] NPFMC. 2014. 2. Assessment of the Other Rockfish stock complex in the Gulf of Alaska. SAFE. Accessed 2015 http://www.afsc.noaa.gov/REFM/Docs/2014/GOAorock.pdf

Quantity	As estimated or *specified last* year for:		As estimated or *recommended this* year for:	
	2014	2015	2015	2016
M (natural mortality rate)[a]	0.02-0.10	0.02-0.10	0.02-0.10	0.02-0.10
Tier[b]	5 or 4	5 or 4	5 or 4	5 or 4
Biomass (t)	83,383	83,383	83,383	83,383
F_{OFL} [a]	0.02-0.10	0.02-0.10	0.02-0.10	0.02-0.10
$maxF_{ABC}$ [a]	0.0015-0.0750	0.0015-0.0750	0.0015-0.0750	0.0015-0.0750
F_{ABC} [a]	0.0015-0.0750	0.0015-0.0750	0.0015-0.0750	0.0015-0.0750
OFL (t)	5,347	5,347	**5,347**	**5,347**
maxABC (t)	4,079	4,079	4,079	4,079
ABC (t)	4,079	4,079	**4,079**	**4,079**
Status	As determined *last* year for:		As determined *this* year for	
	2012	2013	2013	2014
Overfishing	No	n/a	No	n/a

[a]Values represent a range among species.

[b]All species are Tier 5 except sharpchin rockfish is Tier 4.

Figure F13.13 GOA Other Rockfish reference points

Other Rockfish – BSAI

Catch and fishery lengths updated through October 25, 2014. 2) Biomass estimates, catch per unit effort (CPUE), and length frequency compositions were included from the 2014 AI trawl survey, the 2013 and 2014 EBS shelf surveys.[158]

Summary for the entire Other Rockfish complex (SST and non-SST combined).

Quantity	As estimated or *specified last* year for:		As estimated or *recommended this* year for:	
	2014	2015	2015	2015
M (natural mortality rate)	0.03	0.03	0.03	0.03
Tier	5	5	5	5
Biomass (t)	47,705	47,705	50,050	50,050
F_{OFL}*	-	-	-	-
$maxF_{ABC}$	-	-	-	-
F_{ABC}	-	-	-	-
OFL (t)	1,550	1,550	1,696	1,696
maxABC (t)	1,163	1,163	1,272	1,272
ABC (t)	1,163	1,163	1,272	1,272
AI ABC (t)	473	473	570	570
EBS ABC (t)	690	690	702	702
Status	As determined *last* year for:		As determined *this* year for:	
	2012	2013	2013	2014
Overfishing		n/a		n/a

*Fishing mortality rates are specified separately for the SST and non-SST portions of the Other Rockfish complex.

[158] NPFMC. 2014. 2. Assessment of the Other Rockfish stock complex in the Bearing Sea and Aleutian Islands. SAFE. Accessed 2015 http://www.afsc.noaa.gov/REFM/Docs/2014/BSAIorock.pdf

Figure F13.14 BSAI Other Rockfish reference points

-ETP Prohibitied Species Catches
Estimation of bycatch and developments of the observer program in regards to non-halibut bycatch in the directed halibut fishery

In the directed longline fisheries for Pacific halibut, bycatch of other fish species is not well documented on any sized vessel because of the lack in observer coverage (albeit partial coverage requirements were implemented in January 2013) in this fleet. Management actions are in place in respect to increasing knowledge on the bycatch dynamics of the directed halibut longline.
A paper titled *Methods for the estimation of non-target species catch in the unobserved halibut IFQ fleet* was produced in August 2011 to address the issue and help the accounting of groundfish and other species bycatch in other Alaska fisheries. [159]

The NMFS announced to NPFMC on June 7th 2012 the approval of Amendment 86 to the FMP for Groundfish of the BSAI Management Area and Amendment 76 to the FMP for Groundfish of the GOA (RIN 0648-BB42). These amendments restructure the funding and deployment system for observers in the North Pacific groundfish and halibut fisheries and include vessels less than 60 ft. In length and halibut vessels in the North Pacific Groundfish Observer Program, in compliance with the MSA. [160]

The 2014 ADP allocated observer effort to at-sea deployments on vessels. Observers were allocated among trips in the trip selection stratum and among vessels in the vessel selection stratum. The deployment period for vessels in the vessel selection pool was 2 months.

Table 1-1. Number of trawl catcher vessels that voluntarily participated in the full observer coverage category and total number of vessels that participated in the BSAI Pacific cod fishery, 2013-2015.

Number of vessels	2013	2014	2015
Volunteering for full coverage	40	37	31
Total in BSAI Pacific cod fishery	53	48	48

[159] Methods for the estimation of non-target species catch in the unobserved halibut IFQ fleet http://www.npfmc.org/wp-content/PDFdocuments/resources/SAFE/1110IFQbycatch.pdf
[160] US Dept. of Commerce Letter to NPFMC http://www.fakr.noaa.gov/sustainablefisheries/amds/amds86_76/approval060712.pdf

Table 4-5. Total catch (retained and discard) of groundfish species and halibut (in metric tons) caught in 2014 by *catcher vessels in the Gulf of Alaska.* See Appendix A for species grouping definitions.

Sector	Species Caught	Trip Disposition	Hook and Line		Jig		Non-Pelagic Trawl		Pot		Pelagic Trawl	
			Retained	Discard	Retained	Discard	Retained	Discard	Retained	Discard	Retained	Discard
Catcher Vessel	Deepwater Flatfish	Observed		32			1,353	331	1	<1	92	1
		Total	<1	214	<1		14,025	2,248	2	1	771	14
	Halibut	Observed	1,095	1,153				188		1		2
		Total	8,245	8,038	11			1,316		62		2
	Other groundfish	Observed	1	50			12	41	77	113	8	2
		Total	7	309	<1		59	382	511	859	56	11
	Pacific cod	Observed	724	191			2,315	253	2,941	25	218	<1
		Total	7,467	1,220	1,047		20,346	2,186	19,745	211	1,697	1
	Pollock	Observed	14	7			869	46	3	1	19,052	79
		Total	118	65	16	<1	9,096	329	33	8	127,847	548
	Rockfish	Observed	126	88			8,126	112		1	1,889	92
		Total	777	534	24		8,695	632	<1	11	2,143	476
	Sablefish	Observed	1,381	69			325	3		<1	1	<1
		Total	8,511	427			439	31		2	16	<1
	Shallow-water flats	Observed		1			542	39	<1	<1	6	
		Total	<1	13	<1		3,196	333	<1	2	118	<1
	Skates	Observed	65	414			84	46	<1	<1	2	<1
		Total	468	2,812	<1		666	223	<1	<1	16	1
	Sharks	Observed	<1	134			1	4		<1	1	19
		Total	<1	1,187			3	18		3	11	152

North Pacific Groundfish and Halibut Observer Program 2014 Annual Report[161]

Impact of fishing gear on seabirds

The short-tailed albatross (*Phoebastria albatrus*) is a listed species under the Endangered Species Act (ESA). As such, incidental takes in the longline fishery are regulated and limits are set. The limit set by NMFS under the current ESA biological opinion is a maximum of four birds in a two- year cycle. If that level is exceeded, it automatically initiates an ESA Section 7 Consultation, which involves a consultation between the US Fish and Wildlife Service and the National Marine Fisheries Service.

Trends in seabird occurrence on stock assessment surveys (2002-2014)

Seabird occurrence data have been collected during International Pacific Halibut Commission (IPHC) stock assessment surveys since 2002. The waters off California and northward to Alaska are generally surveyed from June through August. A total of 16,444 observations were conducted over the last thirteen years, with 1,314 occurring in 2014. More than 738,000 birds were recorded since 2002.

Northern fulmar (*Fulmarus glacialis*), glaucous-winged gulls (*Larus glaucescens*), blackfooted albatross (*Phoebastria nigripes*), and fork-tailed storm petrels (Oceanodroma furcata) represent the most commonly reported species. The observed number of unidentified gulls has continually decreased, inversely correlated with an increased number of observations of glaucouswinged gulls and herring gulls (*L. argentatus*). This shift was likely the result of increased focus on gull identification during annual IPHC sampler training. A total of 262 endangered short-tailed albatross (*Phoebastria albatrus*) sightings were recorded overall, with 20 sightings occurring in 2014. [162]

The survey is neither conducted at the same time in each area in a given year, nor is it in a particular area between years, and this can skew the bird sighting information. Further work is needed to more fully examine charter timing and its effect on the bird occurrence data[163].

[161] North Pacific Groundfish and Halibut Observer Program 2014 Annual Report https://alaskafisheries.noaa.gov/sustainablefisheries/observers/annualrpt2014.pdf

[162] Trends in seabird occurrence on stock assessment surveys (2002-2014) Tracee O. Geernaert http://www.iphc.int/publications/rara/2014/rara2014_35seabird.pdf

[163] Geernaert, T. 2015. Trends in seabird occurrence on stock assessment surveys (2002-2014). Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2014: 577-586. http://www.iphc.int/publications/rara/2014/rara2014_35seabird.pdf

Table F13.1. Number of individual birds (by species) observed in post-hauling counts 2002-14.

Species	2014	Average 2002-14	Total observed	Percent presence
Northern fulmar	27,305	40,671	528,729	100%
Black-footed albatross	5,604	4,361	56,695	100%
Laysan albatross	1,048	752	9,772	100%
Short-tailed albatross	20	20	262	100%
Glaucous-winged gull	8,034	5,131	66,703	100%
Herring gull	172	311	3,734	92%
Western gull	51	279	558	17%
Mew gull		38	115	25%
Glaucous gull	35	25	147	50%
Heermann's gull		18	90	42%
Sabine's gull		3	19	50%
Slaty-backed gull		7	7	8%
Ring-billed gull		3	6	17%
Bonaparte's gull		3	6	17%
Unidentified gull	307	2,519	32,744	100%
Arctic tern		2	3	17%
Unidentified tern		6	30	42%
Ruddy turnstone		8	8	8%
Pomarine jaeger		4	45	83%
Parasitic jaeger		3	32	75%
Long-tailed jaeger	11	6	18	25%
Unidentified jaeger		6	40	58%
South polar skua		1	1	8%
Fork-tailed storm petrel	1,309	1,244	16,178	100%
Leach's storm petrel	22	57	737	100%
Unidentified storm petrel	139	386	5,017	100%
Black-legged kittiwake	218	373	4,845	100%
Red-legged kittiwake	12	10	124	100%
Unidentifed kittiwake	1	72	937	100%
Short-tailed shearwater	37	135	1,624	92%
Sooty shearwater	384	136	1,767	100%
Pink-footed shearwater	158	48	333	58%
Flesh-footed shearwater		2	2	8%
Unidentified shearwater	53	482	6,263	100%
Common murre	7	5	23	42%
Thick-billed murre		30	30	8%
Unidentified murre	13	19	245	100%
Rhinoceros auklet		1	2	17%
Parakeet auklet		2	2	8%
Tufted puffin	11	7	88	92%
Horned puffin		2	8	42%
Unidentified puffin	3	13	170	100%
Unidentified alcid		1	2	33%
Bald eagle	5	20	79	17%
Unidentified cormorant	5	2	11	50%
Unidentified bird		17	118	58%
Grand total	**44,964**	**57,784**	**738,369**	
Number of counts	1,314	1,245	16,444	
Number of unique species	21	20	36	

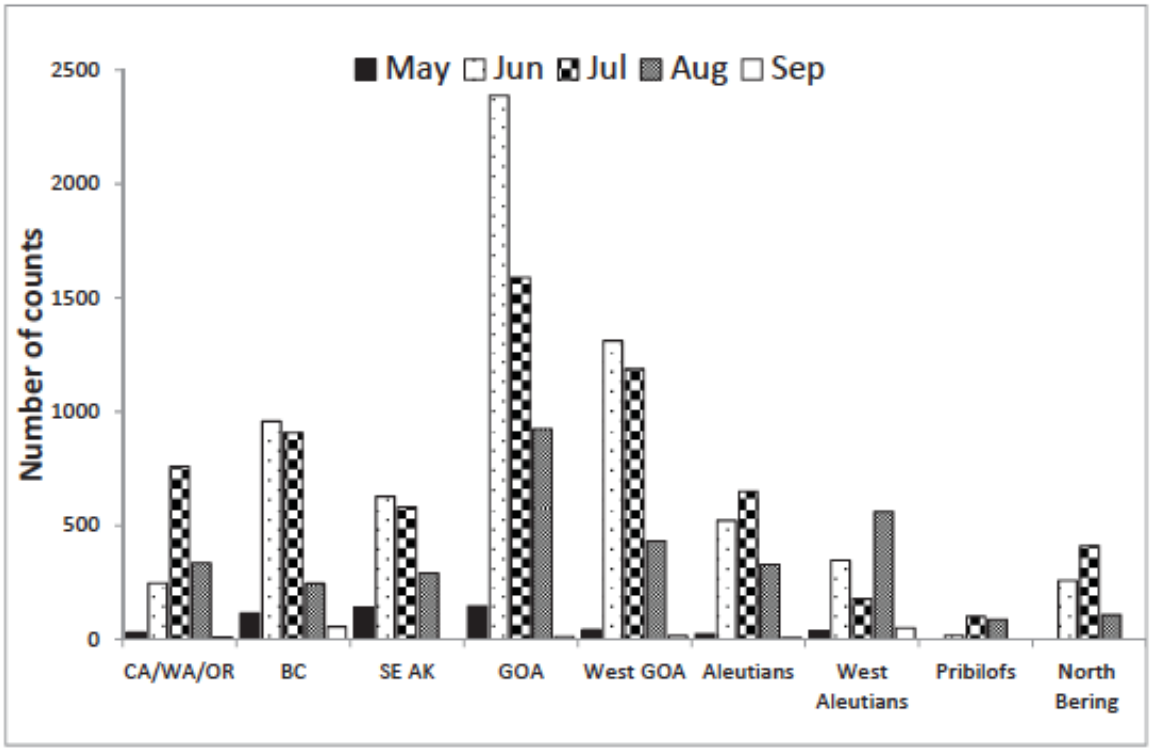


Figure F13.15. Total number of seabird counts conducted on IPHC standardized stock assessment setline survey, by area and month, 2002-2014. Abbreviated locations are as follows: CA/WA/OR= California, Oregon, and Washington, BC = British Columbia, SE AK = southeast Alaska, GOA = central Gulf of Alaska, West GOA = western Gulf of Alaska

Interactions with Marine mammals

Sperm whale diets overlap with commercial fisheries harvests more than any other species of toothed whales, but the degree of overlap is at least partly because of direct interactions with longline gear. In addition to consuming primarily medium - to large-sized squid, sperm whales also consume some fish and have been observed feeding off longline gear targeting sablefish and halibut in the GOA. The interactions with commercial longline gear do not appear to have an adverse impact on sperm whales. Much to the contrary, the whales appear to have become more attracted to these vessels in recent years. Killer whales frequently take fish directly from commercial fishing gear as it is retrieved. Interactions with commercial longline fisheries are well-documented throughout the GOA and BSAI. Killer whale (*Orcinus orca*) depredation adversely impacts demersal longline fisheries for Pacific halibut (*Hippoglossus stenolepis*) in the Bering Sea, Aleutian Islands and Western Gulf of Alaska. These interactions increase direct costs and opportunity costs associated with catching fish and reduce the profitability of longline fishing in western Alaska. A study estimating the frequency of killer whale depredation in longline fisheries in Alaska, and depredation-related catch per unit effort reductions, found that in the Bering Sea the percentages of sets depredated for halibut was 6.9%. The estimated reduction in observed fishery CPUE associated with killer whale depredation,

averaged across all depredated hauls and accounting for differences among vessels and years as well as for spatial patterns in CPUE for halibut was 36%.[164]

Killer whales fall under the jurisdiction of the NOAA Fisheries PRD, and are protected under the Marine Mammal Protection Act of 1972.
The NMFS 2014 Marine Mammal SAFE report indicates that the halibut commercial fleet didn't cause serious harm or mortality of marine mammals in Alaska.[165]

Depredation tracking in IPHC survey
During gear retrieval, samplers recorded all damaged and missing hooks with suspected interference from depredating species, typically sperm whale (Physeter microcephalus) and killer whale (Orcinus orca). Samplers noted all damaged halibut and damaged bycatch retrieved during these encounters. Marine mammals approached charter vessels during gear retrieval on 65 sets (4.5%); of those, 51 encounters involved either sperm whales or killer whales. Though damaged halibut were observed on 27 of the stations at which whales were present, no sets were deemed ineffective for halibut stock assessment because of depredation.[166]

4. Pollution – MARPOL
MARPOL 73/78 (the "International Convention for the Prevention of Pollution From Ships") is one of the most important treaties regulating pollution from ships. Six Annexes of the Convention cover the various sources of pollution from ships and provide an overarching framework for international objectives. In the U.S., the Convention is implemented through the Act to Prevent Pollution from Ships (APPS). Under the provisions of the Convention, the United States can take direct enforcement action under U.S. laws against foreign-flagged ships when pollution discharge incidents occur within U.S. jurisdiction. When incidents occur outside U.S. jurisdiction or jurisdiction cannot be determined, the United States refers cases to flag states, in accordance with MARPOL. These procedures require substantial coordination between the Coast Guard, the State Department, and other flag states, and the response rate from flag states has been poor. Different regulations apply to vessels, depending on the individual state.[167] [168]

5. Management responses to likely serious impacts on ecosystem
Many trawl closures have been implemented to protect benthic habitat or reduce bycatch of prohibited species (i.e., salmon, crab, herring, and halibut) (Figure 13.16). Some of the trawl closures are in effect year-round while others are seasonal. In general, year-round trawl closures have been implemented to protect vulnerable benthic habitat. Seasonal closures are used to reduce bycatch by closing areas where and when bycatch rates had historically been high.

[164] Peterson, M.J, Mueter, F., Criddle, K., Haynie, A. Killer Whale Depredation and Associated Costs to Alaskan Sablefish, Pacific Halibut and Greenland Turbot Longliners. Plosone. 2014. Accessed 2015. http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0088906

[165] NMFS 2014 Marine Mammal SAFE. Accessed 2015 http://www.nmfs.noaa.gov/pr/sars/pdf/draft_alaska_2014_sars_final.pdf

[166] http://www.iphc.int/publications/rara/2014/rara2014_33ssasurvey.pdf

[167] Act to Prevent Pollution from Ships, 33 U.S.C. §§ 1901–1915. https://www.law.cornell.edu/uscode/text/33/1901

[168] U.S. Government Accountability Office, Washington, D.C. (2000). "Progress Made to Reduce Marine Pollution by Cruise Ships, but Important Issues Remain." Report to Congressional Requesters. Report No. RCED-00-48. http://www.gao.gov/assets/230/228813.pdf

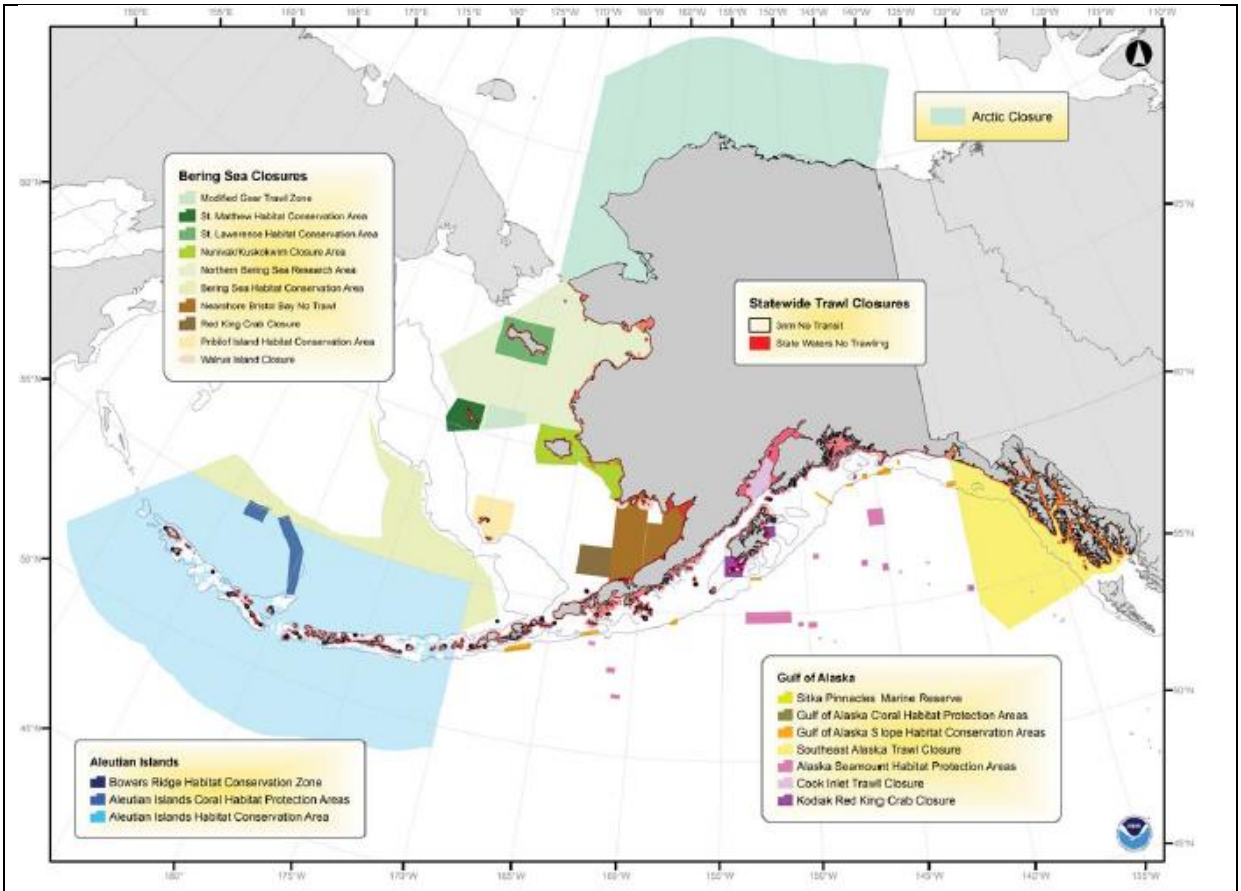


Figure 13.16. Year round groundfish closures in the U. S Exclusive Economic Zone (EEZ) off Alaska, excluding most SSL closures. [169]

6. Regulations/measures to minimize impacts

Regulations are in place to address waste, discard, bycatch, and endangered species interactions in the halibut fisheries. The IPHC, the NMFS, and ADFG promulgate these regulations through the Commission, the NPFMC, and the Alaska Board of Fisheries. In the directed longline fisheries for Pacific halibut, bycatch of other fish species has not been well documented until the end of 2012. Since January 2013, the halibut fleet is partially covered by the newly restructured North Pacific Groundfish Observer Program.

Bycatch of seabirds has been addressed by specific regulations put in place to reduce the incidental mortality of the short-tailed albatross, a listed species under the Endangered Species Act (ESA), and other seabird species in 1998, then revised in 2008. These measures now include the use of streamer (tory) lines, night setting, lineshooters and lining tubes, have been shown to reduce seabird interactions when setting or retrieving gear. In the early 1980s the IPHC conducted research on capture efficiency of circle vs J hooks and determined that using circle hooks lowered the mortality of undersized halibut caught and released during fishing. In 1983, industry made the operational switch from J-hooks to circle hooks in the commercial fishery.

General spawning areas have been mapped in Alaska. The halibut fishery is closed during peak spawning times, by regulation. The NPFMC has established Marine Protected Areas that benefit juvenile fish and adult spawners. The Halibut Longline Closure Area is 36,300 square miles in size. Additional trawl closures for areas in the Bering Sea, Aleutian Islands and Gulf of Alaska provide a

[169] NPFMC. 2014. Ecosystem Consideration Report. Accessed 2015. http://www.afsc.noaa.gov/REFM/Docs/2014/ecosystem.pdf

significant degree of refuge for juvenile halibut.

7. Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) mandates NOAA to identify habitats essential for managed species and conserve habitats from adverse effects on those habitats (NMFS 2010). These habitats are termed "Essential Fish Habitat" or EFH, and are defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (NMFS 2010).[170]

8. Research on environment and social impacts of fishing gear

The IPHC staff has developed a series of research studies for 2015, which it recommends to the Commission for adoption through this Annual Research Plan. The recommended studies require a funding level of approximately $0.329 M during fiscal year 2015. Several studies will contribute towards greater understanding of three issues currently facing the Commission and industry stakeholders, notably the decline in size at age, understanding the sex ratio of the catch and the accurate characterization of the spawning biomass, and improving our understanding of the scope and timing of migration.

Objective 1: Stock identification, monitoring and assessment

The staff is recommending two high-priority studies designed to develop methodology for accurate determination of the sex ratio of the commercial landings. The sex ratio of commercial landings cannot be determined directly because landed fish are dressed at sea, so a genetic method of determining the sex of fish will be developed. The staff will also continue with collection of juvenile abundance data from trawl surveys, which is incorporated into the annual assessment. Fishery-independent and -dependent data will also be collected by the annual stock assessment survey and the commercial fi shery port sampling program, respectively.

Objective 2: Harvest policy and management

Research by the staff and stakeholders on the harvest policy is ongoing through the Management Strategy Evaluation (MSE) effort with the Management Strategy Advisory Board (MSAB) and other staff work. In particular, the MSE process will be focusing on the impacts of changing the current minimum commercial size limit for halibut.

Objective 3: Biology, physiology, and migration

Investigation will continue into the declining trend in size at age, taking advantage of IPHC's extensive historical otolith archives dating to the 1920s. This study would also integrate with external research involving IPHC, which is supported by the North Pacific Research Board (NPRB). Second, as part of the continued focus on understanding halibut migration, the staff proposes to continue with the development of the geomagnetic archival tag technology, which involves several projects to resolve tag attachment, geomagnetic data resolution, and release locations in Area 4B. In addition, data collection will continue in 2015 into the halibut length-weight relationship study, both at sea and in ports, in order to accurately estimate the removals from the stock. The staff will also complete a limited examination of halibut movements within the southern Salish Sea, using PAT tags.

Objective 4: Ecosystem interactions and environmental influences

[170] NMFS Essential Fish Habitat Research Plan
http://www.afsc.noaa.gov/HEPR/docs/Sigler_et_al_2012_Alaska_Essential_Fish_Habitat_Research_Plan.pdf

Three studies are proposed which are continuations of studies currently underway: oceanographic monitoring with the profi lers from the survey platforms, mercury and contaminant assessment, and assessment of Ichthyophonus prevalence. These studies strive to describe halibut habitat in order to assess the effect of a changing climate on stock dynamics, and also address possible environmental threats facing the population. [171]

Summary of habitat-related research priorities

2006 EFH Research Plan (AFSC 2006)

1) Characterize habitat utilization and productivity;
2) Assess sensitivity, impact and recovery of disturbed benthic habitat;
3) Improve the habitat impacts model;
4) Map the seafloor; and
5) Assess coastal areas facing development.

Habitat Assessment Improvement Plan (NMFS 2010)

1) Meet Magnuson-Stevens Act mandates;
2) Improve identification and impact assessments of EFH;
3) Reduce habitat-related uncertainty in stock assessments and facilitate a greater number of advanced stock assessments.

2010 AFSC Science Plan (AFSC 2010)

Describe and assess the role of habitats in supporting healthy marine ecosystems and populations of fish, crab and marine mammals:

1) Assess and evaluate the importance of specific habitat types for fish, crab, and marine mammal populations;
2) Evaluate and forecast ecosystem impacts of fishing and develop mitigation tools;
3) Evaluate and forecast impacts of human activities (other than fishing) on fish, crab, and marine mammals and their habitats.

5-year EFH review (NPFMC 2010)

Immediate Concerns

1) Assess whether Bering Sea canyons are habitats of particular concern;
2) Assess Bering Sea skate nursery areas and evaluate the need for designation of new HAPCs;
3) Assess baseline conditions in the northern Bering Sea and Arctic.

Ongoing Needs

4) Improve habitat maps (especially, benthic habitats);
5) Begin to develop a GIS relational database for habitat including spatial intensity of commercial fisheries;
6) Assess the extent of the distribution of *Primnoa* spp. corals in the GOA;
7) Evaluate importance of habitat-forming living substrates to commercially important species, including juveniles;
8) Develop a time series of the impact of fishing on Gulf of Alaska, Aleutian Island and Bering Sea habitats;
9) Evaluate effects of fishing closures on benthic habitats and fish production.
10) Develop new analytical approaches and/or models to refine EFH descriptions at higher levels.

Habitat Blueprint (Schwaab 2011)

1) Preserve or improve the habitat condition within a defined geographic area and on a scale greater than an individual restoration project;
2) The science component should contribute to the initiative through integration of information, modeling, decision support, and/or monitoring.

Figure F13. 17 Summary of habitat related research priorities [172]

[171] 2015 Annual Research Plan - November 2014. Accessed 2015 http://www.iphc.int/publications/rara/2014/rara2014_02researchplan.pdf

[172] AFSC PROCESSED REPORT 2012-06 Alaska Essential Fish Habitat Research Plan http://www.afsc.noaa.gov/HEPR/docs/Sigler_et_al_2012_Alaska_Essential_Fish_Habitat_Research_Plan.pdf

Clause 14 "where fisheries enhancement is utilized, environmental assessment and monitoring shall consider genetic diversity and ecosystem integrity" is not relevant to this fishery.

8. Performance specific to agreed corrective action plans

Not Applicable. This is the 4th FAO RFM Alaska Pacific halibut surveillance assessment report. Non-conformances were not issued during the full assessment nor the 1st ,2nd or 3rd surveillance assessments. However, a number of issues were identified for review during surveillance to identify whether management actions were being taken to improve issues relating to estimation of bycatch in the halibut fleet and the restructuring of the observer program. The developments have been positive and proceeded as planned. Details of these points are available under Fundamental Clause 8 and 13.

9. Unclosed, new non-conformances and new corrective action plans

Not applicable. There are no unclosed non conformances or newly issued non-conformances.

10. Future Surveillance Actions

11. Client signed acceptance of the action plan

Not applicable.

12. Recommendation and Determination

Following this 4th surveillance assessment, in 2015, the assessment team and the certification committee recommends that continued Certification under the FAO-Based Responsible Fisheries Management Certification Program is maintained for the management system of the applicant fishery, the Pacific halibut commercial fishery employing benthic longline gear within the IPHC's Regulatory Areas 2C, 3A, 3B, 4A, 4B, and 4CDE, within Alaska jurisdiction (200 nautical miles EEZ), under international [International Pacific Halibut Commission (IPHC)], federal [National Marine Fisheries Service (NMFS)/North Pacific Fishery Management Council (NPFMC)] and state [Alaska Department of Fish and Game (ADFG)] management.

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80 FR 13771, March 17, 2015	https://alaskafisheries.noaa.gov/frules/80fr13771.pdf

Appendix 1

Based on the technical expertise required to carry out the above fishery assessment, Global Trust Certification Ltd., is pleased to confirm the 4th Surveillance assessment team members for the fishery as follows:

Dr. Ivan Mateo, Lead Assessor

Dr. Ivan Mateo has over 15 years' experience working with natural resources population dynamic modeling. His specialization is in fish and crustacean population dynamics, stock assessment, evaluation of management strategies for exploited populations, bioenergetics, ecosystem-based assessment, and ecological statistical analysis. Dr. Mateo received a Ph.D. in Environmental Sciences with Fisheries specialization from the University of Rhode Island. He has studied population dynamics of economically important species as well as candidate species for endangered species listing from many different regions of the world such as the Caribbean, the Northeast US Coast, Gulf of California and Alaska. He has done research with NMFS Northeast Fisheries Science Center Ecosystem Based Fishery Management on bioenergetic modeling for Atlantic cod He also has been working as environmental consultant in the Caribbean doing field work and looking at the effects of industrialization on essential fish habitats and for the Environmental Defense Fund developing population dynamics models for data poor stocks in the Gulf of California. Recently Dr. Mateo worked as National Research Council postdoc research associate at the NOAA National Marine Fisheries Services Ted Stevens Marine Research Institute on population dynamic modeling of Alaska sablefish.

William Brodie, Assessor

Bill Brodie is an independent fisheries consultant with previously, a 36-year career with Science Branch of Fisheries and Oceans Canada (DFO, Newfoundland and Labrador Region). He has a BSc in Biology from Memorial University of Newfoundland and Labrador. For the last twelve years of service he worked as Senior Science Coordinator/Advisor on Northwest Atlantic Fisheries Organization (NAFO) issues, serving as chair of the Scientific Council of NAFO and chairing 3 standing committees. As a senior stock assessment biologist, he led assessments and surveys for several flatfish species and stocks, including American plaice, Greenland halibut, yellowtail and witch flounders. These include the largest stocks of flatfish in the NW Atlantic. He also participated in assessment of flatfish, cod, and shrimp stocks in the NE Atlantic and North Sea. Bill has participated in over 30 scientific research vessel surveys on a variety of Canadian and international ships. He has also worked with fishery managers and the fishing industry on developing rebuilding plans under a Precautionary Approach. Bill has previously served as an assessor on Alaska Responsible Fisheries Management certification surveillance audit for Pacific cod.

Deirdre Hoare, Assessor

Deirdre Hoare has a BSc in Marine Science and a MSc in Marine Zoology from the National University of Ireland, Galway and a post graduate diploma in Statistics from Trinity College Dublin. Deirdre has worked directly in fisheries stock assessment as an observer on international projects in NAFO and

Ireland. For 5 years she worked as a Fisheries Assessment Analyst and as a Scientific and Technical Officer for the Marine Institute in Ireland. This work involved fisheries research and stock assessment for ICES working groups. The work also involved coordination and management of a Fisher Self sampling program in the Irish Sea, with particular emphasis on spatial and temporal discard measurement tools. Currently Deirdre is working as an independent Fisheries Consultant. Her work currently involves evaluation and verification of fisheries management and sustainability against international standards. Deidre has previously served as an assessor on FAO Based Responsible Fisheries Management Certifications in Iceland and Alaska. She also performs fish stock assessments, data evaluations and outlines the limitations.