# Responsible Fishery Management (RFM)

## U.S. Alaska Pacific Halibut and Sablefish Commercial Fisheries

## 1st Surveillance Audit

| | |
|---|---|
| **Certification Body (CB):** | **Global Trust Certification** |
| **Assessment team:** | Dr. Ivan Mateo, Lead Assessor<br>Dr. Robert Leaf, Assessor |
| **Fishery client:** | Alaska Fisheries Development Foundation |
| **Assessment Type:** | 1st Surveillance audit |
| **Report Code:** | AK/HAL-SAB/0.01.1/2024 |
| **Report Date:** | December 6 2024 |

**Global Trust Certification**
Quayside Business Park
Mill Street, Dundalk
Co. Louth, Ireland
**T:** + 353 42 932 0912
**E:** ClientServicesie@nsf.org

## Foreword

The Responsible Fisheries Management (RFM) Certification program is a third-party sustainable seafood certification program for wild capture fisheries owned by the Certified Seafood Collaborative (CSC), a 501(c)(3) non-profit foundation led by a diverse board of seafood and sustainability industry experts.

The program was previously owned by the Alaska Seafood Marketing Institute (ASMI) when it was known as the Alaska RFM program but when ownership passed to the CSC in July 2020 scope of the program was expanded to include other North American fisheries outside the State of Alaska.

The Responsible Fisheries Management (RFM) Standard is composed of Conformance Criteria based on the 1995 FAO Code of Conduct for Responsible Fisheries and the FAO Guidelines for the Eco-labelling of Fish and Fishery Products from Marine Capture Fisheries adopted in 2005 and amended/extended in 2009. The Standard also includes full reference to the 2011 FAO Guidelines for the Eco-labelling of Fish and Fishery Products from Inland Fisheries which in turn are now supported by a suite of guidelines and support documents published by the UN FAO. Further information on the RFM program may be found at: https://rfmcertification.org/.

## 1. Content

## 1.1. List of Figures

## 1.2. List of Tables

## 2. Glossary

| Acronym | Full Name |
|---|---|
| AAF | Areas as Fleets |
| ABC | Allowable Biological Catch |
| ABOF | Alaska Board of Fisheries |
| ACOR | Alaska Coastal Observations and Research |
| ADEC | Alaska Department of Environmental Conservation |
| ADFG | Alaska Department of Fish and Game |
| ADP | Annual Deployment Plan |
| ADPS | Alaska Department of Public Safety |
| AFDF | Alaska Fisheries Development Foundation |
| AHO | Annual Harvest Objective |
| AKFIN | Alaska Fisheries Information Network |
| ASMI | Alaska Seafood Marketing Institute |
| AAV | Average Annual Variability |
| AWT | Alaska Wildlife Troopers |
| BSAI | Bering Sea and Aleutian Islands |
| BSFEP | Bering Sea Fishery Ecosystem Plan |
| CARE | Committee for Age Reading Experts |
| CCCABMS | Council Coordinating Committee Area-Based Management Subcommittee |
| CCTF | Climate Change Task Force |
| CDQ | Community Development Quota |
| CFEC | Commercial Fisheries Entry Commission |
| CPUE | Catch Per Unit Effort |
| CQE | Community Quota Entity |
| CSC | Certified Seafood Collaborative |
| CSP | Catch Sharing Plan |
| DFG | Derelict Fishing Gear |
| DMR | Discard Mortality Rate (Halibut) |
| EEZ | Exclusive Economic Zone |
| EFH | Essential Fish Habitat |
| EIS | Environmental Impact Statement |
| EM | Electronic Monitoring |
| ENGOs | environmental non-governmental organizations |
| ER | Electronic Reporting |
| FC | Fundamental Clause |
| FDA | U.S. Food and Drug Administration |
| FISS | Fishery-Independent Setline Survey |
| FMP | Fishery Management Plan |
| FY | Fiscal Year |
| GOA | Gulf of Alaska |
| HAL | Hook-and-line |

| Acronym | Full Name |
|---|---|
| HCRs | Harvest Control Rules |
| HSP | Harvest Strategy Policy |
| IFQ | Individual Fishing Quota |
| IPHC | International Pacific Halibut Commission |
| JEA | Joint Enforcement Agreement |
| MCS | Monitoring, Control, and Surveillance |
| MEY | Maximum Economic Yield |
| MSA | Magnuson-Stevens Act |
| MSAB | Management Strategy Advisory Board |
| MSE | Management Strategy Evaluation |
| MSFCMA | Magnuson-Stevens Fishery Conservation and Management Act |
| MSL | Minimum Size Limit |
| MSY | Maximum Sustainable Yield |
| NIH | U.S. National Institute of Health |
| NMFS | National Marine Fisheries Service |
| NOAA | National Oceanic and Atmospheric Administration |
| NOAA - OLE | National Oceanic and Atmospheric Administration Office Law Enforcement |
| NPFMC | North Pacific Fishery Management Council |
| NPOP | North Pacific Observer Program |
| NPUE | Numbers Per Unit Effort |
| NSEI | Northern Southeast Inside |
| OFL | Overfishing Level |
| OLE | Office of Law Enforcement (NOAA) |
| OM | Operating Model |
| PacFIN | Pacific Fisheries Information Network |
| PDO | Pacific Decadal Oscillation |
| PSC | Prohibited Species Catch |
| PSEIS | Programmatic Supplemental Environmental Impact Statement |
| PSTAT | Pacific Sablefish Transboundary Assessment Team |
| RAB | Research Advisory Board |
| RFM | Responsible Fisheries Management (Scheme) |
| SBLIM | Spawning Biomass Limit |
| SCAA | Statistical Catch-At-Age |
| SEIS | Supplemental Environmental Impact Statement |
| SIR | Supplementary Information Report |
| SPR | Spawning Potential Ratio |
| SRB | Scientific Review Board |
| SSC | Scientific and Statistical Committee |
| SSEI | Southern Southeast Inside |
| SST | Sea Surface Temperature |
| TAC | Total Allowable Catch |

| Acronym | Full Name |
|---|---|
| TCEY | Total Catch Equivalent Yield |
| TSC | Technical Subcommittee of the Canada-U.S. Groundfish Committee (TSC) |
| U32 | Pacific halibut less than 32” (81.3 cm) in fork length |
| UoC | Unit of Certification |
| USCG | U.S. Coast Guard |
| USDA | U.S. Department of Agriculture |
| WPUE | Weight Per Unit of Effort |

# 3. Executive Summary

## 3.1. Brief introduction and description of surveillance process.

This Surveillance Report documents the 1st surveillance assessment of the 1st cycle of recertification for the U.S. Alaska Pacific Halibut and Alaska Pacific Sablefish (Black cod) Commercial Fisheries (200nm EEZ) and presents the recommendation of the Assessment Team for continued RFM Certification.

The Alaska Pacific Halibut Commercial Fishery (200nm EEZ) and the Alaska Pacific Sablefish (Black cod) Commercial Fishery (200nm EEZ) were reassessed and recertified against the requirements of the RFM Certification Program on May 30, 2023. The request for reassessment was made by Alaska Fisheries Development Foundation, and was conducted by Global Trust Certification Ltd. The Alaska Pacific Halibut Commercial Fishery (200nm EEZ) was originally certified on 23rd April 2011, and recertified 9th January 2017. The Alaska Pacific Sablefish (Black cod) Commercial Fishery was originally certified originally certified on 11th October 2011, and recertified 9th January 2017.

This Surveillance Report documents the assessment results for the continued certification of the above fisheries to the RFM Certification Program. This is a voluntary program that has been supported by ASMI previously and now by Certified Seafood Collaborative foundation (CSC) who wish to provide an independent, third-party certification that can be used to verify that these fisheries are responsibly managed.

The assessment was conducted according to the Global Trust procedures for Alaska RFM Certification using the fundamental clauses of the RFM Conformance Criteria Version 2.1 (September 2020) in accordance with ISO 17065 accredited certification procedures.

The assessment is based on 4 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:

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

These four major components are supported by 12 fundamental clauses (+ 1 in case of enhanced fisheries) that guide the RFM Certification Program surveillance assessment.

The surveillance process included a desktop review of relevant new documentary information including but not limited to: the most current fishery assessment and stock evaluation reports; Groundfish Plan Team reports and meeting minutes; Council publications; relevant scientific publications; ecosystem status reports; fishery management plans and amendments thereof; changes to state and federal regulations; fishery enforcement statistics; environmental impact statements; marine mammal stock assessments; and strategic plans (see Section 10 - References for a more complete listing of documents reviewed).

The surveillance process also included substantive meetings with representatives from each of the key fishery management agencies charged with management of the AK Pacific halibut and AK sablefish commercial fisheries. Assessment team meetings included: North Pacific Fishery Management Council (NPFMC); Alaska Department of

Fish & Game (ADFG); Alaska Fisheries Science Center (AKFSC-Seattle); and NOAA National Marine Fisheries Alaska Regional Office (NOAA Regional). The assessment team also met with the Alaska Fisheries Development Foundation (AFDF) fishery client and certificate holder. All meetings were held remotely via videoconferencing.

As described more fully in the following report sections, the assessment team did note some minor changes to the fishery management system. However, none of these changes were seen to undermine continued compliance of the fishery management system for AK Pacific halibut and AK sablefish commercial fisheries with requirements of the RFM Standard.

A summary of the site meetings is presented in Section 6. Assessors included both externally contracted fishery experts and Global Trust internal staff.

## 3.2. Summary of main findings.

The Audit team has determined that the U.S. Alaska Pacific Halibut and Alaska Pacific Sablefish (Black cod) Commercial Fisheries operated within the defined Alaskan UoAs remained in compliance with the RFM Fishery Standard's Fundamental Clauses for the Fisheries Management System component (Clauses 1, 2, and 3), Science & Stock Assessment Activities, and the Precautionary Approach component (Clauses, 4, 5, 6 ,7), Monitoring and Control component (Clauses 8,9,10 and 11) and Serious Impacts of the Fishery on the Ecosystem component (Clauses 12 and 13). No evidence exists to indicate that non-conformance situations arose during the 1st Surveillance audit.

## 3.3. Recommendation with respect to continuing Certification.

Following this 1st Surveillance Assessment, the assessment team recommends that continued Certification under the CSC Responsible Fisheries Management Certification Program is maintained for the management system of the applicant fishery, the US Alaska Pacific halibut commercial fishery, under international (IPHC), federal (NMFS/NPFMC) and state (ADFG) management, fished with benthic longline, pots and troll (within Alaska's 200 nm EEZ).

Following this 1st Surveillance Assessment, the assessment team recommends that continued Certification under the CSC Responsible Fisheries Management Certification Program is maintained for the management system of the applicant fishery, the US Alaska Sablefish commercial fishery, under federal (NMFS/NPFMC) and state (ADFG) management, fished with benthic longline, pots and troll (within Alaska's 200 nm EEZ).

## 3.4. Assessment Team Details

The Assessment Team for this assessment was as follows; further details are provided in Appendix 1):

- Dr. Ivan Mateo – Lead Assessor, Responsible for Fundamental Clauses 1, 2, 3, 9, 10, 11, 12.
- Dr. Robert Leaf – Assessor 1, Responsible for Fundamental Clauses 4, 5, 6, 7, 8.

## 3.5. Details of Applicable RFM Documents

This assessment was conducted according to the relevant program documents outlined in **Error! Reference source not found.**.

**Table 1.** Relevant RFM program documents including applicable versions.

| Document title | Version number, Issue Date | Usage |
|---|---|---|
| RFM Procedure 2: Application to Certification Procedures for the RFM Fishery Standard | Version 6, September 2020 | Process |
| Responsible Fisheries Management Certification Program Fisheries Standard. | Version 2.1, September 2020 | Standard |
| Responsible Fisheries Management Certification Program Guidance to Performance Evaluation for the Certification of Wild Capture and Enhanced Fisheries in North America | Version 2.1, January 2021 | Guidance to Standard |

## 4. Client contact details

| **Table 2.** Client details and key contact information. | | |
|---|---|---|
| Applicant Information | | |
| Organization/Company Name: | | Alaska Fisheries Development Foundation |
| Address: | Street: | PO Box 2205 |
| | City: | Juneau |
| | State: | Alaska |
| | Country: | USA |
| | Zip code | 99802 |
| Applicant Key Contact Information | | |
| Name: | | Kristy Clement |
| Position: | | Chief Executive Officer |
| E-mail: | | kclement@afdf.org |

# 5. Units of Certification

## 5.1. Units of Certification

The Units of Certification (i.e., what is covered by the certificate) are as described in Table 3 and Table 4.

**Table 3. Units of Assessment details, Pacific halibut.**

| Unit of Assessment 1 (of 2) | | |
|---|---|---|
| Species: | Common name: | Pacific halibut |
| | Latin name: | *Hippoglossus stenolepis* |
| Geographical area: | | U.S. Federal and State fisheries within the Gulf of Alaska and the Bering Sea & Aleutian Islands. |
| Stock(s): | | Eastern Pacific |
| Management system: | | U.S. Federal and State fisheries within the Gulf of Alaska and the Bering Sea & Aleutian Islands managed by:<br>• International Pacific Halibut Commission (IPHC)<br>• National Marine Fisheries Service (NMFS)<br>• North Pacific Fishery Management Council (NPFMC)<br>• Alaska Department of Fish and Game (ADFG) and Board of Fisheries (BOF) |
| Fishing gear/method: | | Unique to each UoC |
| UoC 1 | | Benthic longline |
| UoC 2 | | Pots |
| UoC 3 | | Troll |
| All eligible fishery participants: | | Eligible fishery participants are defined by membership of the client group. |

**Table 4. Units of Assessment details, Sablefish.**

| Unit of Assessment 2 (of 2) | | |
|---|---|---|
| Species: | Common name: | Sablefish (Black cod) |
| | Latin name: | *Anoplopoma fimbria* |
| Geographical area: | | U.S. Federal and State fisheries within the Gulf of Alaska and the Bering Sea & Aleutian Islands. |
| Stock(s): | | Eastern Pacific |
| Management system: | | U.S. Federal and State fisheries within the Gulf of Alaska and the Bering Sea & Aleutian Islands managed by:<br>• National Marine Fisheries Service (NMFS)<br>• North Pacific Fishery Management Council (NPFMC)<br>• Alaska Department of Fish and Game (ADFG) and Board of Fisheries (BOF) |
| Fishing gear/method: | | Unique to each UoC |
| UoC 1 | | Benthic longline |
| UoC 2 | | Pots |
| UoC 3 | | Bottom trawl |
| All eligible fishery participants: | | Eligible fishery participants are defined by membership of the client group. |

## 5.2. Changes to the Units of Certification

There have not been any changes to the Units of Certification for the 2nd surveillance audit.

## 6. Summary of site visits and/or consultation meetings

Desktop reviews are the preferred assessment vehicle within the RFM program. In general, on-site/off-site audits are required only if the Certification Body deems that a desktop review may be inadequate for determining whether the fishery is continuing to comply with the RFM Fishery Standard, based on the performance of the fishery, status of non-conformances and related corrective actions.

**Table 5.** Summary of site visits and/or consultation meetings.

| Meeting Date and Location | Personnel | Areas of discussion |
|---|---|---|
| Date:<br>June 10, 2024<br><br>Location:<br>Conference call | AFDF<br>Kristy Clement<br>Hannah Wilson<br>Ann Robertson<br>Jamie O' Connor<br><br>Assessment Team Members<br>Dr. Ivan Mateo, Lead Assessor<br>Dr. Robert Leaf, Assessor | Topics discussed:<br>• Purpose of surveillance audit.<br>• Updates on performance of the fishery. |
| Date:<br>June 28, 2024<br><br>Location:<br>Conference call | IPHC<br>Ian Stewart<br>Allan Hicks<br><br>Assessment Team Members<br>Dr. Ivan Mateo, Lead Assessor<br>Dr. Robert Leaf, Assessor | Topics Discussed:<br>• Updates on the developments of IPHC Harvest Strategy Policy since 2023.<br>• Status of MSE implementation plan for Pacific Halibut fishery since 2023.<br>• Update - 2nd Performance Review Implementation Plan.<br>• Update of significant regulatory or policy changes affecting the stock assessment, ecosystems, or management system of the Pacific halibut commercial fishery in Alaska.<br>• Any significant changes to the current decision-making processes of AK Pacific halibut among Federal/State agencies.<br>• Significant changes to catch statistics from the fishery for AK Pacific Halibut.<br>• Significant changes to the observer scheme for AK Pacific Halibut.<br>• Scope of observer programs and its efficiency to provide quantitative estimates of total catch, discards, and incidental takes of living aquatic resources in the AK Pacific Halibut fisheries.<br>• Updates on the research that is concerned with supporting these stocks as food fishes.<br>• Economic and social aspects of the stock and fishery being explored for AK Pacific Halibut.<br>• Use of traditional fishery knowledge of the stock and fishery being explored for AK Pacific Halibut.<br>• New updates on research of climate impacts of the stock and fishery being explored for AK Pacific Halibut. |

| Meeting Date and Location | Personnel | Areas of discussion |
|---|---|---|
| | | • New updates on cooperative international research of the stock and fishery being explored for AK Pacific Halibut.<br>• Changes in the development of target reference points for Alaska Pacific Halibut.<br>• Changes in stock and fishery status for Pacific Halibut.<br>• Changes in management measures for the Pacific Halibut.<br>• Notable changes in efforts in reducing fleet capacity in the AK Pacific Halibut.<br>• Notable changes in discard monitoring in the AK Pacific Halibut.<br>• Notable changes in gear regulations in the AK Pacific Halibut.<br>• Evaluation of environmental factors impacting on AK Pacific Halibut stock.<br>• Considerations of broader relationships within the ecosystem (e.g., food web studies) in the assessment.<br>• Updates on Biological and Ecosystem Science Research program.<br>• New information on Bycatch in non-Pacific halibut-target fisheries<br>• New information on halibut discard mortality during the directed commercial fishery. |
| Date:<br>July 11, 2024<br><br>Location:<br>Conference call | NMFS AKFSC MESA Group<br>Chris Lunsford<br>Dan Goethel<br><br>Assessment Team Members<br>Dr. Ivan Mateo, Lead Assessor | Topics Discussed:<br>• Update of significant regulatory or policy changes affecting the stock assessment, ecosystems or management system of the Sablefish commercial fishery in Alaska since last year.<br>• Significant changes to catch statistics from the fishery for AK Sablefish.<br>• Significant changes to the observer scheme for AK Sablefish.<br>• Scope of observer programs and its efficiency to provide quantitative estimates of total catch, discards, and incidental takes of living aquatic resources in the AK Sablefish fisheries.<br>• Updates on research concerning the support of these stocks as food fishes.<br>• Economic and social aspects of the stock and fishery being explored for AK Sablefish.<br>• Use of traditional fishery knowledge of the stock and fishery being explored for AK Sablefish.<br>• New research of climate impacts of the stock and fishery being explored for AK Sablefish. |

| Meeting Date and Location | Personnel | Areas of discussion |
|---|---|---|
| | | • New cooperative international research of the stock and fishery being explored for AK Sablefish.<br>• Updates in the development of target reference points for Alaska Sablefish.<br>• Notable changes in efforts in reducing fleet capacity in the AK Sablefish.<br>• Notable changes in discard monitoring in the AK Sablefish.<br>• Notable changes in gear regulations in the AK Sablefish.<br>• Incorporation of environmental factors impacting AK Sablefish stocks in the model.<br>• New information on sablefish bycatch in non-Sablefish-target fisheries.<br>• New information on bycatch species composition on the AK sablefish directed longline fishery from observers' data from 2022-2023.<br>• New information on bycatch (retained and/or discarded) in the AK Sablefish fleet component using Electronic Monitoring (EM).<br>• New information on AK Sablefish fisheries interactions with marine mammals, seabirds or other ETP species.<br>• |
| Date:<br>July 12, 2024<br><br>Location:<br>Conference call | AK NOAA Regional Office<br>Andrew Olson<br>Phil Ganz<br>Kurt Iverson<br>Molly Zaleski<br>Josh Keaton<br>Gretchen Harrington<br>Caleb Taylor<br><br>Assessment Team Members<br>Dr. Ivan Mateo, Lead Assessor | Topics Discussed:<br>• Update - Electronic Technology Implementation Plan.<br>• Adjustments to NOAA's VMS requirements for Alaska in 2023.<br>• Status of implementation of Halibut Abundance-Based Management Prohibited Species Catch Limits.<br>• Status of implementation Area 4 Vessel Use Cap Interim Measures.<br>• Programmatic Environmental Impact Statement (Programmatic EIS or PEIS).<br>• Initial review of the proposed action to allow small sablefish release.<br>• 2023 Sablefish and Halibut IFQ Program Review.<br>• Notable changes in management measures for the AK Pacific Halibut/Sablefish.<br>• Notable changes in discard monitoring in the AK Pacific Halibut/Sablefish.<br>• Notable changes in gear regulations in the AK Pacific Halibut/Sablefish.<br>• New information on Sablefish bycatch in non-AK Pacific Halibut Sablefish-target fisheries.<br>• New information on AK Pacific Halibut /Sablefish discard mortality during the directed commercial fishery. |

| Meeting Date and Location | Personnel | Areas of discussion |
|---|---|---|
| | | • Updates Ecosystem and Socioeconomic Profile (ESP) of the sablefish stock.<br>• New information on bycatch species composition on the AK Pacific Halibut /Sablefish directed longline fishery from observers' data from 2022-2023.<br>• New information on bycatch (retained and/or discarded) in the AK Pacific Halibut /Sablefish fleet component using EM for 2022 and 2023.<br>• Updates on ESA Section 7 consultations to evaluate the effects of the GOA and BSAI groundfish fisheries on ESA-listed species and critical habitats.<br>• New information on evaluating the most probable adverse impacts of the AK Pacific Halibut /Sablefish fisheries on habitats.<br>• Recent advances in the understanding of AK Pacific Halibut /Sablefish EFH.<br>• New information on the impacts of lost AK Pacific Halibut /Sablefish pots (number lost per year, effectiveness of biodegradable closure materials, design changes to reduce ghost fishing, etc.)<br>• Recent research into the social or environmental impacts of AK Pacific Halibut /Sablefish pots.<br>• Recent or proposed changes to Marine Protected Areas (MPAs) or other spatial closures. |
| Date:<br>July 15, 2024<br><br>Location:<br>Conference call | Alaska Division Fish and Game<br>Forrest Bowers<br>Katie Palof<br>Rhea Ehrisman<br>Janet Rumble<br>Caitlin Stern<br><br>Assessment Team Members<br>Dr. Ivan Mateo, Lead Assessor<br>Dr. Robert Leaf, Assessor | Topics Discussed:<br>• Significant changes to the Harvest strategy and Harvest control rules for the AK Sablefish commercial fishery in state waters since last year.<br>• Changes in Statewide Commercial Groundfish Regulations for 2023-2024.<br>• Fisheries management activities report – Pacific halibut and Sablefish commercial fisheries in state waters 2022 year-end and 2023.<br>• Updates/changes in AK Sablefish management plan – Statewide since last year.<br>• Emergency orders/releases issued in 2022 and 2023 specific to the AK Halibut and Sablefish commercial fisheries from the Board of Fisheries.<br>• Documentation on sablefish bycatch in non-AK Pacific Halibut /Sablefish-target fisheries in state.<br>• 2023 SSEI Pot vs Longline Survey Comparison study.<br>• information on bycatch species composition on the AK Pacific Halibut /Sablefish directed longline/pot fisheries fishery from observers' data in state waters from 2023-2024. |

| Meeting Date and Location | Personnel | Areas of discussion |
|---|---|---|
| | | • Progress with implementation of recommendations of the report by Alaska Bycatch Review Task Force related to AK Pacific Halibut/ Sablefish in state waters. |
| Date:<br>July 18, 2024<br><br>Location:<br>Conference call | North Pacific Fisheries Management Council<br>David Witherell<br>Sara Evans<br>Dr. Diana Stram<br>Sarah Cleaver<br>Ana Henry<br><br>Assessment Team Members<br>Dr. Ivan Mateo, Lead Assessor<br>Dr. Robert Leaf, Assessor | Topics Discussed:<br>• Update - Electronic Technology Implementation Plan.<br>• Adjustments to NOAA's VMS requirements for Alaska in 2023.<br>• New updates on how all 10 National Standards guidelines under the MSA are operationalized in the AK Pacific Halibut /Sablefish commercial fisheries in federal waters.<br>• Status of implementation Halibut Abundance-Based Management.<br>• Status of implementation Area 4 Vessel Use Cap Interim Measures.<br>• Programmatic Environmental Impact Statement (Programmatic EIS or PEIS).<br>• Initial review of the proposed action to allow small sablefish release.<br>• 2023 Sablefish and Halibut IFQ Program Review.<br>• Status of sablefish MSE.<br>• New information on Sablefish bycatch in non-AK Pacific Halibut /Sablefish-target fisheries.<br>• New information on AK Pacific Halibut /Sablefish discard mortality during the directed commercial fishery.<br>• New information on bycatch species composition on the AK Pacific Halibut /Sablefish directed longline fishery and Pot fishery from observers' data from 2023-2024.<br>• New information on evaluating the most probable adverse impacts of the AK Pacific Halibut /Sablefish fisheries on habitats.<br>• New information on evaluating the most probable adverse impacts of the AK Pacific Halibut /Sablefish fisheries on the Gulf of Alaska and Bering Sea Aleutian Islands ecosystems.<br>• New information on the impacts of lost AK Pacific Halibut /Sablefish pots (number lost per year, effectiveness of biodegradable closure materials, design changes to reduce ghost fishing, etc.)<br>• Recent or proposed changes to Marine Protected Areas (MPAs) or other spatial closures. |
| Date:<br>August 5, 2024<br><br>Location:<br>Conference call | AFDF<br>Kristy Clement<br>Hannah Wilson<br>Jamie O'Connor | Topics discussed:<br>• Progress on the NCs.<br>• Discussion Surveillance Findings |

| Meeting Date and Location | Personnel | Areas of discussion |
|---|---|---|
| | Assessment Team Members:<br>Dr. Ivan Mateo, Lead Assessor<br>Dr. Robert Leaf, Assessor | |

## 7. Summary findings

Surveillance audits are summary audits intended to evaluate continued compliance with the RFM Fishery Standard. Each aspect of the fishery they are intended to focus on is addressed below.

### 7.1. Update on topics that trigger immediate failure

The following fisheries management issues cause a fishery to immediately fail RFM assessment:

- Dynamiting, poisoning, and other comparable destructive fishing practices.
- Significant illegal, unreported, and unregulated (IUU) fishing activities in the country jurisdiction.
- Shark finning.
- Slavery and slave labor on board fishing vessels.
- Any significant lack of compliance with the requirements of an international fisheries agreement to which the U.S. is signatory. A fishery will have to be formally cited by the International Governing body that has competence with the international Treaty in question, and that the US has been notified of that citation of non-compliance.

The Assessment Team has, as part of this surveillance, carried out a review of any new evidence with respect to these issues and found no evidence that any of the above issues are occurring/describe any issues identified and the consequences for the fishery.

### 7.2. Changes in the management regime and processes

There were no changes in the management regime or its processes that would affect the outcome of certification or that have potential to change the effect of the fishery on resources.

### 7.3. Changes to the organizational responsibility of the main management agencies

There were no changes in the management regime or its processes that would affect the outcome of certification or that have potential to change the effect of the fishery on resources.

### 7.4. New information on the status of stocks

**Alaska Pacific Halibut**[1]

The IPHC's current interim management procedure specifies a reference level of fishing intensity of F43%, based on the Spawning Potential Ratio (SPR). For 2024, the relative spawning biomass is estimated at 42% (credible interval: 20-56%), slightly higher than the 41% estimated for 2023. There is a 26% probability that the stock is below the SB30% level at the beginning of 2023, with only a 1% chance of falling below SB20%. Two long-term models (coastwide and areas-as-fleets) offer differing estimates when comparing the current stock size to the historical low in the 1970s. The AAF model suggests that the current stock size is well below those historical levels (44%), while the coastwide model places it above (168%).

**Alaska Sablefish**[2]

Under the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act, the Secretary of Commerce is required to report on the status of each U.S. fishery with respect to overfishing. The official catch estimate for the most recent complete year (2022) is 26,900 t, which is less than the 2022 OFL of 34,500 t. Therefore, the stock is not being subjected to overfishing. Because 2023 SSB is at B52% (i.e., above B35%),

[1] https://www.iphc.int/uploads/2024/01/IPHC-2024-SA-01.pdf
[2] https://apps-afsc.fisheries.noaa.gov/Plan_Team/2023/sablefish.pdf

sablefish are not overfished. Similarly, given that the 2025 SSB is projected to be at B70% (i.e., above B35%), sablefish are not approaching an overfished condition. Thus, overfishing is not occurring on Alaskan sablefish and the stock is not overfished nor is it approaching an overfished condition.

## 7.5. Update on fishery catches.

**Pacific Halibut**[3]

Since 1923, the fishery has ranged annually from 34 to 100 million pounds (16,000-45,000 t) with an annual average of 63 million pounds (~29,000 t). Annual mortality was above this long-term average from 1985 through 2010 and has averaged 37.4 million pounds (~17,000 t) from 2019-23. Coastwide commercial Pacific halibut fishery landings (including research landings) in 2023 were approximately 23.0 million pounds (~10,400 t), down 6% from 2022.

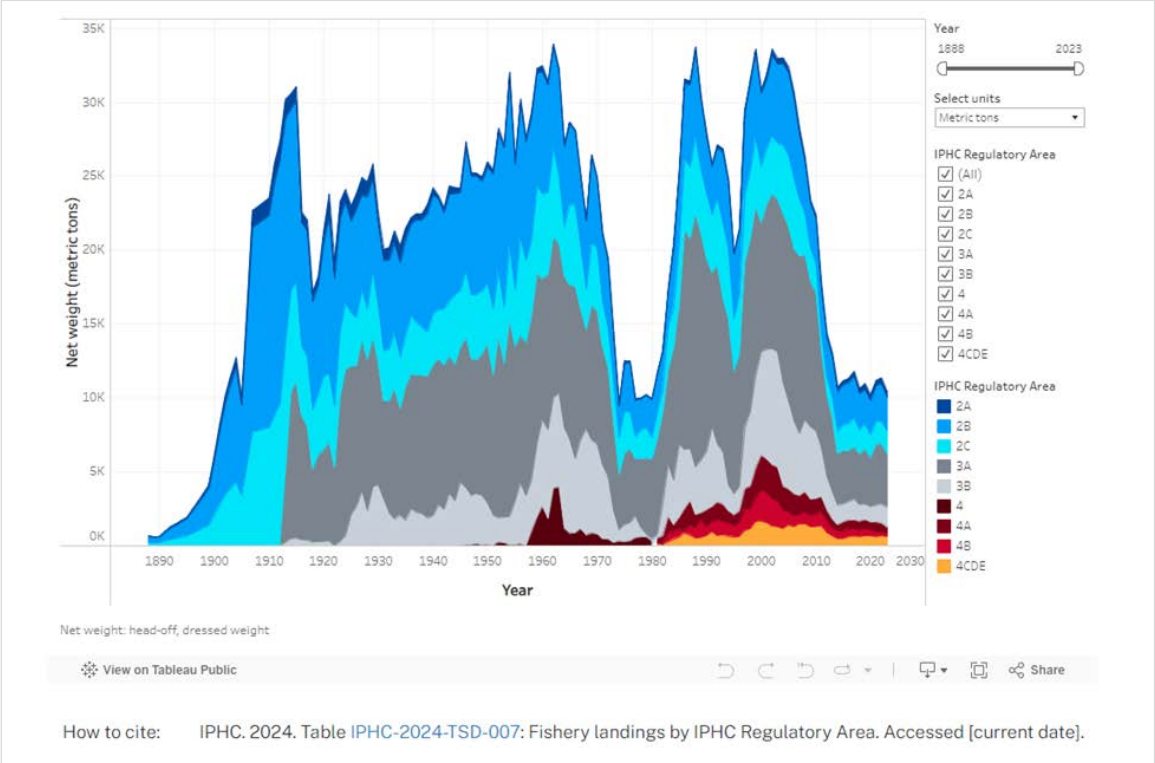



**Figure 1.** Fishery Landings by IPHC Regulatory area (Source: IPHC 2024a).

**Alaska Sablefish**

Sablefish have been exploited since the late 19th century, with a significant expansion in the 1960s when Japanese longliners began operating in the eastern Bering Sea[4]. Heavy fishing by foreign vessels extended into the Gulf of Alaska in the 1970s, leading to a peak catch of 53,000 tons in 1972. This intense fishing pressure caused a substantial population decline, prompting the implementation of fishery regulations in Alaska. By 1988, U.S. fisheries were responsible for all sablefish harvested in Alaska, primarily using hook-and-line gear in the eastern and central Gulf of Alaska. In 1995, individual fishing quotas (IFQs) were introduced for hook-and-line vessels.

[3] https://www.iphc.int/data/fishery-landings-by-iphc-regulatory-area/
[4] https://www.npfmc.org/wp-content/PDFdocuments/SAFE/2023/sablefish.pdf

Since 2021, most of the catch by the fixed gear fleet has been taken using pot gear, driven largely by the increasing use of collapsible 'slinky' pots.

Further details on Alaskan sablefish fisheries, including trawl catches, fixed gear catch rates, and observer coverage, can be found in the stock assessment by Goethel *et al*. (2023). Sablefish are managed under Tier 3 of the North Pacific Fishery Management Council's harvest control rule, which aims to maintain the population at 40% of its unfished biomass (B40%). The projected female spawning biomass for 2024 is estimated to be 62% of the unfished biomass, placing sablefish in sub-tier "a" of Tier 3. Spawning biomass is expected to increase in the near future, with the maximum permissible fishing mortality (FABC) for 2024 set at 0.086, resulting in a recommended ABC of 47,146 tons after accounting for whale depredation. The overfishing limit (OFL) mortality rate is 0.101, corresponding to a 2024 OFL of 55,385 tons. Current model projections indicate that the Alaskan sablefish stock is not subject to overfishing, is not overfished, and is not approaching an overfished condition. In 2023, the sablefish catch was 20,400 tons, with an Overfishing Limit (OFL) of 47,400 tons, an Allowable Biological Catch (ABC) of 40,500 tons, and a Total Allowable Catch (TAC) of 39,600 tons.

**Table 6.** Summary of management measures with time series of catch, ABC, OFL, and TAC. All values are in tons. 2023 catches are as of October 10, 2023 (from www.akfin.org*; Source: Goethel *et al*., 2023).

| Year | Catch | OFL | ABC | TAC | Management measure |
|---|---|---|---|---|---|
| 1980 | 10,400 | | | 18,000 | Amendment 8 to the Gulf of Alaska Fishery Management Plan established the West and East Yakutat management areas for sablefish. |
| 1981 | 12,600 | | | 19,300 | |
| 1982 | 12,000 | | | 17,300 | |
| 1983 | 11,800 | | | 14,500 | |
| 1984 | 14,100 | | | 14,800 | |
| 1985 | 14,500 | | | 13,500 | Amendment 14 of the GOA FMP allocated sablefish quota by gear type: 80% to fixed gear and 20% to trawl gear in WGOA and CGOA and 95% fixed to 5% trawl in the EGOA. |
| 1986 | 28,900 | | | 21,400 | Pot fishing banned in Eastern GOA. |
| 1987 | 35,200 | | | 27,700 | Pot fishing banned in Central GOA. |
| 1988 | 38,400 | | 44,200 | 36,400 | |
| 1989 | 34,800 | | 37,100 | 32,200 | Pot fishing banned in Western GOA. |
| 1990 | 30,200 | | 33,400 | 33,200 | Amendment 15 of the BSAI FMP allocated sablefish quota by gear type: 50% to fixed gear in and 50% to trawl in the EBS, and 75% fixed to 25% trawl in the Aleutian Islands. |
| 1991 | 26,400 | | 28,800 | 28,800 | |
| 1992 | 23,900 | 34,100 | 25,200 | 25,200 | Pot fishing banned in Bering Sea (57 FR 37906). |
| 1993 | 25,400 | 33,200 | 25,000 | 25,000 | |
| 1994 | 23,600 | 35,900 | 28,800 | 28,800 | |
| 1995 | 20,700 | 25,700 | 25,300 | 25,300 | Amendment 20 to the Gulf of Alaska Fishery Management Plan and 15 to the Bering Sea/Aleutian Islands Fishery Management Plan established IFQ management for sablefish beginning in 1995. These amendments also allocated 20% of the fixed gear allocation of sablefish to a CDQ reserve for the Bering Sea and Aleutian Islands. |
| 1996 | 17,400 | 22,800 | 19,600 | 19,400 | Pot fishing ban repealed in Bering Sea except from June 1-30. |
| 1997 | 14,600 | 45,600 | 17,200 | 16,800 | Maximum retainable allowances for sablefish were revised in the Gulf of Alaska. The percentage depends on the basis species. |
| 1998 | 13,900 | 27,800 | 16,800 | 16,800 | |
| 1999 | 13,600 | 24,700 | 15,900 | 15,400 | |
| 2000 | 15,600 | 21,500 | 17,200 | 17,200 | |
| 2001 | 14,100 | 20,700 | 16,900 | 16,900 | |
| 2002 | 14,700 | 26,100 | 17,300 | 17,300 | |
| 2003 | 16,400 | 28,900 | 20,900 | 20,900 | |
| 2004 | 17,500 | 30,800 | 23,000 | 22,600 | |
| 2005 | 16,600 | 25,400 | 21,000 | 21,000 | |
| 2006 | 15,600 | 25,300 | 21,000 | 20,700 | |
| 2007 | 16,000 | 23,700 | 20,100 | 20,100 | |
| 2008 | 14,600 | 21,300 | 18,000 | 18,000 | Pot fishing ban repealed in Bering Sea for June 1-30 (74 FR 28733). |
| 2009 | 13,100 | 19,000 | 16,100 | 16,100 | |
| 2010 | 11,900 | 18,000 | 15,200 | 15,200 | |
| 2011 | 13,000 | 19,000 | 16,000 | 16,000 | |
| 2012 | 13,900 | 20,400 | 17,200 | 17,200 | |
| 2013 | 13,600 | 19,200 | 16,200 | 16,200 | |
| 2014 | 11,500 | 16,200 | 13,700 | 13,700 | |
| 2015 | 10,900 | 16,100 | 13,700 | 13,700 | NPFMC passes Amendment 101 to allow pot fishing in the GOA. |
| 2016 | 10,200 | 13,400 | 11,800 | 11,800 | Whale depredation accounted for in survey and fishery. |
| 2017 | 12,300 | 15,400 | 13,100 | 13,100 | Pot fishing begins in the GOA. |
| 2018 | 14,200 | 29,500 | 15,000 | 15,000 | |
| 2019 | 16,600 | 32,800 | 15,100 | 15,100 | |
| 2020 | 19,000 | 50,500 | 22,000 | 18,300 | TAC set below ABC based on AP recommendation. |
| 2021 | 21,300 | 60,400 | 29,600 | 26,100 | |
| 2022 | 26,900 | 40,400 | 34,500 | 34,500 | OFL changed to Alaska-wide. |
| 2023 | 20,400 | 47,400 | 40,500 | 39,600 | |

* The 2023 catch value is incomplete and does not include specified catch as incorporated in the assessment model. Catch does not include non-commercial catch.

## 7.6. Significant changes in the ecosystem effects of the fishery

An updated assessment of fishing impacts on Essential Fish Habitat (EFH) for groundfish and crab species, encompassing 27 Arctic Indicator (AI) species, 34 Eastern Bering Sea (EBS) species, and 42 Gulf of Alaska (GOA) species was completed in 2022 for the 2023 EFH 5-year review (Zaleski *et al*., 2024).

The impact of fishing on Essential Fish Habitat (EFH) was assessed utilizing the Fishing Effects Model and the Core EFH Area (CEA) derived from the updated Species Distribution Model (SDM) EFH maps. Stock authors evaluated the data, and if the FE model indicated that > 10% of the CEA was affected by fishing gear, they performed further analysis to ascertain whether the impacts of fishing on EFH were significant and not merely temporal.

None of the stock assessors concluded that fishing effects on their species were more than minimal and not temporary, and therefore no stock assessors recommended elevating their species to the Plan Teams and the SSC for possible mitigation to reduce fishing effects to EFH.

A discussion paper reporting the SA evaluations was prepared for the SSC October 2022 meeting and presented to the Crab Plan Team and Joint Groundfish Plan Teams meetings in September 2022. The Council's Joint Groundfish Plan Team, Crab Plan Team, and Scientific and Statistical Committee reviewed these FE evaluations and concluded that fishing effects were no more than minimal and temporary and therefore no species were recommended for elevation to the Council for possible mitigation to reduce fishing effects to EFH.

In February 2023, based on the analysis with the FE model, the Council concurred with the Plan Team and SSC consensus that the effects of fishing on EFH do not currently meet the threshold of more than minimal and not temporary, and that mitigation action is not needed at this time. This conclusion is consistent with the conclusions of the 2005 EFH EIS, the 2010 EFH Review, and the 2017 EFH Review[5].

In December 2023, [6] the Council evaluated the initial and final analysis of the Fishery Management Plans (FMP) omnibus amendment and the proposed amendment language in accordance with the 2023 Essential Fish Habitat (EFH) five-year review. The Council finalized its decision and selected Alternative 2, as revised, as the preferable option.

Alternative 2 will revise the EFH information in the BSAI Groundfish, GOA Groundfish, BSAI crab, and Arctic FMPs, after the thorough study conducted in the 2023 EFH 5-year review provided to the Council in February. These revisions encompass revised EFH maps and text descriptions, findings from the fishing impacts on habitat (FE) analysis, modifications to prey species tables, additions to the non-fishing effects report, and updated research and information requirements. The Salmon FMP was revised to amend EFH maps in accordance with Echave *et al.* (2012). Incorporating EFH information into the FMPs enables the Council to integrate the most reliable scientific data into the relevant FMPs.

In December 2023, the Council evaluated the Ecosystem Status Reports for the Aleutian Islands (AI) and the Bering Sea (BS). Ecosystem conditions are encapsulated in report card summaries at the beginning of each ESR. The Bering Sea has cooled compared to the current warm period (2014-2021); however, it predominantly stays above average temperatures. The overall ecosystem indicators reveal low primary productivity, although secondary productivity ranged from moderate to low. The Aleutian Islands saw the warmest winter on record, characterized

[5] https://www.npfmc.org/february-2023-newsletter/
[6] https://www.npfmc.org/december-2023-newsletter/

by consistently elevated temperatures and significant alterations in sea surface temperature (SST). The persisting warm weather, enhanced rockfish availability, and increased pink salmon populations may collectively signify a shift in the ecosystem towards a state where rockfish and pink salmon serve as the primary conduit for zooplankton into the food chain.

The Council also evaluated the Ecosystem Status Report for the Gulf of Alaska, which included a two-page ecosystem brief. The paper detailed oceanic conditions, densities of phytoplankton and zooplankton, abundance of forage fish, and trends in seabirds and marine mammals. The survey indicated that GOA ocean temperatures were roughly average to below average during winter and spring, and above average in late summer. Oceanic conditions are anticipated to deviate in 2024 from previous multi-year patterns due to the warming linked to El Niño. In 2024, vulnerable GOA groundfish may encompass the larval and age-0 juveniles of Pacific cod, walleye pollock, and northern rock sole, attributed to elevated surface temperatures and diminished zooplankton quality.

On July 19, 2024, NMFS announces the approval of amendment 127 to the Fishery Management Plan (FMP) for Groundfish of the Bering Sea and Aleutian Islands Management Area (BSAI), amendment 115 to the FMP for Groundfish of the Gulf of Alaska (GOA)[7]. These amendments revise the FMPs by updating the description and identification of essential fish habitat (EFH) and updating information on adverse effects on EFH from fishing and non-fishing activities based on the best scientific information available. These amendments are intended to promote the goals and objectives of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), the FMPs, and other applicable laws.

## 7.7. Violations and enforcement information

The Monitoring, Control and Surveillance (MCS) programs operated by the federal and state enforcement agencies (NMFS, USCG; ADPS's AWT) continued to perform at a high rate of effectiveness in monitoring the Alaska Pacific halibut and Alaska sablefish fishing fleets that operate within state waters (0-3 nm) and Alaska's EEZ (3-200 nm) and in applying the significant number of federal and state regulations they are mandated to enforce. The IPHC does not actively enforce regulations but relies on the enforcement mechanisms of the Contracting Parties (Convention, Article IV). The Contracting Parties provide extensive annual reports to the IPHC regarding their fishery management, catch monitoring and accounting, and enforcement activities[8].

The USCG and NMFSs Office of Law Enforcement (OLE) enforce Alaska fisheries laws and regulations, especially 50 CFR 679 (on the management of fisheries off the Alaska EEZ). The AWT enforces halibut and sablefish regulations in state waters. All landings of halibut and sablefish must be reported to NMFS via its mandatory "e-landings" reporting system.

**US Coast Guard Information**

Information from LCDR Jedediah Raskie Domestic Fisheries Enforcement Section Chief, U.S. Coast Guard District 17 (dre) on Federal Violations from 2022 and 2023 received on May 13, 2024.

**2022: 140 boardings, 13 violations**

- Aleutian Islands Subarea: 2 boardings, 1 violation for not retaining rockfish as required.
- Bering Sea Subarea: 8 boardings, 1 violation for no IFQ Permit onboard.

[7] https://www.federalregister.gov/documents/2024/07/19/2024-15930/fisheries-of-the-exclusive-economic-zone-off-alaska-essential-fish-habitat-amendments
[8] https://www.iphc.int/uploads/pdf/priph/iphc-2019-priphc02-06.pdf

- Gulf of Alaska Subarea: 54 boardings, 5 violations (1 violation for no IFQ Permit onboard, 1 violation for not logging bycatch, 1 violation for improper buoy markings, 1 violation for improperly retained and mutilated sport-caught/personal use halibut of 100 lbs./117 packages, 1 violation for improperly retained and mutilated sport-caught/personal use halibut of 6 packages).
- Southeast Alaska Subarea: 76 boardings, 6 violations (1 violation for not logging bycatch, 2 violations for no logbook onboard as required, 1 violation for no Hired Master Permit onboard, 1 violation for no IFQ Permit onboard, 1 violation for no active Federal Fisheries Permit).

**2023: 78 boardings, 10 violations**

- Aleutian Islands Subarea: 3 boardings, 3 violations (1 violation for not retaining rockfish as required, 1 violation for seven biodegradable pot panels being less than 18" as required, 1 violation for improper logbook entries)
- Bering Sea Subarea: 10 boardings, 2 violations (1 violation for improper logbook entries, 1 violation for not retaining rockfish as required).
- Gulf of Alaska Subarea: 29 boardings, 5 violations (2 violations for not retaining rockfish as required, 1 violation for not logging bycatch as required, 1 violation for improper logbook entries, 1 violation for biodegradable pot panels being less than 18" as required).
- Southeast Alaska Subarea: 36 boardings, no violations.

According to LCDR Jedediah Raskie, "the Alaska Halibut and Sablefish commercial fisheries can be categorized as fisheries with MEDIUM compliance. The violation rate is approximately double the overall fisheries compliance rate across all federal fisheries and all sectors (Commercial, Recreational, and Charter) that we enforce in Alaska" (Personal communication May 13, 2024).

**Alaska Wildlife Troopers**

Information from Captain Derek DeGraaf, Southern Detachment Commander, Alaska Wildlife Troopers received in May,20,2024

"In regard to the smaller amount of "state designated" Sablefish, here is what I could determine from our records for Jan 1, 2022, through Dec 31, 2023".

Violations Detected: 2

Types of Violations: Overlimit (13%, 8%)

Compliance: Very good.

Gear Loss: Very little.

## 7.8. Other information that may affect the outcome of certification.

There was no other information that may affect the outcome of certification.

## 7.9. Update on consistency to the fundamental clauses of the RFM Fishery Standard

There were no changes in the fishery relevant to the fundamental clauses of the RFM Fishery Standard. The fishery continues to conform to the requirements of all Fundamental Clauses of the RFM Fishery Standard.

### 7.9.1. Section A: The Fisheries Management System

#### 7.9.1.1. Fundamental Clause 1. Structured and legally mandated management system

| | |
|---|---|
| **1.** | **There shall be a structured and legally mandated management system based upon and respecting international, State, and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment.** |
| Summary of relevant changes: | Certified AK Pacific halibut and AK sablefish fisheries are in conformance with RFM Fundamental Clause 1. As summarized below, the evidence viewed during surveillance confirms that these fisheries continue to operate under a structured and legally mandated management system that respects international, and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment.<br><br>1.1. <u>There shall be an effective legal and administrative framework established at local and national level appropriate for the fishery resource and conservation and management.</u><br><br>**Halibut**<br>The management system for the Pacific halibut commercial fishery is highly structured and legally supported by federal and state statutes and regulations, including by international convention. Changes to the management system at the international and state levels in 2023 and 2024 were essentially those required to implement new or amended rules, and year-over-year adjustments to FMP measures, including allocative formulae (OFLs, ABCs, PSCs, GHLs, IFQ temporary transfers), opening and closing dates, bycatch monitoring, at-sea observer coverage levels, catch reporting, and halibut sorting on deck.<br><br><u>Management Strategy Evaluation</u><br><u>IPHC Management Strategy Evaluation and Harvest Strategy Policy Updates for 2023</u>[9]<br><u>Results of the 18th Session of the IPHC Management Strategy Advisory Board</u><br>The 18th Session of the IPHC Management Strategy Advisory Board (MSAB018) took place in May 2023, addressing membership, previous evaluations, and a Program of Work.<br>In summary, the MSAB:<br>a. Deliberated on succession planning for its members and the possibility of designating alternate members.<br>b. Expressed interest in creating outreach materials that elucidate the impact of environmental factors (e.g., Pacific Decadal Oscillation) on coastwide and regional stock dynamics, as well as the comparative effects of fishing.<br>c. Requested that the evaluation of annual and multi-year assessments occur following an agreement on a distribution procedure, incorporating elements such as multi-year management procedures (MPs), constraints on the coastwide Total Catch Equivalent Yield (TCEY), smoothing factors in stock distribution calculations, and various Spawning Potential Ratio (SPR) values.<br>d. Examined the definition of exceptional circumstances and potential responses to such situations.<br><br><u>Objectives and performance metrics</u><br>Four priority coastwide objectives are currently endorsed for the MSE.<br>a. Maintain the long-term coastwide female spawning stock biomass above a biomass limit reference point (B20%) at least 95% of the time.<br>b. Maintain the long-term coastwide female spawning stock biomass at or above a biomass threshold reference point (B36%) at least 50% of the time. |

[9] https://www.iphc.int/uploads/2024/01/IPHC-2024-MSE-01_MSE2023.pdf

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

c. Optimize average coastwide TCEY.
d. Limit annual changes in the coastwide TCEY.

Management Procedures (MPs)

The MSAB and the Scientific Review Board (SRB) have provided requests to investigate various MP elements. The following describes these elements of MPs that could be evaluated as part of the current MSE Program of Work.

Priority

- Annual and multi-year stock assessment MPs: These are management procedures that conduct a stock assessment annually or every 2nd or 3rd year and use an empirical MP based on the FISS survey trends to determine the TCEY in non-assessment years.
- Fishing intensity: A range of SPR values (i.e. fishing intensity, currently 43%) and alternative trigger reference points (currently 30%) in the harvest control rule.
- FISS reductions: Investigate scenarios where the FISS effort is reduced or occasionally eliminated in various IPHC Regulatory Areas.

Secondary

- Constraints: A constraint on the coastwide TCEY to reduce inter-annual variability. Past examples include a 15% constraint and a slow-up/fast-down approach.

Additional

- Absolute spawning biomass: Elements related to maintaining the spawning biomass above an absolute threshold.
- Stock distribution: A method to reduce the inter-annual variability in the estimates of stock distribution if used to distribute the TCEY to IPHC Regulatory Areas. This may include using the average of the stock distribution estimates over the past 3 years, for example.
- TCEY distribution: Procedures to distribute the TCEY to IPHC Regulatory Areas.

Updated 2023 operating model

The IPHC's MSE Operating Model for 2023 has been updated to reflect the 2022 stock assessment ensemble and is performing well for evaluating management procedures. The Scientific Review Board (SRB) reviewed the IPHC's MSE Operating Model (OM) for 2023 at the 22nd Session of the SRB (SRB022) and the 23rd Session of the SRB (SRB023) and endorsed the 2023 OM.

IPHC Harvest Strategy Policy [10]

The IPHC Secretariat is in the process of revising the IPHC harvest strategy policy (HSP) document, last amended in 2019, and a draft HSP is ready for the Commission's review.

This draft may be approved as a provisional HSP; however, further MSE efforts are required for a definitive HSP, acknowledging that the HSP may be revised at any point subsequent to additional MSE-related work. The essential MSE activities to undertake involve analyzing multi-year assessments using empirical methods to ascertain the coastwide TCEY in non-assessment years, and evaluating supplementary fishing intensities (i.e., SPR values) for each of those alternatives. The draft HSP outlines the decision-making process and the discretion the Commission would possess in management choices. This decision-making uncertainty is incorporated in the MSE risk analysis.

[10] https://www.iphc.int/uploads/2024/01/IPHC-2024-MSE-01_MSE2023.pdf

| 1. | There shall be a structured and legally mandated management system based upon and respecting international, State, and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment. |
|---|---|
| | The International Pacific Halibut Commission (IPHC) and NOAA's National Marine Fisheries Service (NMFS) collaboratively manage fishing for Pacific Halibut through regulations established under authority of the Northern Pacific Halibut Act of 1982[11]. The Act also provides the North Pacific Fishery Management Council with authority to develop regulations, including limited access regulations that are in addition to, and not in conflict with, approved IPHC regulations. Such Council-developed regulations may be implemented by NMFS only after approval by the Secretary of Commerce. The Council has exercised this authority most notably in the development of its IFQ Program.<br><br>Both agencies have well-established advisory committees (i.e., scientific, technical, policy, enforcement) that undertake monitoring and analysis of key indicators, performance assessment, policy and economic formulations, and other functions as necessary and all recommendations go through extensive review through an FMP implementation team.<br><br>The IPHC's regulations for 2024 were published on February 5, 2024. Sections 3 to 8 and 29 apply generally to all Pacific halibut fishing while Sections 9 to 22 apply to commercial fishing for Pacific halibut[12]<br><br>Regulatory Actions undertaken by the NPFMC, IPHC and NOAA for the 2023-2024 Commercial Halibut Fishery included:<br>**Halibut Annual Management Measures[13] (89 FR 19275)**<br>As provided by the Northern Pacific Halibut Act of 1982 (Halibut Act), the Secretary of State, with the concurrence of the Secretary of Commerce, may accept or reject, on behalf of the United States, regulations recommended by the IPHC in accordance with the Convention. 16 U.S.C. 773b. The Secretary of State, with the concurrence of the Secretary of Commerce, accepted the 2024 IPHC regulations on March 9, 2024, thereby making them effective.<br><br>The 2024 commercial halibut fishery opening date for all IPHC regulatory areas is March 15, 2024. The closing date for the commercial halibut fisheries in all IPHC regulatory areas is December 7, 2024.<br><br>**Amendment 124 to the BSAI FMP for Groundfish and Amendment 112 to the GOA FMP for Groundfish To Revise IFQ Program Regulations (88 FR 12259)[14]**<br>Effective February 27, 2023, NMFS issues a final rule to implement Amendment 124 to the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area (BSAI FMP) and Amendment 112 to the Fishery Management Plan for Groundfish of the Gulf of Alaska (GOA FMP). First, this final rule amends regulations for the Individual Fishing Quota (IFQ) and Community Development Quota (CDQ) Programs for pot gear configurations, pot gear tending and retrieval requirements, pot limits, and associated recordkeeping and reporting requirements. These changes increase operational efficiency and flexibility for IFQ holders and CDQ groups. Second, this final rule authorizes jig gear as a legal gear type for harvesting sablefish IFQ and CDQ, increasing |

[11] https://www.federalregister.gov/documents/2024/03/18/2024-05481/pacific-halibut-fisheries-catch-sharing-plan-2024-annual-management-measures
[12] https://www.iphc.int/uploads/2024/02/IPHC-Fishery-Regulations-2024-5-Feb.pdf
[13] https://www.federalregister.gov/documents/2024/03/18/2024-05481/pacific-halibut-fisheries-catch-sharing-plan-2024-annual-management-measures#:~:text=For%202024%2C%20the%20IPHC%20adopted,entire%20season%3B%20and%203)%20a
[14] https://www.federalregister.gov/documents/2023/06/23/2023-13391/fisheries-of-the-exclusive-economic-zone-off-alaska-amendment-124-to-the-bsai-fmp-for-groundfish-and

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

opportunities for entry-level participants. Third, this final rule temporarily removes the Adak community quota entity (CQE) residency requirement for a period of five years.

**Fisheries of the Exclusive Economic Zone Off Alaska; Gulf of Alaska; Final 2023 and 2024 Harvest Specifications for Groundfish (88 FR 13238)**[15]
Effective March 2, NMFS announces final 2023 and 2024 harvest specifications, apportionments, and Pacific halibut prohibited species catch limits for the groundfish fishery of the Gulf of Alaska (GOA). This action is necessary to establish harvest limits for groundfish during the remainder of the 2023 and the start of the 2024 fishing years and to accomplish the goals and objectives of the Fishery Management Plan for Groundfish of the Gulf of Alaska (FMP).

**Fisheries of the Exclusive Economic Zone Off Alaska; Bering Sea and Aleutian Islands; Final 2023 and 2024 Harvest Specifications for Groundfish 88 (FR 14926)**[16]
Effective March 10, 2023, NMFS announces final 2023 and 2024 harvest specifications, apportionments, and prohibited species catch allowances for the groundfish fishery of the Bering Sea and Aleutian Islands management area (BSAI). This action is necessary to establish harvest limits for groundfish during the remainder of the 2023 and the start of the 2024 fishing years and to accomplish the goals and objectives of the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area (FMP).

**Fisheries of the Exclusive Economic Zone Off Alaska; Pacific Halibut Fisheries; Catch Sharing Plan; Rulemaking To Modify the 2023-2027 Halibut Individual Fishing Quota (IFQ) Vessel Harvest Limitations in IFQ Regulatory Areas 4A, 4B, 4C, and 4D (88 FR 48137)**[17]
Effective July 27, 2023, NMFS issues this final rule to revise regulations for the commercial individual fishing quota (IFQ) Pacific halibut (halibut) fisheries for 2023 through 2027. This rule removes limits on the maximum number of halibut IFQ that may be harvested by a vessel, commonly known as vessel use caps, in IFQ Regulatory Areas 4A (Eastern Aleutian Islands), 4B (Central and Western Aleutian Islands), 4C (Central Bering Sea), and 4D (Eastern Bering Sea). This action provides additional flexibility and stability to IFQ participants in Areas 4A, 4B, 4C, and 4D while a longer-term modification of vessel use caps is considered.

**Fisheries of the Exclusive Economic Zone Off Alaska; Bering Sea and Aleutian Islands Halibut Abundance-Based Management of Amendment 80 Prohibited Species Catch Limit (88 FR 82740)**[18]
Effective January 2024, NMFS issues this final rule to implement Amendment 123 to the Fishery Management Plan (FMP) for Groundfish of the Bering Sea and Aleutian Islands (BSAI) Management Area (BSAI FMP). This final rule amends the regulations governing limits on Pacific halibut (*Hippoglossus stenolepis*) (halibut) prohibited species catch (PSC) to link the halibut PSC limit for the

[15] https://www.federalregister.gov/documents/2023/03/02/2023-04315/fisheries-of-the-exclusive-economic-zone-off-alaska-gulf-of-alaska-final-2023-and-2024-harvest
[16] https://www.federalregister.gov/documents/2023/03/10/2023-04877/fisheries-of-the-exclusive-economic-zone-off-alaska-bering-sea-and-aleutian-islands-final-2023-and
[17] https://www.federalregister.gov/documents/2023/07/26/2023-15816/pacific-halibut-fisheries-catch-sharing-plan-rulemaking-to-modify-the-2023-2027-halibut-individual
[18] https://www.federalregister.gov/documents/2023/11/24/2023-25513/fisheries-of-the-exclusive-economic-zone-off-alaska-bering-sea-and-aleutian-islands-halibut

| | | |
|---|---|---|
| **1.** | **There shall be a structured and legally mandated management system based upon and respecting international, State, and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment.** | |
| | | Amendment 80 commercial groundfish trawl fleet in the BSAI groundfish fisheries to halibut abundance.<br><br>**Fisheries of the Exclusive Economic Zone Off Alaska;Bering Sea and Aleutian Islands; Revised Final 2023 and 2024 Harvest Specifications for Groundfish (88 FR 84754)**[19]<br>Effective January 2024, NMFS publishes revisions to the final 2023 and 2024 harvest specifications for the 2024 groundfish fisheries of the Bering Sea and Aleutian Islands management area (BSAI) that are required by the final rule implementing Amendment 122 to the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area (FMP). This action is necessary to revise the 2024 trawl catcher vessel sector's Pacific cod allocation of the total allowable catch and associated halibut and crab prohibited species catch (PSC) limits in the BSAI.<br><br>**Fisheries of the Exclusive Economic Zone off Alaska; Essential Fish Habitat Amendments (89 FR 58632)**[20]<br>Effective July, 7, 2024, NMFS announces the approval of amendment 127 to the Fishery Management Plan (FMP) for Groundfish of the Bering Sea and Aleutian Islands Management Area (BSAI), amendment 115 to the FMP for Groundfish of the Gulf of Alaska (GOA), amendment 56 to the FMP for BSAI King and Tanner Crabs, amendment 17 to the FMP for the Salmon Fisheries in the exclusive economic zone (EEZ) off Alaska, and amendment 3 to the FMP for Fish Resources of the Arctic Management Area (amendments). These amendments revise the FMPs by updating the description and identification of essential fish habitat (EFH) and updating information on adverse effects on EFH from fishing and non-fishing activities based on the best scientific information available.<br><br>**Sablefish**<br>Sablefish in federal waters are managed by regions to distribute exploitation. The acceptable biological catch (ABC) is apportioned between these regions and then allocated between gear types. A stock assessment is performed annually for the federal fishery using an age-structured model; this assessment is reviewed by the North Pacific Management Council (Goethel.,2023). The sablefish fishery's management plan for 2023 for the state's NSEI and SSEI sub-districts included a small number of regulatory provisions and rules as needed to ensure that management measures reflected decisions made and were legally binding and enforceable. Typically, these regulatory actions/rules included changes to fleet and area allocation tables, fishing gear characteristics, quota sharing, bycatch provisions, area closures, opening and closing dates etc. These changes were necessary in order to manage exploitation more efficiently.<br><br>Regulatory actions undertaken by the NPFMC, NMFC and NOAA for the 2023-2024 Commercial sablefish fishery included.<br>**Fisheries of the Exclusive Economic Zone off Alaska; Amendment 124 to the BSAI FMP for Groundfish and Amendment 112 to the GOA FMP for Groundfish To Revise IFQ Program Regulations (88 FR 12259)**<br>See halibut information. |

[19] https://www.federalregister.gov/documents/2023/12/06/2023-26639/fisheries-of-the-exclusive-economic-zone-off-alaska-bering-sea-and-aleutian-islands-revised-final

[20] https://www.federalregister.gov/documents/2024/07/19/2024-15930/fisheries-of-the-exclusive-economic-zone-off-alaska-essential-fish-habitat-amendments

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

**Fisheries of the Exclusive Economic Zone off Alaska; Fisheries of the Exclusive Economic Zone Off Alaska; Gulf of Alaska; Final 2023 and 2024 Harvest Specifications for Groundfish (88 FR 13238)**
See halibut information.
**Fisheries of the Exclusive Economic Zone off Alaska; Bering Sea and Aleutian Islands; Final 2023 and 2024 Harvest Specifications for Groundfish 88 (FR 14926)**
See halibut information.

**Fisheries of the Exclusive Economic Zone off Alaska; Bering Sea and Aleutian Islands; Revised Final 2023 and 2024 Harvest Specifications for Groundfish (88 FR 84754)**
See halibut information.

**Fisheries of the Exclusive Economic Zone Off Alaska; Sablefish Managed Under the Individual Fishing Quota Program (88 FR 14512)**
Effective March 10, 2024, NMFS is opening directed fishing for sablefish with fixed gear managed under the Individual Fishing Quota (IFQ) Program and the Community Development Quota (CDQ) Program. The season will open 1200 hours, Alaska local time (A.l.t.), March 10, 2023, and will close 1200 hours, A.l.t., December 7, 2023.

**Fisheries of the Exclusive Economic Zone off Alaska; Essential Fish Habitat Amendments (89 FR 58632)**
See halibut information.

**Regulatory Actions undertaken for the 2023-2024 Commercial sablefish fishery in state waters.**
The 2023 Northern Southeast Inside (NSEI) Subdistrict commercial sablefish fishery annual harvest objective (AHO) is 1,393,659 round pounds[21]. The AHO is based on the sablefish recommended acceptable biological catch (ABC) with decrements made for sablefish mortality in other fisheries. There are 73 valid Commercial Fisheries Entry Commission (CFEC) permits for 2023, which is the same number of permits as in 2022. The individual equal quota share (EQS) is 19,091 round pounds, a 13% increase from the 2022 EQS of 16,899 round pounds. The recommended 2023 ABC is 1,573,109 round lb. ($F$ABC = 0.063), a 9% increase from the 2022 ABC.

Regulatory Updates from the 2023 Statewide Finfish and Supplemental Issues Board of Fisheries Meeting Regulations adopted at the 2023 Statewide Finfish and Supplemental Issues Board of Fisheries meeting that affect the NSEI sablefish fishery.
These updates are effective since June 25, 2023, and are summarized as follows:
**Gear Marking Requirements**
Sablefish permit holders operating longlined pot gear in the directed NSEI sablefish fishery must have an attached buoy at each end of a groundfish pot longline marked with the permanent ADF&G vessel plate number of the vessel operating the groundfish longlined pot gear and the buoy must have the letters "LP" to designate the gear as longlined groundfish pot gear. The numbers and letters must be marked in the top one-half of the buoy in numbers and letters that are at least four inches high, one-half inch wide, and in a color that contrasts with the color of the buoy [5 AAC 28.050(b)[22]].

[21] https://www.adfg.alaska.gov/static/applications/dcfnewsrelease/1480926625.pdf
[22] https://www.law.cornell.edu/regulations/alaska/5-AAC-28-050

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

**Legal Gear**
Collapsible groundfish pots ("slinky pots") must contain two escape mechanism openings in the mesh with each equal to or exceeding 18 inches in length that must be laced, sewn, or secured together by a single length of untreated, 100-percent cotton twine, no larger than 30 thread of which may be knotted at each end only and must be on opposite sides of the pot. If the escape mechanism is placed on the tunnel side, the opening must be in an area that does not include the pot door and within six inches of the edge of the pot [5 AAC 39.145][23].

Permit holders are reminded that sablefish pot gear must have at least two circular escape rings, with a minimum inside diameter of three and three-fourths inches, installed on opposing vertical or sloping walls of the pot and individual tunnel eye openings with perimeters of 36 inches or less [5 AAC 28.130 (f)][24].

The 2023 Southern Southeast Inside (SSEI) Subdistrict sablefish commercial annual harvest objective (AHO) is 643,360 round pounds, the same as the 2022 AHO. Equal quota share (EQS) for each of the 22 permit holders will be 29,244 round pounds[25].

**Sablefish MSE - Management strategy evaluation for Alaska Sablefish[26]**
Alaskan sablefish (*Anoplopoma fimbria*) are presently regulated under the F40 harvest control rule (HCR) established by the North Pacific Fishery Management Council (NPFMC). Nevertheless, sablefish are a long-lived, comparatively slow-growing species, and generic harvest control rules (HCRs) designed to optimize annual harvests (such as spawner-per-recruit, SPR, based maximum sustainable yield proxies) may not effectively meet essential conservation and fishery performance objectives (such as preserving a robust age structure and maximizing long-term fishery yield). In response to scientific and stakeholder concerns about the robustness of the existing Harvest Control Rule (HCR) for sablefish, a closed-loop simulation tool will be created and utilized to assess the efficacy and robustness of both current and alternative HCRs, as well as spawning metrics, via management strategy evaluation (MSE; Punt *et al.,* 2016). The objective of the study is to establish Harvest Control Rules (HCRs) that can fulfill both conservation and economic objectives, while also examining how assumptions related to the computation of spawning potential influence the robustness of HCRs.

**Alaska Bycatch Review Task Force[27]**
Established in November 2021, the Task Force's objective is to help better understand unintended bycatch of high value fishery resources in state and federal waters. Its mandate which sunsets on November 30, 2022, is to:

- Study what impacts bycatch has on fisheries.
- Evaluate and recommend policies informed by a better understanding of the issue of bycatch of high-value Alaska fishery resources.
- Ensure state agencies are leveraging available resources to better understand the issue of bycatch.
- Utilize the best available science to inform policy makers and the public about these issues

[23] http://www.touchngo.com/lglcntr/akstats/aac/title05/chapter039/section145.htm
[24] https://www.law.cornell.edu/regulations/alaska/5-AAC-28-130
[25] https://www.adfg.alaska.gov/static/applications/dcfnewsrelease/1471277681.pdf
[26] https://github.com/Ovec8hkin/SablefishMSE
[27] https://www.adfg.alaska.gov/index.cfm?adfg=bycatchtaskforce.main

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

The final report of the ABRT was published on December 8, 2022, and contains recommendations for the Governor on research, state engagement, and management measures related to bycatch.

Among the research and management recommendations were as follow:

**Research Recommendations**

Top Priority: Investigate better ways to estimate total removals and discard mortality.

Other issues identified by the Gulf of Alaska Halibut and Salmon Committee:

a) Study the impacts of repeated capture/discarding of females, sublegal, and legal males.
b) Impacts of fish gear types on halibut habitat.
c) Increase tagging studies to better understand movement between areas.
d) Investigate halibut diet and growth rate to better understand changes in length at age.
e) Studies on size limit and trade-offs (ongoing at IPHC and report due in October 2022).
f) Determine relative fecundity of halibut based on size and age and estimate impact on halibut stocks.

**Management recommendations.**

Gulf of Alaska Trawl Gear

- Recommend the State of Alaska initiate review of the open and closed areas in the GOA for pelagic and non-pelagic trawl gear and consider closing new/additional areas to reduce the bycatch of halibut, salmon, and Tanner crab.
- Recommend the State of Alaska propose that the NPFMC consider development of an abundance-based management program for halibut bycatch in the GOA as a way to address bycatch during fluctuations of halibut biomass.

On March 10, 2023, the Commissioner of Fish and Game established the Bycatch Advisory Council to advise the department on ways to implement the recommendations contained within the final report of the Alaska Bycatch Review Task Force.

1.2. Management measures shall take into account the whole stock unit over its entire area of stock distribution.

**Halibut**

The IPHC is a bilateral, international treaty, established with the primary purpose of managing the whole pacific halibut stock over its entire area of distribution which extends from California to the Bering Sea[28]. As the biological stock unit encompasses multiple jurisdictions (U.S. and Canada) the IPHC considers exploitation by all parties when defining exploitation levels and determining stock health to avoid overfishing/depletion of the resource. IPHC conducts extensive research on Pacific Halibut throughout the entire area through which the species migrates during its life cycle. Additionally, the IPHC explicitly considers halibut life cycle and migration when recommending apportionment of catch limits between regulatory areas. Within the Alaskan EEZ, NPFMC and NMFS also consider the entire range through which halibut migrate during its life cycle.

The IPHC Secretariat is undertaking research on the habitat and mobility of juvenile Pacific halibut by conventional wire tagging, alongside genomic investigations to provide valuable insights into

[28] https://www.iphc.int/uploads/pdf/priphc/priphc0202/iphc-2019-priphc02-r.pdf

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

population structure, distribution, and connectivity of Pacific halibut[29]. The significance of research findings from these activities for stock assessment lies in (1) the potential modification of future stock assessment frameworks, as distinct assessments may be developed if functionally isolated population components are identified (e.g., IPHC Regulatory Area 4B), and (2) the enhancement of productivity estimates, as this data may inform the establishment of management objectives for minimum spawning biomass by Biological Region.

UPDATES

Identification of juvenile habitat for Pacific halibut[30].

The IPHC Secretariat recently examined the connectivity between spawning grounds and potential settlement regions utilizing a biophysical larval movement model (Sadorus *et al.,* 2021). While it is established that Pacific halibut commence their demersal phase as approximately 6-month-old juveniles after the pelagic larval stage and settle in shallow nursery areas near or beyond bay mouths (Carpi *et al.,* 2021), scant information exists regarding the geographic locations and physical attributes of these areas.

The IPHC Secretariat commenced research to determine prospective settlement places for juvenile Pacific halibut within IPHC Convention waters and to ascertain appropriate habitat characteristics for these settlement grounds. The data mining of various sources, including IPHC's historical databases and other public and private agencies that have gathered pertinent data for this project, has yielded catch locations for a total of 52,356 Pacific halibut aged 0-2, recorded from 1946 to 2022 (data sources listed in Table 1 of IPHC-2023-SRB022-09).

Estimated ages are derived from either direct age assessment using otolith analysis or fork length measurements in the absence of otolith data. An additional 1,430 study sites identified as plausible nursery habitats for flatfish in Alaska, based on bottom depth data (less than 50 meters), were sampled using appropriate fishing gear for small flatfish (e.g., beach seines and beam trawls) and recorded as stations where Pacific halibut were absent. The IPHC Secretariat is actively gathering substrate data, some of which has been documented alongside species capture data, such as specific entries in NOAA's Nearshore Fish Atlas database and overlays produced using the United States Geological Survey usSEABED sediment database. The IPHC Secretariat is actively seeking more sources of sediment and substrate data inside the Convention Area.

In the summer of 2023, collaborative efforts commenced with Alaska Coastal Observations and Research (ACOR) and the University of Alaska Fairbanks to extract data from unpublished records documenting juvenile Pacific halibut encounters in beach seines conducted off Kodiak Island, Afognak Island, and Kachemak Bay, Alaska, during the 1990s.

Wire tagging of U32 Pacific halibut study[31]

The migration patterns of Pacific halibut between IPHC Regulatory Areas significantly impact the management of the Pacific halibut fisheries. The IPHC Secretariat has conducted an ongoing research investigation on the migratory patterns of Pacific halibut utilizing externally visible wire tags on

[29] https://www.iphc.int/research/migration-and-population-dynamics/
[30] https://www.iphc.int/uploads/pdf/srb/srb023/iphc-2023-srb023-08.pdf
[31] https://www.iphc.int/uploads/pdf/srb/srb023/iphc-2023-srb023-08.pdf

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

captured and released specimens, which must be retrieved and returned by fishing industry personnel.

In 2015, to enhance knowledge regarding the movement and growth of juvenile Pacific halibut (under 32 inches [82 cm]; U32), the IPHC initiated wire-tagging of small Pacific halibut encountered during the National Marine Fisheries Service (NMFS) groundfish trawl survey and, commencing in 2016, during the IPHC fishery-independent setline survey (FISS).

In 2022, 1,499 Pacific halibut were tagged and released via the IPHC FISS, but no tagging occurred in the NMFS groundfish trawl surveys that year. A total of 8,931 U32 Pacific halibut have been wire tagged and released in the IPHC FISS, with 205 of those retrieved to date; these figures include a subset of U32 releases associated with a tail pattern experiment. As of 2019, the NMFS groundfish trawl surveys have released a total of 6,421 tags, with 78 tags retrieved to date.

Population genomics study.[32]
The main purpose of the present study was conducting an analysis of Pacific halibut population structure in IPHC Convention waters using state-of-the-art low-coverage whole genome resequencing methods. For this purpose, the IPHC Secretariat used genetic samples from male and female adult Pacific halibut collected during the spawning (winter) season in five known spawning grounds: Western and Central Aleutian Islands, Bering Sea, Central Gulf of Alaska and British Columbia.

The results showed that notwithstanding the application of a high-resolution genomic methodology, initial assessments of population structure utilizing a genome-wide selection of 4.7 million SNPs revealed the absence of discernible genetic groups within the dataset. Various techniques were employed to delineate population structure: principal component analysis indicated a significant level of genetic similarity among samples from diverse geographic regions while unsupervised clustering methods (K-means clustering and admixture proportion estimation) similarly did not identify distinct genetic groups. The results indicate minimal spatial structure among the five spawning groups examined across various geographic regions within IPHC Convention Waters. Additionally, assignment testing was conducted to evaluate our proficiency in appropriately attributing samples to their original collection locations. The correctness of the assignment was verified by cross-validation methods, revealing a restricted capacity to correctly attribute samples to their original geographic locations. This the lack of distinct genetic groupings in the sample collections results from significant gene flow among the geographic regions examined in this work, and therefore, reflects the genetically panmictic nature of the Pacific halibut population analyzed.

The observed absence of spatial structure is unsurprising considering the existing knowledge of Pacific halibut biology. Estimated annual migration rates derived from tag recovery data indicate substantial possibilities for individuals to move across IPHC Regulatory Areas during their entire life span (Webster *et al.*, 2013). Analysis of tag recovery data indicates that roughly 11% of Pacific halibut tags have been recovered in a different IPHC Regulatory Area from their release location (Carpi *et al.*, 2021). This indicates that, although it varies by Regulatory Area, the observed percentage of migrants surpasses 10% in most IPHC Regulatory Areas (Carpi *et al.*, 2021). Furthermore, substantial

[32] www.iphc.int/uploads/2024/10/IPHC-2024-IM100-15-Report-on-research-activities.pdf

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

oceanographic connectivity between the Bering Sea and Gulf of Alaska has been associated with a significant extent of larval exchange between these regions. Estimates indicate that 47%-58% of larvae from spawning areas in the Western Gulf of Alaska are transported to the Bering Sea (Sadorus *et al.*, 2021). The rates for larvae from spawning grounds in the Eastern Gulf of Alaska can reach as high as 4.5%-8.6% (Sadorus *et al.*, 2021).

Thus, in conclusion, although the utilization of high-resolution genomic techniques to analyze genomic variance in spawning groups of Pacific halibut collected across extensive spatial and temporal scales, the findings herein align with genetic panmixia.

**Sablefish**

The NMFS and ADFG conduct assessment surveys on sablefish in Alaskan waters[33]. The NMFS conducts an annual longline survey and a triennial trawl survey in the Gulf of Alaska, and ADFG performs annual longline surveys in Chatham and Clarence Strait. These surveys provide estimates of catch per unit effort, relative abundance, and biological data all critical input to the stock assessment model and to informing abundance trends by geographical area. In addition, tagging studies exist to study sablefish movement for federal, state, and Canadian waters such studies integral to refining sablefish migration patterns. The ADFG conducts an annual tagging survey in Chatham Strait as part of a mark-recapture study to estimate population abundance.

Federally managed sablefish found in the Bering Sea and in the Gulf of Alaska are considered one population with migration occurring between these regions (Goethel *et al.*, 2023). In the Gulf of Alaska, small sablefish move westward, and large sablefish move eastward. Consequently, large year classes are first noticed in the westward areas. In Southeast Alaska, the Chatham and Clarence Strait fisheries are considered separate populations; however, tagging studies indicate some movement between Chatham Strait and outside waters and between Clarence Strait and British Columbia waters. The degree of migration between inside and outside waters has not been quantified.

Sablefish are assessed as a single population in Federal waters off Alaska with management and regulatory decisions being implemented at the regulatory area level (Goethel *et al.,* 2023). The NPFMC explicitly considers sablefish life cycle and migration patterns when recommending apportionments of Allowable Biological Catch (ABC) and Overfishing Limit (OFL) between regulatory areas.

As the biological stock unit encompasses multiple national jurisdictions (i.e., U.S. state and federal) the NPFMC and NMFS consider exploitation by all parties when defining exploitation levels and determining stock health to avoid overfishing/depletion of the resource. The NPFMC apportions the ABC and OFL between regulatory areas based on a 5-year exponential weighting of the survey and fishery abundance indices.

Although sablefish found in the Bering Sea and in the Gulf of Alaska are considered one population, there are studies stating there are some spatial structures. Sablefish have historically been classified into two stocks: a northern population residing in seas from northern British Columbia northward, and a southern stock located from southern British Columbia southward (Kimura *et al.,* 1998; Head

[33] https://www.adfg.alaska.gov/index.cfm?adfg=fishresearch.sablefish

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

*et al.,* 2014). These hypothetical stocks exhibit variations in growth and maturity, with fish located north of British Columbia's northern boundary attaining bigger sizes (Head *et al.,* 2014). A more recent study, Kapur *et al.* (2020) analyzed spatial growth patterns and found evidence of additional zonation associated with oceanographic features.

Most previous genetic studies on sablefish have found panmixia throughout most of their range. However, a recent study suggested that there may be population structure.

Orozco-Ruiz *et al.* (2023) genotyped individuals from Mexico to the Kamchatka Peninsula utilizing microsatellites and mitochondrial DNA , concluding that significant population structure exists within the species. Orozco-Ruiz *et al.* (2023) identified genetic structure between their southernmost location (Mexico) and the remainder of the species' distribution using microsatellites, as well as between certain northern sites (Russian waters off the Kamchatka Peninsula) and the rest of the geographic range utilizing mtDNA. Furthermore, Orozco-Ruiz *et al.,* (2023) examined genetic structure patterns in the microsatellite dataset using discriminant analysis of principal components for males, females, and both sexes combined, in the Bering Sea (excluding Russian waters off Kamchatka) and the Gulf of Alaska. This study indicated genetic structure among certain sites in this region when both sexes were aggregated and, in the male, specific dataset, but not in the female-specific dataset.

Currently NOAA Auke Bay lab has a research program focusing into the migration and stock structure of sablefish in Alaska.

Genetics studies[34]

Due to recent different results in genetics studies inferring distinct stock structure in sablefish, Trimm *et al.* (2024) used a high-resolution genetic approach to enhance understanding of the genetic structure of sablefish in Alaska. Collection locations were categorized into four geographic regions: the Bering Sea and Aleutian Islands. the western Gulf of Alaska, the eastern Gulf of Alaska, and the coastline of Washington State, USA.

The findings of Trimm *et al.* (2024) revealed no evidence of genetic structure in sablefish, based on data from millions of genotyped SNPs from individuals spanning Washington State, USA, to the Bering Sea and Aleutian Islands, AK, USA. This research the first analysis primarily on juvenile samples, which are likely more representative of spawning groups than adults due to their reduced dispersal time; yet there is no evidence of genetic structure.

The genome resequencing and RAD-seq data examined offer compelling evidence of panmixia in sablefish across their northern distribution, extending from the West Coast of the United States to the Bering Sea and Aleutian Islands. This outcome aligns with previous genetic research and the life history of sablefish, characterized by frequent and extensive migrations. The results obtained further substantiate that the existing management plan for sablefish in the northern region of their distribution, predicated on high migration rates and genetic panmixia, is adequate.

[34] https://academic.oup.com/icesjms/article/81/6/1096/7687945

| | | |
|---|---|---|
| **1.** | **There shall be a structured and legally mandated management system based upon and respecting international, State, and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment.** | |
| | | Spatial model development from implementation of a tag-integrated assessment for Alaskan sablefish[35]<br>Currently a single, panmictic population is modeled with quotas apportioned to management areas based on area-specific survey biomass. However, significant ontogenetic spatial heterogeneity exists in the population distribution resulting from age-based habitat.<br><br>NOAA Auke bay Lab is developing spatially explicit, tag-integrated model to estimate regional biomass and account for movement among areas. This model can be used as a companion to the single region operational assessment to better identify regional and spatial dynamics of the resource and fishery.<br><br>The preliminary findings[36] suggest that the existing single region model for Alaskan sablefish is probably appropriate for management recommendations, considering the population's panmictic traits. Nonetheless, spatial models also revealed regional variations in sablefish recruitment and age composition. Furthermore, through the application of a comprehensive modeling approach, new ecological insights were generated into the movement dynamics of this highly mobile species, indicating the presence of age-based movement patterns, and suggesting that inter-regional movement is likely less pronounced than when examining tagging data independently. Thus, it can be recommended the use of the single region model for management guidance; however, periodic updates of the spatial model may yield further insights on recruitment distribution and the risk of regional depletion of older sablefish.<br><br>1.3./1.4./1.5/ Transboundary stocks<br>**Halibut**<br>The IPHC considers management of the stock throughout its full range and leads a cooperative forum which is structure between the U.S. and Canada that provides for a joint management and conservation system aimed at ensuring effective conservation and management of the Eastern North Pacific Halibut stock and its environment. Since 2014, the IPHC implemented Management Strategy Evaluation with frameworks for performance review with regards to specific conservation objectives; in addition, the setline survey areas were expanded including areas 2A and 4A; also, the established halibut fishery bycatch working group is focused on reduction of discard mortality levels across the full range of the fishery[37]. The IPHC explicitly considers halibut life cycle and migration when recommending apportionment of catch limits between regulatory areas (Stewart and Hicks, 2024). Within the Alaskan EEZ, NPFMC and NMFS also consider the entire range through which halibut migrate during its life cycle.<br><br>**Sablefish**<br>The GOA and BSAI sablefish stocks are both considered parts of the same stock but separate from sablefish further south along the southern coast of British Columbia and the U.S. west coast (Goethel *et al.,* 2023). There is no legal harvesting of sablefish in North Pacific waters outside the national jurisdiction of the U.S. or Canada. Similarly, there is no sablefish harvesting by U.S. vessels in Canadian waters, or by Canadian vessels in U.S. waters. |

[35] https://spo.nmfs.noaa.gov/content/tech-memo/proceedings-14th-national-stock-assessment-workshop-and-4th-biennial-meeting
[36] https://github.com/chengmatt/SpatialSabieModel
[37] https://www.iphc.int/uploads/2024/01/IPHC-2024-MSE-01_MSE2023.pdf

| | |
|---|---|
| **1.** | **There shall be a structured and legally mandated management system based upon and respecting international, State, and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment.** |
| | Canada-U.S. Groundfish Committee Technical Subcommittee (TSC)[38]<br>The Technical Subcommittee of the Canada-U.S. Groundfish Committee (TSC) was formed in 1960 out of a need to coordinate fishery and scientific information resulting from the implementation of commercial groundfish fisheries operating in US and Canadian waters off the West Coast. Today, representatives from Canadian and American state and federal agencies meet annually to exchange information and to identify data gaps and information needs for groundfish stocks of mutual concern from California to Alaska.<br><br>Each agency compiles a detailed annually report that emphasizes survey and research endeavors, encompassing stock assessments. The TSC evaluates agency reports and advocates for coordinated efforts or organizes workshops on mutually relevant subjects. Historically, the TSC has compiled catch databases that resulted in the establishment of the Pacific Fisheries Information Network (PacFIN) catch reporting system, included the hosting of 24 scientific and management conferences, the organization of 25 working groups, and the foundation of the Committee for Age Reading Experts (CARE). Annually, the TSC deliberates and proposes measures to enhance and synchronize groundfish science across agencies, with these suggestions forwarded to agency leaders and managers to guide research and management objectives.<br><br>The Pacific Sablefish Transboundary Assessment Team (PSTAT)[39]<br>The Pacific Sablefish Transboundary Assessment Team (PSTAT), created in 2017, is a research cooperation involving the Alaska Fisheries Science Center, the Northwest Fisheries Science Center, the Alaska Department of Fish and Game, and the Department of Fisheries and Oceans Canada. The objective of the PSTAT is to facilitate collaboration among scientists and managers across jurisdictions to enhance the study of sablefish population dynamics throughout the Pacific.<br><br>Based on recent work showing sablefish to be genetically mixed across the range, tagging studies confirming high movement rates, and the range wide synchrony in biomass trends, including declines and subsequent stock increases during the last decade, these observations led scientists in the PSTAT team to consider whether evaluating the stock as a spatially structured population might reveal transboundary dynamics and/or improve management outcomes at the regional scale.<br><br>A management strategy evaluation was developed with stakeholders and scientists to investigate whether spatially structured management paradigms might result in better conservation and economic outcomes[40].<br><br>The MSE for sablefish populations in Alaska, British Columbia and Southern US West Coast utilizes a spatially explicit transboundary operational model that integrates movement rates from the tagging model and spatially dynamic demographics to simulate sablefish dynamics with varying spatial complexities d potential stratifications, and harvest control rules (Kapur *et al*., 2024). |

[38] https://www.psmfc.org/tsc2/
[39] https://www.pacificsablefishscience.org/
[40] https://cdnsciencepub.com/doi/10.1139/cjfas-2024-0008

| 1. | There shall be a structured and legally mandated management system based upon and respecting international, State, and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment. |
|---|---|
| | The study found that the "status quo" management paradigm (three separate areas, blind to movement, individual region-specific HCRs) led to undesirable management outcomes. However, there were several management procedures with only minor model differences from the status quo that avoided these outcomes, including accounting for movement and applying consistent HCRs across management regions.<br><br>1.6 <u>The means to finance fisheries management organizations are agreed and such arrangements aim to recover costs of fisheries conservation, management, and research</u><br>In 1996, the Magnuson-Stevens Act (MSA) was amended to, among other purposes, require the Secretary of Commerce to "collect a fee to recover the actual costs directly related to the management and enforcement of any individual quota program." This requirement was further amended in 2006 to include collection of the actual costs of data collection and to replace the reference to "individual quota program" with a more general reference to "limited access privilege program" at § 304(d)(2)(A) of the Act. Section 304(d)(2) of the Act also specifies an upper limit on these fees, when the fees must be collected, and where the fees must be deposited[41].<br><br>NOAA Fisheries (NMFS) and PFMC are funded by Congressional appropriation and cost recovery from limited access privilege programs, as required by the MSA. Annually, NOAA Fisheries publishes the individual fishing quota standard prices and fee percentage for cost recovery for the IFQ Program for the Pacific halibut and sablefish fisheries of the North Pacific. The percentage fee for 2023 was 3%[42]. This action is intended to provide holders of halibut and sablefish IFQ permits with the standard prices and fee percentage to calculate the required payment for IFQ cost recovery fees due on or before the date in the notice. The total dollar amount of the fee is determined by multiplying the NMFS published fee percentage by the ex-vessel value of all IFQ landings made on the permit(s) during the IFQ fishing year.<br><br>The operating and capital budget of the ADFG consists of a variety of funding sources, including federal receipts, general fund receipts, fish and game fund receipts, and several other sources[43]. All of the state budgets are submitted through the State Office of Management and Budget (OMB) and funded by the state legislature[44]. In addition, state enforcement activities are routinely enhanced by NOAA Fisheries (NMFS) via Joint Enforcement Agreements that are intended to supplement state enforcement of federal laws but may include non-operational activities such as new asset acquisitions or replacements, and enhanced training.<br><br>IPHC budgetary appropriations are granted by the US Congress and the Canadian Parliament as provided by the Convention[45]. Appropriations to other federal agencies like NOAA Fisheries (NMFS) are subject to statutory provisions as set forth in the MSA (or other statutes) and the Congressional budgetary appropriations process[46]. Alaska state agencies undergo a similar Fiscal year review and approval process by their Legislature. |

[41] https://www.govinfo.gov/content/pkg/FR-2018-12-12/html/2018-26875.html
[42] https://www.federalregister.gov/documents/2023/12/28/2023-28707/fisheries-of-the-exclusive-economic-zone-off-alaska-north-pacific-halibut-and-sablefish-individual
[43] https://www.adfg.alaska.gov/index.cfm?adfg=about.budgets
[44] https://omb.alaska.gov/
[45] www.iphc.int/uploads/2024/07/IPHC-2024-CR-018-FOR-DECISION-FY2025-Budget.pdf
[46] https://crsreports.congress.gov/product/pdf/R/R48157

| | | |
|---|---|---|
| **1.** | **There shall be a structured and legally mandated management system based upon and respecting international, State, and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment.** | |
| | | 1.7. Review and Revision of conservation and management measures.<br>**Federal organizations**<br>The IPHC, NOAA Fisheries and the NPFMC have procedures at multiple levels to undertake periodic reviews of their mandated programs, measures, and activities. They employ an adaptive management approach at the national (and international) level of the Pacific Halibut and AK Sablefish fisheries to inform their routine periodic reviews. All three agencies conduct assessments and research related to fishery impacts on ecosystems and habitats and how environmental factors affect the fishery. Findings and conclusions are published in the Ecosystem section of the SAFE documents, annual Ecosystem Considerations documents, and various other research reports. For example:<br><br>The IPHC's Scientific Review Board (SRB) is mandated by the Commission's Rules of Procedure (2023[47]; Appendix VIII, Sect.1, para.1-3) to provide an independent scientific peer review of the Commission science/research proposals, programs, and products, including but not limited to:<br>a. Data collection<br>b. Historical data sets<br>c. Stock assessment<br>d. Management Strategy Evaluation<br>e. Migration<br>f. Reproduction<br>g. Growth<br>h. Discard survival<br>i. Genetics and Genomics<br>The SRB is also required to undertake periodic reviews of science/research strategy, progress, and overall performance, as to review the recommendations arising from the Management Strategy Advisory Board (MSAB) and Research Advisory Board (RAB). ·<br><br>NOAA Fisheries - Alaska Region's Strategic Plan 2022-2027[48] emphasizes the important of working collaboratively with the IPHC, State of Alaska entities, stakeholders, and the public in operationalizing its overarching strategies which include: (i) Amplifying the economic value of commercial and recreational fisheries while ensuring their sustainability, (ii) Conserving and recovering protected species while supporting responsible fishing and resource development. The former includes managing stocks for optimum yield; adequately assessing all prioritized stocks and maintaining information for currently assessed stocks; and promoting ecosystem-based fishery management. The later strategic objective includes stabilizing highest priority protected species; and minimizing bycatch and entanglement of protected species while supporting fisheries.<br><br>The NPFMC's revised Statement of Organization, Practices and Procedures (2023[49]) is required by Section 302(f)(6) of the MSA. The Council is mandated to "review on a continuing basis, and revise as appropriate, the assessments and specifications contained in each FMP for each fishery within its geographical area." The Council's SSC is required to "provide ongoing scientific advice for fishery management decisions, including recommendations for acceptable biological catch, overfishing limits, maximum sustainable yield, and achieving rebuilding targets, and report on stock status and |

[47] https://www.iphc.int/uploads/pdf/basic-texts/iphc-rop-current.pdf
[48] https://www.fisheries.noaa.gov/s3/2022-09/akro-strategic-plan-2022.pdf
[49] https://www.npfmc.org/wp-content/PDFdocuments/membership/Council/NPFMC_SOPP.pdf

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

health, bycatch, habitat status, social and economic impacts of management measures, and sustainability of fishing practices." Moreover, the SSC will "provide expert scientific and technical advice to the Council on the development of fishery management policy, fishery management plans and amendments, their goals and objectives, proposed regulations, and criteria for judging plan effectiveness.

The NPFMC's harvest specifications process is to apply the harvest strategy to the best available scientific information to derive annual harvest specifications. The Council's Groundfish Plan Teams and Scientific and Statistical Committee (SSC) use stock assessments to calculate biomass, overfishing levels, and acceptable biological catch (ABC) limits for each species or species group for specified management areas[50]. Overfishing levels and ABCs provide the foundation for the Council and NMFS to develop the total allowable catch (TAC) for each species or species group. Overfishing levels and ABC amounts reflect fishery science, applied considering the requirements of the FMPs[51]. The TACs recommended by the Council are either at or below the ABCs. The sum of the TACs for each area (the BSAI or GOA) is constrained by the optimum yield established for that area. The annual harvest specifications also set or apportion the prohibited species catch (PSC) limits. When new or significant adjustments are under consideration that affect the FMPs, the NPFMC's Groundfish Plans Teams of experts, together with NOAA's teams, are required to carry out a detailed Environmental Impact Statement (EIS) of the effects of the adjustments within the action areas on for example, target species, non-specific species, forage species, prohibited species, marine mammals, seabirds, essential fish habitat, ecosystem relationships, economy, and environmental justice. The product of this collaboration - a Supplementary Information Report (SIR)[52] - evaluates the need to prepare a Supplemental EIS (SEIS) for the 2023 and 2024 groundfish harvest specifications. In short, a SEIS should be prepared if (i) the agency makes substantial changes in the proposed action that are relevant to environmental concerns, or (ii) significant new circumstances or information exist relevant to environmental concerns and bearing on the proposed action or its impacts (40 CFR 1502.9(d)(1)).

The Alaska BOF, like the NPFMC, has mechanisms in place to guarantee that the efficacy of state conservation and management measures, including those for state sablefish stocks, is continually reviewed. The BOF meeting calendar is published by ADFG so that stakeholders can suggest changes to existing regulations or provide feedback on current proposals. This includes, for example, the preparation and publication of a Book of Proposals (e.g., BOF 2024-2025 Proposal Book[53]) which details all regulatory proposals that will be heard by the BOF during upcoming meetings.

1.8. Transparent management arrangements and decision making.
There were no reported changes to the current decision-making processes of other federal and state agencies.

**Federal management arrangements**
Information regarding the Pacific Halibut and Sablefish commercial fisheries is extensively disseminated on the NPFMC and NOAA Fisheries websites, at both national and regional levels.

[50] https://www.npfmc.org/about-the-council/plan-teams/
[51] https://www.npfmc.org/library/fmps-feps/
[52] https://repository.library.noaa.gov/view/noaa/49144
[53] https://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/2024-2025/proposals/book-full.pdf

| | |
|---|---|
| **1.** | **There shall be a structured and legally mandated management system based upon and respecting international, State, and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment.** |
| | Publicly accessible law enforcement arrangements exist for NOAA-OLE and USCG at both national and regional levels, as well as for ADPS-AWT statewide.<br><br>**A. NPFMC Procedure**<br>The Council's management processes encompass numerous procedural components that enhance and ensure transparency in management arrangements[54]. Illustrations comprise:<br>• Issued prompt notifications regarding all committee and subordinate committee meetings, including meeting agendas, background documents, presentations with access instructions, public participation guidelines, terms of reference, objectives, and a three-meeting forecast.<br>• Regular distribution of newsletters, press releases, blogs, and social media updates.<br>• Identification of committee membership, affiliations, contact information, appointment terms, members' conflicts of interest, and ethical principles.<br>• Dissemination of Fishery Management Plans (FMPs) and modifications; issuance of proposed and final Council regulations in the U.S. Federal Register to facilitate public commentary. All remarks regarding final regulations will receive a written reply. A Record of Decision elucidates the justification for NMFS action.<br><br>The management mechanisms of NOAA's Alaska Region resemble those of the Council mentioned above. Illustrations comprise:<br>• Issued announcements and regulations, including those available for public commentary[55].<br>• Consistent distribution of newsletters, feature articles, forthcoming events, blogs, and social media updates[56].<br>• Dissemination of Fishery Management Plans (FMPs) and revisions; publishing of proposed and final Council regulations in the U.S. Federal Register to facilitate public commentary. All comments on final regulations will receive a written reply. A Record of Decision delineates the justification for NMFS action[57].<br><br>**State Management Arrangements**<br>Information regarding the Pacific Halibut and Sablefish commercial fisheries is extensively disseminated on the ADFG and ABoF websites. Law enforcement arrangements are publicly accessible on the ADPS-AWT website.<br><br>**A. Processes of the Alaska Department of Fish and Game**<br>The Department's procedures encompass disseminated media releases, brochures, newsletters, regulatory announcements, news releases, emergency orders, pertinent subjects and issues, as well as Board actions and activities[58].<br><br>**B. Procedures of the Alaska Board of Fisheries**<br>The Board's procedures encompass published (i) announcements of public meetings, (ii) announcements of work sessions, (iii) announcements of NPFMC/ABoF Joint Protocol meetings, (iv) |

[54] https://www.npfmc.org/library/
[55] https://www.fisheries.noaa.gov/rules-and-announcements/open-for-comment?title=&field_management_area_value%5BAlaska%5D=Alaska&field_species_vocab_target_id=&sort_by=field_comments_close_value
[56] https://www.fisheries.noaa.gov/region/alaska/overview
[57] https://www.fisheries.noaa.gov/region/alaska/fisheries
[58] https://www.adfg.alaska.gov/index.cfm?adfg=fishingCommercial.main

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

announcements of proposed regulatory amendments, and (v) a multi-year meeting calendar[59]. Board meetings encompass agendas and papers, departmental reports, and emergency petitions. The agency's management operations must adhere to the stipulations of Article 6 of the State's Administrative Procedures Act.

**International Management Decision-Making**

A. IPHC

In recent years, the IPHC has increasingly resolved to consider all meetings (Commission and its subsidiary bodies) as open unless explicitly designated as closed (sessions related to personnel remain closed)[60]. All sessions are aired live to the public, allowing for audience questions and responses during the web transmission. Audio recordings of all sessions are released on the website and YouTube channels for public record. During the session, all participants, including observers, members of the public, and the webinar audience, can offer questions and receive responses from the Commission in a two-way interaction throughout the meeting. The Rules of Procedure of the IPHC provide that:

- Invitations for Commission and subsidiary body meetings are disseminated no later than 90 days prior to the session.
- All papers for Commission and subsidiary body sessions are formatted uniformly and published on the IPHC website[61].
- Documents for meetings are disseminated no later than 30 days prior to the session, and a detailed meeting report is published as promptly as feasible after each session.
    - The schedule of the IPHC annual meeting cycle, with significant decisions rendered by the Commission in January or early February each year, is designed to accommodate the requirements of the domestic regulatory frameworks for the Pacific halibut fisheries in both Contracting Parties.

The IPHC's allocation decisions are guided by stock assessments performed by scientific personnel and are reviewed annually by various advisory entities, including the Conference Board, the Processor Advisory Group, the Research Advisory Board, the Management Strategy Advisory Board, the Scientific Review Board, and the Management Strategy Evaluation Board, which employs performance metrics in its management performance evaluation[62]. The IPHC conducts an annual meeting and promotes public involvement in management through its five advisory groups that convene throughout the year.

Either Contracting Party may elect to contest and thereby refrain from implementing particular IPHC fishing regulations. Mutual consent from both Parties is necessary to implement a new regulatory measure. In cases of disagreement, the Parties will engage in an inter-sessional dialogue procedure. If an agreement remains unattainable, the matter will be sent to the subsequent session of the Commission for consideration. At that juncture, the approval of merely 2 Commissioners from each Contracting Party (4 in total) is necessary for a decision to be ratified.

[59] https://www.adfg.alaska.gov/index.cfm?adfg=fisheriesboard.main
[60] https://www.iphc.int/upcoming-meetings/
[61] https://www.iphc.int/meetings/100th-session-of-the-iphc-annual-meeting-am100/
[62] https://www.iphc.int/uploads/2023/12/IPHC-2024-AM100-12-Projections-and-harvest-decision-table.pdf

| | |
|---|---|
| **1.** | **There shall be a structured and legally mandated management system based upon and respecting international, State, and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment.** |
| | Regulations established by the IPHC remain effective until amended or replaced by the Commission. The IPHC Convention mandates that during sessions, all Commission decisions must be adopted by the affirmative vote of at least two of the three Commissioners from each Party[63]. In the absence of such an agreement, current regulations remain effective, ensuring that fishing operations are not impeded or restricted if the Commission neglects to update the regulations. The Commission endeavors to prevent this occurrence, which has transpired only twice in the preceding 96 years. Degree to which IPHC employs transparent and consistent decision-making processes that enable the prompt and effective implementation of management regulations.<br><br>**Federal management decision-making**<br>B. North Pacific Fishery Management Council<br>The North Pacific Halibut Act permits the Council to formulate restrictions, including limited access regulations, that do not contradict the regulations established by the Commission (16 U.S.C. §§ 773c, (c))[64]. Regulations proposed by the Council require approval from the Secretary of Commerce prior to implementation via the NMFS. The NMFS is tasked with overseeing the Halibut fisheries in accordance with regulations sanctioned by the Secretary. The NPFMC employs a transparent and inclusive decision-making process, facilitating public meetings that enable all interested individuals to contribute to the formulation of FMPs, revisions, and other Council decisions.<br><br>The Council's decision-making process is predominantly dependent on its Scientific and Statistical Committee, Advisory Panels, Plan/Management Teams, Workgroups, and routine public hearings to pinpoint topics of concern for fisheries managers to tackle[65]. All of these groups convene regularly and present their problems of interest to the Council for consideration in its decision-making processes. In accordance with the MSA and the Administrative Procedures Act, the procedure must be transparent, with supporting papers, meeting minutes, and testimonies made available on the Council's website.<br><br>The Council's decision-making process[66] comprises three essential processes that generate management plans and rules to fulfill its objectives: A Council formulates a fishery management plan that proactively identifies challenges and assesses the ramifications of proposed laws outside the fishery, including other fisheries, the ecosystem, and coastal communities. The Secretary of Commerce assesses the proposed plan, its broader ramifications, and its compliance with applicable laws. Third, NMFS, the states, the US Coast Guard, and their collaborators execute the plan's provisions. The Council's Statement of Organization, Practices and Procedures[67] (sub-section 3.2.4) stipulates that the approval or disapproval of a fishery management plan or amendment, including proposed regulations, comments for the Secretary on foreign fishing applications, or Secretarially prepared management plans necessitates a vote by Council members.<br><br>Decision-making for the Alaska Sablefish fishery transpires inside the Council framework, integrating contributions from the NMFS, member states, and various industry stakeholders. |

[63] https://www.iphc.int/about/the-commission/
[64] https://www.law.cornell.edu/uscode/text/16/773c
[65] https://www.npfmc.org/how-we-work/
[66] https://www.npfmc.org/how-we-work/navigating-the-council-process/
[67] https://www.npfmc.org/wp-content/PDFdocuments/membership/Council/NPFMC_SOPP.pdf

| 1. | There shall be a structured and legally mandated management system based upon and respecting international, State, and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment. |
|---|---|
| | **Decision-making in state management**<br>A. Board of Fisheries (BOF)[68]<br>The Board is a decision-making entity responsible for making allocative and regulatory decisions by integrating scientific data, societal values, and economic requirements. The Board's evaluation of management plans, amendments, and other regulatory modifications include feedback from ADFG personnel, Regional ADFG advisory groups, external scientists, industry representatives, environmental non-governmental organizations (ENGOs), stakeholders, and the public at large.<br><br>The Board of Fisheries conducts numerous public hearings annually at diverse sites across Alaska, with each decision documented in a public forum following public commentary. The BoF collaborates with 84 advisory committees statewide, ensuring public accessibility and increasing the probability of addressing all highlighted issues within the fishery. The structure facilitates a platform for the aggregation and articulation of regional perspectives on fish-related matters. Consequently, the BoF evaluates suggestions put forth by advisory groups to amend commercial fishing regulations. In light of this framework, public engagement constitutes a fundamental component of the BoF. The Board of Fisheries annually examines and adopts the management plan for Chatham Strait in the state-managed Sablefish fishing areas. The management plan's material is aligned with the annual stock assessment, indicating that the Board annually examines and approves the fishery's AHO based on the latest evaluation of the Sablefish stock, thereby addressing variations in the species' population.<br><br>B. ADFG[69]<br>The advisory committees of ADFG, created by the BoF, collaborate with the Bureau to formulate regulatory measures, assess and refine suggestions for the Board, and offer a public platform for fish conservation. When the BoF decides against adhering to the local advisory committee's recommendations, it must notify the committee of its decision and elucidate the rationale for disregarding the suggested suggestions. The BoF offers public access to fisheries meeting details and departmental reports on the ADFG website.<br><br>Department reports encompass fishery data that underpins decision-making, together with the rationale for those decisions. Documents accessible to the public that encompass this information include the 2023-2024 Statewide Commercial Groundfish Fishing Regulations[70] and the 2022 Northern and Southern Southeast Inside Subdistrict Sablefish Fishery Stock Assessments[71,72].<br><br>1.9. Compliance with international conservation and management measures<br>The Supporting clause is not relevant because the Pacific Halibut and Sablefish fisheries do not operate on the high seas (beyond the U.S. EEZ). |
| References: | Carpi, P., Loher, T., Sadorus, L.L., Forsberg, J.E., Webster, R.A., Planas, J.V., Jasonowicz, A., et al. 2021. Ontogenetic and spawning migration of Pacific halibut: a review. Reviews in Fish Biology and Fisheries. 31: 879-908. |

[68] https://www.adfg.alaska.gov/index.cfm?adfg=fisheriesboard.main
[69] https://www.adfg.alaska.gov/index.cfm?adfg=process.advisory#:~:text=Advisory%20committees%20are%20local%20groups,Developing%20regulatory%20proposals
[70] https://www.adfg.alaska.gov/static/regulations/fishregulations/pdfs/commercial/cf_groundfish_regs_2023_2024.pdf
[71] https://www.adfg.alaska.gov/FedAidPDFs/RIR.1J.2022.19.pdf
[72] https://www.adfg.alaska.gov/FedAidPDFs/RIR.1J.2022.18.pdf

| 1. | There shall be a structured and legally mandated management system based upon and respecting international, State, and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment. |
|---|---|
| | Echave, K., M. Eagleton, E. Farley, and J. Orsi. 2012. A refined description of essential fish habitat for Pacific salmon within the U.S. Exclusive Economic Zone in Alaska. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-236, 104 p.<br>Goethel, D.R., Cheng, M.L.H., Echave, K.B., Marsh, C., Rodgveller, C.J., Shotwell, K., and Siwicke, K. 2023. Assessment of the sablefish stock in Alaska. North Pacific Fishery Management Council, Anchorage, AK.<br>Head M.A. , Keller A.A, Bradburn M. 2014. Maturity and growth of sablefish, *Anoplopoma fimbria* , along the US west coast. Fisheries Research; 159 :56–67.<br>Kimura D.K. , Shimada A.M., Shaw F.R. 1998. Stock structure and movement of tagged sablefish, *Anoplopoma fimbria* , in offshore northeast Pacific waters and the effects of El Nino southern oscillation on migration and growth. Fishery Bulletin; 96 :462–81.<br>Orozco-Ruiz A.M., Galvan-Tirado C, Orlov A.M. *et al.* 2023. Genetic analyses reveal a non-panmictic genetic structure in the sablefish *Anoplopoma fimbria* in the northern Pacific. ICES Journal Marine Sciences 2023; 80 :1319–28.<br>Punt, A., Butterworth, D., de Moor, C., De Oliveira, J. & Haddon, M. 2016. Management strategy evaluation: Best practices. Fish and Fisheries. 17. 303-334.<br>Sadorus L. L., Goldstein E. D., Webster R. A., Stockhausen W. T., Planas J., Duffy-Anderson J. T. 2021. Multiple life-stage connectivity of pacific halibut (*Hippoglossus stenolepis*) across the Bering Sea and Gulf of Alaska. Fisheries Oceanography. 30, 174–193.<br>Stewart, I., and Hicks, A. 2024. Assessment of the Pacific halibut (*Hippoglossus stenolepis*) stock at the end of 2023. IPHC-2024-SA-01. 39 p.<br>Trimm L.E, W.A. Larson, A.J. Jasonowicz, K.M. Nichols. 2024. Whole genome resequencing of sablefish at the northern end of their range reveals genetic panmixia and large putative inversions, ICES Journal of Marine Science, Volume 81, Issue 6, Pages 1096–1110. |
| Statement of consistency to the RFM Fishery Standard | **The fishery conforms to the requirements of Fundamental Clause 1 of the RFM Fishery Standard.** |

### 7.9.1.2. Fundamental Clause 2. Coastal area management frameworks

| | |
|---|---|
| **2.** | **Management organizations shall participate in coastal area management, decision-making processes and activities related to the fishery and its users, supporting sustainable and integrated resource use, and conflict avoidance.** |
| Summary of relevant changes: | 2.1/2.2/2.3/2.4 Policy, legal and institutional frameworks adopted to achieve sustainable and integrated use of marine resources along with mechanisms to avoid conflict shall be in place. Certified AK Pacific halibut and AK sablefish are in conformance with RFM Fundamental Clause 2. Evidence viewed during surveillance confirms that relevant management organizations participate in coastal area management, decision-making processes and activities related to the fishery and its users, supporting sustainable and integrated resource use, and conflict avoidance.<br><br>The activities of primary federal and state agencies tasked with advancing fishery and coastal management and conservation at state, federal, and international levels remained directed by established multi-year strategic plans that include their fundamental programs, as well as by internal policies and practices regulating all facets of their operations.<br><br>All fishery agencies possess protocols, committees, and groups that provide the official evaluation and engagement of coastal zone resource management concerns. The NPFMC, IPHC, NMFS, and ADFG meetings serve as platforms for discussing and raising awareness about issues related to coastal, ecosystem-based resource management and their possible effects on fish populations and socio-economic interests.<br><br>Management organizations shall engage in coastal area management institutional frameworks, decision-making processes, and activities pertaining to fisheries and their users, to promote sustainable and integrated resource utilization and to prevent conflicts. financial interests. Large-scale projects in Alaska are overseen by the Office of Project Management and Permitting within the Department of Natural Resources (ADNR)[73]. The Office serves as the primary coordinating office for interstate agency involvement in the execution of the Alaska National Interest Lands Conservation Act (ANILCA)[74]. ANILCA explicitly mandates federal agencies to engage in consultation and coordination with the State of Alaska.<br><br>The coastal zone is assessed within the coastal management framework with physical, chemical, biological, economic, and social metrics. Participation encompasses federal and state agencies and programs, including the U.S. Fish and Wildlife Service[75], the NMFS Fisheries Science Centre[76], the NMFS Habitat Conservation Division and its Essential Fish Habitat monitoring and protection program[77], the USCG[78], and the Alaska Department of Fish and Game[79]. In Alaska, the State has designated Critical Habitat Areas (AS 16.20.500[80]) to "protect and preserve habitat areas vital for the sustenance of fish and wildlife, and to limit all other uses incompatible with this primary objective." Permits from the Habitat Section are mandatory for any habitat-altering activities (AS 16.20.520-530) or any actions that disrupt fish or wildlife, excluding legitimate hunting, trapping, and fishing[81]. |

[73] http://dnr.alaska.gov/commis/opmp/
[74] https://www.adfg.alaska.gov/index.cfm?adfg=habitatoversight.anilca
[75] https://www.fws.gov/about/region/alaska
[76] https://www.fisheries.noaa.gov/contact-directory/alaska-fisheries-science-center-divisions-and-programs
[77] https://www.fisheries.noaa.gov/region/alaska/habitat
[78] https://www.pacificarea.uscg.mil/Our-Organization/District-17/
[79] https://www.adfg.alaska.gov/index.cfm?adfg=lands.main
[80] https://www.adfg.alaska.gov/index.cfm?adfg=habitatregulations.critical
[81] https://www.adfg.alaska.gov/index.cfm?adfg=uselicense.areas

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

Furthermore, mechanisms were established to facilitate collaboration among surrounding States to enhance coastal resource management via information exchange, joint or coordinated planning and decision-making, and integrated coastal management strategies. Throughout the COVID-19 pandemic and subsequently, formal and informal consultation and engagement mechanisms were modified to sustain public and stakeholder participation in decision-making and management activities. Legislation, rules, and public engagement initiatives were established to resolve disputes that may occur within the fisheries industry or between fisheries resource users and other coastal stakeholders.

No information suggested that decisions made in 2023 and 2024 resulted in conflicts among users or others. Furthermore, the management system was free from ongoing unresolved disputes or political instability. All principal agencies at both federal and state levels engage in the NEPA processes[82] designed to manage coastal resources transparently, responsibly, and sustainably. Section 307(c)(1) of the federal Coastal Zone Management Act[83] mandates that federal actions impacting land, water use, or natural resources within a state's coastal zone must be executed in a way that is, to the greatest degree feasible, consistent with state-approved coastal management programs. The criteria for consistency determination are outlined in NOAA regulations at 15 CFR part 930, subpart C.

2.5. The economic, social and cultural value of coastal resources shall be assessed in order to assist decision-making on their allocation and use.

**Halibut**

Under the Convention, the IPHC's mandate is optimum management of the Pacific halibut resource, which necessarily includes an economic dimension. The goal of the IPHC's economic studies is to provide stakeholders with an accurate and all-sectors assessment of the socioeconomic impact of the Pacific halibut resource that includes the full scope of Pacific halibut's contribution to regional economies of Canada and the United States of America[84].

For example, IPHC social scientists applied a multiregional economic impact assessment to Pacific halibut commercial fishing in Alaska to understand the magnitude of the multiplier effect caused by fisheries management policies that may affect catch limits having a direct impact on harvesters, but at the same time, there is a ripple effect through the economy (Hutniczak, 2022). The study showed that the implementation of a multiregional method to assess the economic impact of the AK Pacific halibut fishery underscores that numerous economic advantages in this instance that are accrued significantly away from where the resource is harvested. This arises from the robust economic connections between Alaskan fishing operations and the broader United States economy, whether through trade, nonresident labor, or external investment in production elements like fishing quotas. Another example is that an MSE[85] was used to do a size limit evaluation considering economic aspects such as market considerations, regional supply-price relationships for commercial landings, as well as localized importance of the Pacific halibut fishery to communities.

[82] https://www.epa.gov/nepa/national-environmental-policy-act-review-process
[83] https://coast.noaa.gov/czm/consistency/#:~:text=Section%20307%20of%20the%20%22Coastal,activities%20must%20be%20fully%20consistent.
[84] https://www.iphc.int/research/economic-research/
[85] https://www.iphc.int/uploads/pdf/am/am099/iphc-2023-am099-13.pdf?_t=1699037264

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

**Sablefish**

The Economic and Social Sciences Research Program in Alaska[86] is operated by NOAA's Alaska Fisheries Science Centre. The objective of the Program is to furnish economic and sociocultural data to aid NMFS in fulfilling its stewardship obligations. The Program generates an annual Economic Status Report on the Groundfish fishery in Alaska concerning socio-economic data collecting. NOAA personnel also perform research to assess the advantages and expenses of various management strategies for commercial fisheries, prioritize management requirements, and formulate policies that sustainably optimize societal benefits derived from oceanic and coastal resources.

The agency's primary areas of focus encompass:

- Financial statements and revenue reports
  Economic performance of fisheries
- Regional economic consequences
- Spatial decision-making behavior
- Market dynamics and consumer inclinations
- Assessment of capacity and technical efficiency
- Distribution of resources among user groups

The report titled: Stock Assessment and Fishery Evaluation Report for the Groundfish Fisheries of the Gulf of Alaska and Bering Sea/Aleutian Islands Area: Economic Status of the Groundfish Fisheries off Alaska, 2023[87], contains evidence of the implemented process and the current status concerning the economic, social, and cultural value of Alaska's groundfish resources.

The Research and Planning Section of Alaska's Commercial Fisheries Entry Commission[88] generates and disseminates various fishery-related reports. A significant portion of the data utilized in the reports is disseminated to the ADFG, NMFS, and NPFMC via the Alaska Fisheries Information Network.
Core reports encompass:

- Economic analysis
- Buyback advisory and execution
- Permit valuation reports
- Gross revenue assessments
- Regulatory evaluations and feedback
- Permit holder questionnaires
- Ex-vessel price projections
- Fisheries oversight

2.6./2.7./2.8. Research and monitoring of the coastal environment, mechanisms for cooperation and coordination, appropriate technical capacities and financial resources, conflict avoidance amongst user group.
Monitoring of the coastal environment in Alaska is performed by federal and state agencies. The NMFS and NPFMC as federal agencies participate in coastal area management-related institutional

[86] https://www.fisheries.noaa.gov/alaska/socioeconomics/alaska-economic-and-social-sciences-research
[87] https://www.fisheries.noaa.gov/resource/data/2023-economic-status-groundfish-fisheries-alaska
[88] http://www.cfec.state.ak.us/

| 2. | **Management organizations shall participate in coastal area management, decision-making processes and activities related to the fishery and its users, supporting sustainable and integrated resource use, and conflict avoidance.** |
|---|---|
| | frameworks through federal NEPA processes. Other federal and State agencies that cooperate at the sub-regional level to improve coastal area management include:<br>• Alaskan Department of Environmental Conservation (DEC)[89]<br>• Alaska Department of Fish and Game (ADFG)[90]<br>• Alaskan Department of Natural Resources (DNR)[91]<br>• DNR Office of Project Management and Permitting (OPMP) [92]<br>• U.S. Fish and Wildlife Service (USFWS)[93]<br>• Bureau of Ocean Energy Management (BOEM)[94]<br><br>The ADFG's Habitat Division[95] conducts research on coastal and marine environments throughout Alaska to document and mitigate human-related impacts, changes in habitat and species abundance. The agency also collects physical and chemical data, including temperature, depth, salinity, and conductivity.<br><br>Other entities involved in collaborative research in the North Pacific region include the Alaska Fisheries Science Center (AFSC), North Pacific Research Board (NPRB)[96], NMFS Pacific Marine Environmental Lab (PMEL)[97] and institutes of higher learning such as the University of Alaska Fairbanks' (UAF) Institute of Marine Science (IMS)[98].<br><br>The NPFMC's administrative regulations offer a platform for resolving any disagreements, allowing users to testify either in person or in writing[99]. These conflict resolution procedures have demonstrated efficacy in addressing most concerns, hence preventing the escalation of disagreements to legal action. Nonetheless, when mechanisms fail to resolve conflicts, parties may seek resolution through the federal court system. |
| References: | Hutniczak, B. 2022. Assessing cross-regional flows of economic benefits: A case study of Pacific halibut commercial fishing in Alaska. Fisheries Research, 255:106449. |
| Statement of consistency to the RFM Fishery Standard | **The fishery continues to conform to the requirements of Fundamental Clause 2 of the RFM Fishery Standard** |

[89] https://dec.alaska.gov/
[90] https://www.adfg.alaska.gov/index.cfm?adfg=habitatregulations.main
[91] https://dnr.alaska.gov/
[92] https://dnr.alaska.gov/commis/opmp/index.htm
[93] https://www.fws.gov/about/region/alaska
[94] https://www.boem.gov/
[95] https://www.adfg.alaska.gov/index.cfm?adfg=divisions.haboverview
[96] https://nprb.org/
[97] https://www.pmel.noaa.gov/
[98] https://www.uaf.edu/cfos/research/institute-of-marine-scien/
[99] https://www.npfmc.org/how-we-work/management-policies/

### 7.9.1.3. Fundamental Clause 3. Management objectives and plan

| **3.** | **Management objectives shall be implemented through management rules and actions formulated in a plan or other framework.** |
|---|---|
| Summary of relevant changes: | 3.1 Long-term management objectives shall be translated into a plan or other management document and be subscribed to by all interested parties.<br>Certified Alaska Pacific halibut and Alaska sablefish fisheries remain in conformance with RFM Fundamental Clause 3. As summarized below, evidence viewed during surveillance confirms that the management objectives for these fisheries continue to be implemented through management rules and actions that are clearly articulated in a fishery management plan (FMP).<br><br>**Halibut**<br>The Commission's interim Harvest Strategy Policy is a work-in-progress and is informed by the Commission's Management Strategy Evaluation. The principal goal of the IPHC Harvest Strategy Policy is the long-term sustainable and profitable use (optimum yield) of Pacific halibut through the implementation of a harvest strategy that maintains the stock at sustainable levels while maximizing economic returns[100]. To achieve this goal the IPHC will implement a harvest strategy that minimizes risk to the stock and pursues maximum economic yield (MEY) for the directed Pacific halibut fisheries. Maximizing the net economic return from the fishery may not always equate with maximizing the profitability of the fishery. Net economic return may consider inter-annual stability to maintain markets, and economic activity may also arise from recreational and Indigenous fishing, and the need to share the resources appropriately will be considered where necessary.<br><br>Priority objectives to achieve this goal include:<br>• Maintain Pacific halibut female spawning biomass, above a female spawning biomass limit where the risk to the stock is regarded as unacceptable (SBLIM), at least 95% of the time.<br>• Maintain Pacific halibut female spawning biomass, at least 50% of the time, at or above a reference (fixed or dynamic) female spawning biomass that optimizes fishing activities on a spatial and temporal scale relevant to the fishery.<br>• Optimize average coastwide yield given the constraints above.<br>• Limit annual changes in the coastwide mortality limit (TCEY).<br><br>The harvest strategy will ensure fishing is conducted in a manner that does not lead to overfishing. Overfishing is defined as where the stock is subject to a level of fishing that would move it to an overfished state or prevent it from rebuilding to a 'not overfished' state, within a specific timeframe and probability. Where it is identified that overfishing of the stock is occurring, action will be taken immediately to cease that overfishing and action taken to recover the overfished stock to levels that will ensure long-term sustainability and productivity to maximize net economical returns.<br><br>The harvest strategy will also ensure that if the stock is overfished, the fishery must be managed such that, with regard to fishing impacts, there is a high degree of probability the stock will recover. If the stock is assessed to be below the female spawning biomass limit reference point (i.e. overfished), a stock rebuilding strategy will be developed to rebuild the stock to the limit female spawning biomass level, whereby the harvest control rules would then take effect to build the stock further to target female spawning biomass levels.<br><br>The IPHC currently operates of a schedule of three-years for full stock assessments, with update stock assessments in the intervening two years, and the MSE OM is updated following each full stock |

[100] https://www.iphc.int/uploads/2024/01/IPHC-2024-AM100-INF06-IPHC-2024-HSP2024-Interim-Harvest-strategy-policy.pdf

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

assessment to maintain consistent approaches and paradigms[101]. Therefore, MPs are re-evaluated at a minimum of three years after implementation, if needed.

An exceptional circumstance may trigger a re-evaluation before then and are defined as follows.

- The coastwide all-sizes FISS WPUE or NPUE from the space-time model is above the 97.5$^{th}$ percentile or below the 2.5$^{th}$ percentile of the simulated FISS index for two or more consecutive years.
- The observed FISS all-sizes stock distribution for any Biological Region is above the 97.5$^{th}$ percentile or below the 2.5$^{th}$ percentile of the simulated FISS index over a period of two or more years.
- Recruitment, weight-at-age, sex ratios, other biological observations, or new research indicating parameters that are outside the 2.5$^{th}$ and 97.5$^{th}$ percentiles of the range used or calculated in the MSE simulations.

Exceptional circumstances would be reviewed by the SRB to determine if one should be declared. In the event that an exceptional circumstance is declared, the following actions are to be completed.

- A review of the MSE simulations to determine if the OM can be improved and MPs should be reevaluated.
- Consult with the SRB and MSAB to identify why the exceptional circumstance occurred, what can be done to resolve it, and determine a set of MPs to evaluate with an updated OM.
- Further consult with the SRB and MSAB after simulations are complete to identify whether a new MP is appropriate.

MSE work is currently ongoing to supplement this interim harvest strategy policy. Current elements of MPs being investigated include not conducting a stock assessment every year and using an empirical rule based on the FISS WPUE in years without a stock assessment to determine the coastwide TCEY[102]. With the harvest strategy currently being evaluated, updates to this interim harvest strategy policy may occur before three year.

**Stock assessment**

The IPHC's interim management procedure employs a relative spawning biomass threshold of 30% as a fishery trigger, diminishing the reference fishing intensity if the relative spawning biomass declines further towards a limit reference point of 20%, at which point directed fishing is suspended due to critically low biomass levels[103]. The predicted relative spawning biomass at the commencement of 2024 was 42% (credible interval: 20-56%), just above the forecast for 2023 (41%)[104]. The likelihood that the stock falls below SB30% is projected at 26% at the commencement of 2023, with a 1% possibility that the stock is below SB20%.

The IPHC's existing interim management procedure designates a reference level of fishing intensity represented by a Spawning Potential Ratio (SPR) of F43%; this indicates the fishing level that would diminish the lifetime spawning output per recruit to 43% of the unfished level, considering current

[101] https://www.iphc.int/uploads/2024/10/IPHC-2024-IM100-17-HSP-1.pdf
[102] www.iphc.int/uploads/2023/12/IPHC-2024-AM100-11-MSE-summary.pdf
[103] https://www.iphc.int/uploads/2024/01/IPHC-2024-SA-01.pdf
[104] https://www.iphc.int/uploads/2024/01/IPHC-2024-SA-01.pdf

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

biological, fishery, and demographic factors. The 2023 evaluation indicates that the fishing intensity is projected to align with an F52% (credible interval: 31-66%).

Stock forecasts were performed utilizing the consolidated outcomes from the stock assessment ensemble, specifics of IPHC Regulatory Area-specific catch sharing arrangements, and mortality estimates from the 2023 directed fisheries and other mortality sources. There exists a minimum 45% likelihood of stock depreciation in 2024 for any yields exceeding the current standard. The 2024 "3-year surplus" alternative corresponds to a Total Catch Equivalent Yield (TCEY) of 39.1 million pounds (17,700 metric tons) and an anticipated Stock-to-Prey Ratio (SPR) of 49% (credible interval 28-64%). At the reference level (a predicted SPR of 43%), the likelihood of a reduction in spawning biomass from 2024 to 2025 is 74%, diminishing to 72% over three years. The annual probability of the stock declining below SB30% is 24-26% across all options.

**Sablefish**

The commercial Pacific halibut and sablefish fisheries in the GOA and the BSAI management areas are managed under the IFQ Program that was implemented in 1995[105] (58 FR 59375, November 9, 1993). The NPFMC and NOAA Fisheries developed the IFQ Program to resolve the conservation and management problems commonly associated with open access fisheries. There are a small number of commercial sablefish fisheries in state waters that are managed by the ADFG/BoF**.**

**Alaska BSAI and GOA Groundfish Management Objectives[106,107]**

The Council's groundfish management policy applies fisheries management practices that are based on sound scientific research and analysis, proactively rather than reactively, to ensure the sustainability of fishery resources and associated ecosystems. The Council considers and adopts, as appropriate, measures that accelerate the precautionary, adaptive management approach through community-based or rights-based management, ecosystem-based management principles that protect managed species from overfishing, and where appropriate and practicable, increase habitat protection and bycatch constraints. All management measures are based on the best scientific information available.

To meet the goals of the overall management approach, the Council and NMFS use the Alaska Groundfish Fisheries Programmatic Supplemental Environmental Impact Statement (PSEIS) as a planning document. To help focus consideration of potential management measures, the Council and NMFS use the following objectives as guideposts, to be re-evaluated, as amendments to the FMP are considered over the life of the PSEIS.

**Prevent Overfishing:**

1. Adopt conservative harvest levels for multi-species and single species fisheries and specify optimum yield.
2. Continue to use the 2 million mt optimum yield cap for the BSAI groundfish fisheries.
3. Provide for adaptive management by continuing to specify optimum yield as a range.
4. Provide for periodic reviews of the adequacy of F40 and adopt improvements, as appropriate.
5. Continue to improve the management of species through species categories**.**

[105] https://www.fisheries.noaa.gov/action/individual-fishing-quota-ifq-program-alaska-federal-register-rules-and-notices-1986-2003
[106] https://www.npfmc.org/wp-content/PDFdocuments/fmp/BSAI/BSAIfmp.pdf
[107] https://www.npfmc.org/wp-content/PDFdocuments/fmp/GOA/GOAfmp.pdf

| | |
|---|---|
| **3.** | **Management objectives shall be implemented through management rules and actions formulated in a plan or other framework.** |
| | **Promote Sustainable Fisheries and Communities:**<br>6. Promote conservation while providing for optimum yield in terms of the greatest overall benefit to the nation with particular reference to food production, and sustainable opportunities for recreational, subsistence, and commercial fishing participants and fishing communities.<br>7. Promote management measures that, while meeting conservation objectives, are also designed to avoid significant disruption of existing social and economic structures.<br>8. Promote fair and equitable allocation of identified available resources in a manner such that no particular sector, group, or entity acquires an excessive share of the privileges.<br>9. Promote increased safety at sea.<br><br>**Preserve Food Web:**<br>10. Develop indices of ecosystem health as targets for management.<br>11. Improve the procedure to adjust acceptable biological catch levels as necessary to account for uncertainty and ecosystem factors.<br>12. Continue to protect the integrity of the food web through limits on harvest of forage species.<br>13. Incorporate ecosystem-based considerations into fishery management decisions, as appropriate.<br><br>**Manage Incidental Catch and Reduce Bycatch and Waste:**<br>14. Continue and improve current incidental catch and bycatch management program.<br>15. Develop incentive programs for bycatch reduction including the development of mechanisms to facilitate the formation of bycatch pools, vessel bycatch allowances, or other bycatch incentive systems.<br>16. Encourage research programs to evaluate current population estimates for non-target species with a view to setting appropriate bycatch limits, as information becomes available.<br>17. Continue program to reduce discards by developing management measures that encourage the use of gear and fishing techniques that reduce bycatch which includes economic discards.<br>18. Continue to manage incidental catch and bycatch through seasonal distribution of total allowable catch and geographical gear restrictions.<br>19. Continue to account for bycatch mortality in total allowable catch accounting and improve the accuracy of mortality assessments for target, prohibited species catch, and non-commercial species.<br>20. Control the bycatch of prohibited species through prohibited species catch limits or other appropriate measures.<br>21. Reduce waste to biologically and socially acceptable levels.<br>22. Continue to improve the retention of groundfish where practicable, through establishment of minimum groundfish retention standards.<br><br>**Avoid Impacts to Seabirds and Marine Mammals:**<br>23. Continue to cooperate with U.S. Fish and Wildlife Service (USFWS) to protect ESA-listed species, and if appropriate and practicable, other seabird species.<br>24. Maintain or adjust current protection measures as appropriate to avoid jeopardy of extinction or adverse modification to critical habitat for ESA-listed Steller sea lions.<br>25. Encourage programs to review status of endangered or threatened marine mammal stocks and fishing interactions and develop fishery management measures as appropriate.<br>26. Continue to cooperate with NMFS and USFWS to protect ESA-listed marine mammal species, and if appropriate and practicable, other marine mammal species. |

| | | |
|---|---|---|
| **3.** | **Management objectives shall be implemented through management rules and actions formulated in a plan or other framework.** | |
| | | **Reduce and Avoid Impacts to Habitat:**<br>27. Review and evaluate efficacy of existing habitat protection measures for managed species.<br>28. Identify and designate essential fish habitat and habitat areas of particular concern pursuant to Magnuson-Stevens Act rules, and mitigate fishery impacts as necessary and practicable to continue the sustainability of managed species.<br>29. Develop a Marine Protected Area policy in coordination with national and state policies.<br>30. Encourage development of a research program to identify regional baseline habitat information and mapping, subject to funding and staff availability.<br>31. Develop goals, objectives, and criteria to evaluate the efficacy and suitable design of marine protected areas and no-take marine reserves as tools to maintain abundance, diversity, and productivity. Implement marine protected areas if and where appropriate.<br><br>**Promote Equitable and Efficient Use of Fishery Resources:**<br>32. Provide economic and community stability to harvesting and processing sectors through fair allocation of fishery resources.<br>33. Maintain the license limitation program, modified as necessary, and further decrease excess fishing capacity and overcapitalization by eliminating latent licenses and extending programs such as community or rights-based management to some or all groundfish fisheries.<br>34. Provide for adaptive management by periodically evaluating the effectiveness of rationalization programs and the allocation of access rights based on performance.<br>35. Develop management measures that, when practicable, consider the efficient use of fishery resources taking into account the interest of harvesters, processors, and communities. Increase Alaska Native Consultation:<br>36. Continue to incorporate local and traditional knowledge in fishery management.<br>37. Consider ways to enhance collection of local and traditional knowledge from communities and incorporate such knowledge in fishery management where appropriate.<br>38. Increase Alaska Native participation and consultation in fishery management.<br><br>**Improve Data Quality, Monitoring and Enforcement**:<br>39. Increase the utility of groundfish fishery observer data for the conservation and management of living marine resources.<br>40. Develop funding mechanisms that achieve equitable costs to the industry for implementation of the North Pacific Groundfish Observer Program.<br>41. Improve community and regional economic impact costs and benefits through increased data reporting requirements.<br>42. Increase the quality of monitoring and enforcement data through improved technology.<br>43. Encourage a coordinated, long-term ecosystem monitoring program to collect baseline information and compile existing information from a variety of ongoing research initiatives, subject to funding and staff availability.<br>44. Cooperate with research institutions such as the North Pacific Research Board in identifying research needs to address pressing fishery issues.<br>45. Promote enhanced enforceability.<br>46. Continue to cooperate and coordinate management and enforcement programs with the Alaska Board of Fish, Alaska Department of Fish and Game, and Alaska Fish and Wildlife Protection, the U.S. Coast Guard, NMFS Enforcement, International Pacific Halibut Commission, Federal agencies, and other organizations to meet conservation requirements; promote healthy and sustainable fisheries and fishing communities; and maximize efficiencies in management and enforcement pro the U.S. |

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

Coast Guard, NMFS Enforcement, International Pacific Halibut Commission, Federal agencies, and other organizations to meet conservation requirements; promote economically healthy and sustainable fisheries and fishing communities; and maximize efficiencies in management and enforcement programs through continued consultation, coordination, and cooperation.

The NPFMC took the following actions in 2023 and 2024 regarding the federally managed commercial sablefish and halibut fishery.

**February Meeting 2023**[108]

Area 4 Vessel Use Cap Interim Measures

The Council took final action to remove vessel cap limitations for IFQ halibut harvested in Areas 4A, 4B, 4C and 4D through the 2027 fishing season. If the Council takes subsequent action to permanently modify vessel cap limits in area 4, such action will supersede this removal if implemented before 2027. The affected vessel caps were included in the development of the IFQ program to prevent large amounts of IFQ from being fished on only a few vessels and are specified in Federal Regulations: "No vessel may be used, during any fishing year, to harvest more IFQ halibut than one-half percent of the combined total catch limits of halibut for IFQ regulatory areas 2C, 3A, 3B, 4A, 4B, 4C, 4D, and 4E" and "No vessel may be used, during any fishing year, to harvest more than 50,000 lb (22.7 mt) of IFQ halibut derived from QS held by a CQE" (50 CFR § 679.42(h)(1)).

The Council was in agreement that vessel caps be removed temporarily to provide relief for areas that have experienced reduced harvesting and processing capacity in recent years; while the Council works on a longer-term solution to adjust vessel caps in area 4 initiated in June 2022. The Council agreed that vessel cap limitations are a central component of the IFQ program and that extending the exemption through 2027 did not signal that the longer-term solution was less of a priority, but rather to provide a longer buffer in the event of unexpected delays in the Council or implementation process.

EFH 5-Year Review

The Council reviewed the summary report of a 5-year review of essential fish habitat (EFH) components of the Council's Fishery Management Plans (FMPs), initiated an analysis at this meeting to update the Council's BSAI Groundfish, GOA Groundfish, BSAI King and Tanner Crab, Salmon, and Arctic FMPs' descriptions and maps of Essential Fish Habitat (EFH). The proposed alternatives are detailed below:

Alternatives:

Alternative 1: No action/status quo. Do not amend the EFH sections of the FMPs with new EFH information identified in the 2023 5-year Review.

Alternative 2. Amend the Council's FMPs to incorporate the updated EFH information based on the new and best available science information identified in the 2023 EFH 5-year Review.

[108] https://www.npfmc.org/february-2023-newsletter/

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

EFH component 1 (descriptions and identification), Amend 4 FMPs to update EFH descriptions and maps, including up to EFH Level 3 information on habitat-related vital rates. Add or revise the EFH text description and add or replace the maps for—

- 41 species or complexes in the BSAI FMP,
- 46 species or complexes in the GOA FMP,
- all five species in the Crab FMP, and
- all three species in the Arctic FMP.
- For all five species in the Salmon FMP, amend the Salmon FMP by replacing the distribution maps with the EFH maps.

EFH component 2 (fishing effects). Update the fishing effects (FE) information in the BSAI, GOA, and Crab FMPs to reflect updates to the FE model, analysis, and evaluation for the 2023 EFH 5-year Review.

EFH component 4 (non-fishing effects). Revise the EFH appendices in the BSAI, GOA, Crab, Arctic, and Salmon FMPs where conservation recommendations for non-fishing activities are described.

EFH component 7 (prey of EFH species). Revise text or habitat description table information for two species of BSAI sharks, BSAI pollock, GOA Pacific cod, and BSAI red king crab in the BSAI, GOA, and Crab FMPs.

EFH component 9 (research and information needs). Revise the EFH appendices with updated research and information needs in the BSAI, GOA, Crab, Arctic, and Salmon FMPs.

In response to public testimony, the Council discussed whether to initiate any additional EFH or HAPC processes at this time. The Council's discussion highlighted ongoing actions in the Council process that may also inform habitat conservation and enhancement, such as the PSEIS, crab bycatch analyses, and taskforce work through the Bering Sea FEP on climate and other ways of knowing. While the Council elected not to initiate additional habitat-specific processes at this time, they did highlight for the public that specific fishery management proposals, including those focused on habitat, may always be submitted to the Council for consideration under the staff tasking agenda item.

<u>Area 2C and 3A Halibut Catch Share Plan Revised Allocations Motion</u>
At this meeting the Council chose to rescind a motion made in February 2022 which would have considered alternative allocations for the Area 2C and 3A charter and commercial halibut fisheries. The Council had initiated an analysis of this proposed action in February 2022 based on concerns about the impacts of the Halibut Catch Sharing Plan and associated management measures on the charter sector, particularly at times of lower abundance. The alternative allocations would have shifted more halibut allocation to the charter sector in times of lower abundance and more halibut allocation to the commercial sector in times of higher abundance.

However, in initiating this analysis, the Council's February 2022 motion also stated its preferred mechanism for dealing with reallocations in this Catch Sharing Plan is compensated reallocation via the Recreational Quota Entity (RQE). The Council stated through its motion that should the RQE fee funding mechanism become law and the Council take final action on the RQE funding mechanism,

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

the Council intends to table or refine this action. The Council took final action on an RQE funding mechanism in April 2022 and on December 29, President Biden signed the FY 2023 Consolidated Appropriations Act (Public Law No: 117-328; H.R. 2617 of the 117th Congress). The law (pages 802-803) includes language authorizing the RQE funding mechanism. Based on these actions, the Council chose to rescind the previous motion.

In the next steps, NMFS will be working with the RQE, Charter Halibut Management Committee and charter stakeholders to begin an implementation plan for the charter halibut stamp fee collection mechanism to fund the purchase of halibut quota share.

Small Sablefish Release Update

The Council adopted a revised purpose and need statement and alternatives and initiated analysis for the proposed action to allow vessel operators in the fixed gear IFQ sablefish fishery to voluntarily release sablefish. This proposed action, which has been moving through the Council process since 2018, is in direct response to the low economic value of small sablefish which have inundated commercial catches over the past several years.

The Council received a presentation on the update document prepared by Council, AKRO, and AFSC staff. The document and presentation were intended to assist the Council in evaluating how to prioritize preparation of a second initial review analysis of the Council's current alternatives for small sablefish release, given the required workload and changing conditions (environmental uncertainty, stock status, changes in fishery) since the Council and SSC reviewed the first initial review analysis in February 2021. Due to the significant changes that would be required either to monitoring in the sablefish IFQ fishery or to the stock assessment under the previously existing alternatives from 2019/2021, staff sought feedback from the Council on how to proceed with limited resources.

Council Changes to the Alternatives:

In contrast to the alternatives put forward by the Council in 2019/2021, the new alternatives include an option (Alternative 2, Option 2) to continue requiring retention of sablefish greater than or equal to 22 inches in total length. This option still provides for voluntary release of sablefish under 22 inches, while addressing some of the data and stock assessment issues regarding uncertainty in discard estimates.

Under Element 1, the Council also added a 6th DMR option, that DMR(s) for released sablefish would need to be chosen through the harvest specifications (stock assessment/Plan Team/SSC) process. The Council noted that options 1-5 under Element 2 are included for analytical purposes to estimate potential impacts based on a variety of DMRs.

The other notable change to the Council's alternatives is the addition of a new Element 4, which includes options to either: 1) review effects of the proposed action a certain number of years after implementation, or 2) sunset the provisions in the proposed action 5 years following implementation.

Lastly, the Council directed staff to incorporate SSC recommendations as feasible in the next initial review, and to flag any that are unlikely to be accomplished within the allotted time frame.

| | |
|---|---|
| **3.** | **Management objectives shall be implemented through management rules and actions formulated in a plan or other framework.** |
| | **Meeting June 2023**[109]<br>IFQ Program Review<br>The Council approved the workplan for the IFQ Program Review and recommended the Review incorporate recommendations from the SSC and the IFQ Committee to the extent practicable. The Council specifically highlighted recommendations related to community level impacts, as many of the suggestions from the advisory bodies and written and public testimony focused on the discussion of the potential differential distribution of impacts among tribal, minority, low-income, and other communities of potential concern with respect to equity and environmental justice.<br><br>Additionally, the Council recommended the Program Review include description of actions to promote new entry and active participation that the Council has considered since the previous Program Review. Although these actions have not resulted in any regulatory amendments to the IFQ program, it is important to document the Council deliberations related to these issues. The Council also discussed the relative utility of the analyst's proposed format of a shorter written document and a more substantial online appendix, and whether it may be more useful to have the complete report in one document but did not make an official recommendation regarding format.<br><br>Groundfish Proposed Harvest Specifications<br>Under this agenda item, the Council received reports from the recent Bering Sea and Aleutian Islands (BSAI) and Gulf of Alaska (GOA) Groundfish Plan Team meetings and recommended 2024 and 2025 BSAI and GOA groundfish harvest specifications and prohibited species catch (PSC) limit apportionments for proposed rulemaking. Additionally, the Council concurred with separating management of GOA Demersal Shelf Rockfish (DSR) and Other rockfish complexes beginning in 2025.<br><br>The SSC was presented with the reports from the Groundfish Plan Teams that summarized the issues discussed and actions taken by the Plan Teams at their September meetings. Under their C1 Crab Specifications agenda item, the SSC received a preview of ecosystem status reports (ESRs) reporting that given data so far, there are no specific red flags or ecosystem areas of concern to highlight with respect to the Bering Sea, Aleutian Islands, and Gulf of Alaska. Full presentations of these reports will be provided to the Council in December.<br><br>The Council received condensed presentations of the Groundfish Plan Team reports that focused on issues most relevant to proposed specifications, including preliminary survey results and proposed modeling updates for stocks in December. Updated groundfish stock assessments will be reviewed by the Plan Teams at the upcoming meetings November 13-17 at the Alaska Fisheries Science Center, Seattle WA and the Council will receive full reports at its December meeting prior to recommending final BSAI and GOA groundfish harvest specifications for 2024 and 2025.<br><br>BSAI Groundfish<br>For proposed rulemaking for the 2024 and 2025 fishing years, the Council recommended OFLs and ABCs, consistent with SSC recommendations, and TACs, based on a rollover of the existing 2024 specifications for all BSAI groundfish stocks. The Council also recommended PSC limit apportionments for halibut, crab, and herring, and halibut Discard Mortality Rates (DMRs) for 2024 and 2025. Full details are included in the Council motion for proposed BSAI groundfish harvest specifications. |

[109] https://www.npfmc.org/june-2023-newsletter/

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

GOA Groundfish

For proposed rulemaking for the 2024 and 2025 fishing years, the Council recommended OFLs and ABCs, consistent with SSC recommendations, and TACs, based on rollover of the existing 2024 specifications for all GOA groundfish stocks. The Council also recommended GOA halibut PSC limit apportionments and adopted updated halibut DMRs for 2024 and 2025; full details are included in the Council motion for proposed GOA groundfish harvest specifications.

**Meeting December 2023**[110]

EFH FMP Amendments

The Council reviewed the Fishery Management Plans (FMP) omnibus amendment initial/final analysis, and proposed FMP amendment text based on the 2023 EFH 5 year Review. The Council took final action (motion) and selected Alternative 2, as amended, as the preferred alternative.

The preferred alternative (Alternative 2) will update the EFH information in the BSAI Groundfish, GOA Groundfish, BSAI crab, and Arctic FMPs, as a result of the comprehensive analysis in the 2023 EFH 5-year review presented to the Council in February. These updates include updated EFH maps and text descriptions, results of the fishing effects on habitat (FE) analysis, updates to prey species tables, updates to the non-fishing effects report and updated research and information needs. The Salmon FMP was updated as a housekeeping item to update EFH maps as a result of Echave et al (2012). Updating EFH information into the FMPs allows the Council to incorporate the best available science into the applicable FMPs.

BSAI Groundfish Specifications

The Council reviewed the Ecosystem Status Reports for the Aleutian Islands and Bering Sea, approved the BSAI Groundfish Stock Assessment and Fishery Evaluation (SAFE) Report, and made final recommendations on groundfish harvest specifications, prohibited species catch (PSC) limits, and halibut Discard Mortality Rates (DMRs) to manage the 2024 and 2025 BSAI groundfish fisheries. Harvest and PSC specifications for 2024 and 2025 fishing years are available in the Council motions.

The Council reviewed Ecosystem Status Reports for the Aleutian Islands (AI) and the Bering Sea (BS). Ecosystem conditions are summarized in report card summaries at the beginning of each ESR. The Bering Sea has cooled relative to the recent warm stanza (2014-2021), but largely remains warmer than average. The overall ecosystem metrics indicate poor primary productivity while secondary productivity was moderate to low. In the Aleutian Islands (AI) there was the warmest winter on record, with sustained warmer temperatures and large-scale changes in SST. The persistent warm conditions, increased rockfish dominance and increasing pink salmon abundance jointly might indicate a transition of the ecosystem to a state where rockfish and pink salmon are the main pathway of zooplankton into the food web.

The BSAI SAFE report forms the basis for BSAI groundfish harvest specifications for the next two fishing years. Some groundfish stocks in the BSAI are assessed annually while others are assessed less frequently due to stock prioritization, including assessment methods and data availability. Full assessments were performed in 2023 for 7 stocks including EBS pollock, EBS and AI cod, Sablefish, Yellowfin sole, northern rock sole, northern rockfish, skates and octopus. A forage fish report and a report on sculpins were also produced in this cycle. A report on the status of forage fish in the BSAI

[110] https://www.npfmc.org/december-2023-newsletter/

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

was provided. For stocks with harvest projections or catch reports, specifications are rolled over from the previous assessment. The statewide sablefish assessment was provided during the Joint Plan Team report. Final BSAI specifications for 2024 and 2025 are shown on Table 1 in the Council motion.

GOA Groundfish Specifications

The Council approved the 2023 Gulf of Alaska (GOA) Groundfish Stock Assessment and Fishery Evaluation (SAFE) report and recommended final harvest specifications for the 2024 and 2025 GOA groundfish fisheries. For final rulemaking for the 2024 and 2025 fishing years, the Council recommended Overfishing Limits (OFLs) and Acceptable Biological Catch (ABC) levels consistent with SSC recommendations, and final Total Allowable Catch (TAC). This included combining the Western Gulf, Central Gulf, and Western Yakutat sub-area ABCs for the Other rockfish complex. The Council also recommended halibut Prohibited Species Catch (PSC) limit apportionments and adopted updated halibut discard mortality rates (DMRs). In setting the TACs for 2024 and 2025, the Council accounts for guideline harvest levels (GHLs) for groundfish fisheries in state waters; full details are included in the Council Motion.

The Council also reviewed the Ecosystem Status Report for the GOA, including a 2-page GOA ecosystem brief. The report provided information on ocean conditions, phytoplankton and zooplankton densities, forage fish abundance, and seabird and marine mammal trends. The report highlighted that GOA ocean temperatures were approximately average to cooler than average in the winter and spring and above average in the late summer. Ocean conditions are expected to change in 2024 from the past multi-year trends due to the warming associated with El Niño. Vulnerable GOA groundfish in 2024 (due to warm surface waters and reduced zooplankton quality) potentially include the larval and age-0 juveniles of Pacific cod, walleye pollock, and northern rock sole.

The 2023 GOA Groundfish SAFE report includes stock status updates for all stocks or stock complexes managed through the GOA Groundfish FMP. The GOA SAFE report forms the basis for GOA groundfish harvest specifications for the next two fishing years. Based on consideration of stock prioritization including assessment methods and data availability, some stocks are assessed on an annual basis while others are assessed less frequently. Full or update assessments (defined here) or were produced for GOA pollock, Pacific cod, sablefish, deepwater flatfish, rougheye/blacksptted rockfish, shortraker rockfish, Other rockfish, Pacific ocean perch, and skates. Harvest projections were produced for shallow water flatfish including northern and southern rock sole, rex sole, flathead sole, arrowtooth flounder, northern rockfish, and dusky rockfish. Catch reports were produced for Atka mackerel, thornyhead rockfish, SEO demersal shelf rockfish, sharks, and octopus. For harvest projections and catch reports, specifications were rolled over from the previous full assessment for each stock. An ecosystem component report was also prepared for sculpins.

**Meeting February 2024**[111]

Small sablefish release

This agenda item was an SSC-only item at this meeting. The SSC provided analysts with recommendations on sablefish discard mortality rates (DMRs) (12%, 20%, 35%) to be used in the upcoming analysis on the proposed action to allow release of small sablefish in the IFQ fishery. The SSC also provided feedback on the analytical approach for the next iteration of the analysis, including

[111] https://www.npfmc.org/february-2024-newsletter/

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

the proposed simulation study to address prior SSC requests on potential impacts to the sablefish stock, and recommendations for economic analyses associated with the action.

The DMR is a critical assumption when trying to evaluate potential environmental and socioeconomic impacts of this action, and by implementing a reasonable upper and lower bound on DMR, simulation analyses can demonstrate the range of impacts on spawning stock biomass and catch advice. Having a reasonable range of DMRs to analyze will reduce one source of uncertainty in the forthcoming EA/RIR analysis of the potential impacts of the proposed action scheduled for June 2024.

**Meeting June 2024**[112]

Halibut Area 4 Vessel Caps

The Council moved an action on halibut IFQ vessel use caps in Area 4 on for final review with several changes to the purpose and need statement for action and several revisions to the alternatives considered. This action considers a long-term change for creating new vessel caps specific to halibut IFQ regulatory Area 4. This action is being considered to increase utilization of quota and fishery revenues in Area 4 by providing additional harvest opportunities for vessels that were constrained by the previous vessel use cap while maintaining the Council's objectives for the IFQ program to provide entry level opportunities and support sustained participation by fishery dependent communities.

Since 2020 for Areas 4B, 4C/D and 2021 for Area 4A, the Council has requested NMFS promulgate regulations to remove vessel use caps for IFQ halibut. As a result, vessel caps do not apply to Area 4 and IFQ halibut harvested in Area 4 does not accrue to vessel caps in other Areas currently and through the 2027 IFQ fishing season. However, these exemptions were intended to be interim measures to provide additional flexibility to vessels in Area 4 given several years of challenging circumstances (e.g., global pandemic, collapse of snow crab fishery, reduction in processing capacity) and while a longer-term regulatory response is considered. The proposed action currently under consideration would supersede this Area 4 exemption from the vessel caps if implemented before 2027.

The Council's amended action alternative for consideration includes creating a new halibut vessel cap for Area 4 halibut TAC. This would either establish a limit of 4%, 5% or 6% of the Area 4 halibut TAC (Option 1) or exclude Area 4A from the new vessel cap under consideration and establish an Area 4B/4C/4D/4E vessel cap of 7%, 9%, or 11% (Option 2). The Council clarified that this action is not intended to impact the order in which areas are fished; a vessel may operate in Area 2C, Area 3 and Area 4 in any order. Landings in Area 4 up to an amount equal to the difference between the vessel limit that applies inside and outside of Area 4 would not accrue towards the limit outside of Area 4. This does not change the vessel use limitations that exist outside of Area 4; all landings made outside of Area 4 would still be limited by the existing caps and all total landings would apply to the Area 4 cap.

The Council is considering two sub-options that could apply under either option. The first sub-option states that halibut IFQ held by an Area 4B CQE would not accrue towards the Area 4 vessel cap (sub-option 1). The second sub-option considers establishing a review period of three or five years after implementation for any creation of a separate Area 4 vessel cap (sub-option 2).

[112] https://www.npfmc.org/june-2024-newsletter/

| 3. | Management objectives shall be implemented through management rules and actions formulated in a plan or other framework. |
|---|---|
| | The Council has not yet identified a preliminary preferred alternative for action.<br><br>Small Sablefish Release<br>The Council recommended a preliminary preferred alternative on small sablefish release, with revisions to the purpose and need statement and alternatives. The action being considered would allow sablefish under 22 inches in total length to be released in the IFQ and CDQ fixed gear fisheries and would create a new incidental harvest allowance (ICA) to account for sablefish that are not retained. The proposed action, which has been moving through the Council process since 2018, is in response to the low economic value of small sablefish which have inundated commercial catches over the past several years.<br><br>The proposed action includes several options for the Council and elements considered in the analysis. At this meeting, the Council eliminated an option which would allow voluntary release of sablefish of any size. The Council also removed an option to implement a sunset provision for this action. Additionally, the Council added an element recommending the development of careful release requirements for fixed gear sablefish fisheries but did not include this element as part of its PPA.<br><br>The analysis described implementation details that need to be considered when moving this action forward. A discard mortality rate (DMR) would be applied to discarded sablefish. This DMR would be recommended by the SSC during its annual harvest specifications process and would be used both in the sablefish stock assessment as well for in season management of the fisheries. To account for sablefish that are not retained in the fishery, NMFS would need to establish either one or two separate ICAs. The potential impacts of how these ICAs are established, and who would be affected, will be further detailed in the next iteration of the analysis.<br>The analysis, with revisions per SSC and Council discussion, will be considered for final action at a future meeting.<br><br>**Meeting October 2024**[113]<br>Joint BSAI and GOA Groundfish Specifications<br>Groundfish Plan Team Reports and Proposed Harvest Specifications<br>Under this agenda item, the Council received reports from the recent Joint, Bering Sea and Aleutian Islands (BSAI), and Gulf of Alaska (GOA) Groundfish Plan Team meetings and recommended 2025 and 2026 BSAI and GOA groundfish harvest specifications and prohibited species catch (PSC) limit apportionments for proposed rulemaking. Additionally, the Council received presentations on two discussion papers; the first on how marine mammals feeding on halibut discards impacts halibut discard mortality rates, and the other on spatial management of GOA rockfishes, described below.<br>Proposed rulemaking for harvest specifications notifies the public of expected Council action to recommend final groundfish harvest specifications for 2025 and 2026 at the December 2024 meeting. Proposed groundfish harvest specifications for both 2025 and 2026 are typically set to match the final 2025 harvest specifications that were previously approved and published in the Federal Register in March 2024. The Council will recommend final harvest specifications in December 2024 based on stock assessments that incorporate the most recent 2024 survey data. The assessments will be compiled in the Groundfish SAFE reports for the BSAI and GOA that will be released in late November 2024. When the final rule implementing those recommendations is |

[113] https://www.npfmc.org/october-2024-newsletter/

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

published in early 2025, the updated specifications will replace the 2025 specifications that were approved last year.

The SSC reviewed the Joint Groundfish Plan Team Report, the BSAI Groundfish Plan Team Report, and the GOA Groundfish Plan Team Report that summarized the issues discussed and actions taken by the Plan Teams at their September meetings. The SSC received a preview of ecosystem status reports (ESRs) which provided an Alaska climate update and a preliminary assessment of ecosystem indicators for the Bering Sea, Aleutian Islands, and Gulf of Alaska under their C1 Crab Specifications agenda item. Full presentations of these reports will be provided to the Council in December.

The Council received condensed presentations of the Groundfish Plan Team reports that focused on issues most relevant to proposed specifications and some of the highlights coming out of the Plan Team meetings as well as stock assessment products expected for stocks in December. Highlights from the Joint Plan Team meeting included preliminary survey results and proposed modeling updates as well as other informational items.

Updated groundfish stock assessments will be reviewed by the Plan Teams at the upcoming meetings November 12-15 at the Alaska Fisheries Science Center in Seattle, WA, and the Council will receive full reports at its December meeting prior to recommending final BSAI and GOA groundfish harvest specifications.

<u>BSAI Groundfish</u>
For proposed rulemaking for the 2025 and 2026 fishing years, the Council recommended OFLs, ABCs, and TACs based on a rollover of the existing 2025 specifications for all BSAI groundfish stocks, and consistent with SSC recommendations. The Council also recommended PSC limit apportionments for salmon, halibut, crab, and herring, and halibut Discard Mortality Rates (DMRs) for 2025 and 2026. Full details are included in the Council motion for proposed BSAI groundfish harvest specifications.

The Council received a letter from the Alaska Department of Fish and Game (ADF&G) indicating that the combined, post-season sum of the run sizes from the rivers comprising the three-river index (Upper Yukon, Unalakleet, and Kuskokwim Rivers) of Chinook salmon is 197,359 and is below the threshold level of 250,000. Therefore, the performance standard for the Bering Sea pollock fishery will remain at 33,318 Chinook salmon, and the PSC limit will remain at 45,000, as identified in 50 CFR 679.21.

The Council also received a letter from the NMFS indicating that results of the NMFS Eastern Bering Sea bottom trawl survey estimate of halibut is 125,145 fish and below the abundance threshold of 150,000 fish thus in the 'low abundance' state for purposes of setting the 2025-2026 halibut PSC limit for the Amendment 80 fleet. The IPHC letter reporting the abundance estimate from the setline survey was not yet available, thus the Council recommended the same halibut PSC limit as in 2024 for proposed specifications. Abundance estimates for halibut (IPHC setline) and herring (ADF&G) will be available for consideration as part of final specifications in December.

Highlights from the BSAI Plan Team report included preliminary results from the Eastern Bering Sea bottom trawl survey, and proposed changes to and modeling considerations for several of this year's planned stock assessments. The Plan Team, SSC, AP, and Council also reviewed harvest projections

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

for stocks that will not have an updated assessment this year, and which will be included in December final specifications.

Staff contact for the BSAI Groundfish Plan Team is Diana Stram.

GOA Groundfish

For proposed rulemaking for the 2025 and 2026 fishing years, the Council recommended OFLs and ABCs consistent with SSC recommendations, based on rollover of the existing 2025 specifications for all GOA groundfish stocks. The Council also recommended proposed TACs for all species. Lastly, the Council recommended GOA halibut PSC limit apportionments and adopted updated halibut DMRs for 2025 and 2026; full details are included in the Council motion for proposed GOA groundfish specifications.

Highlights from the GOA Plan Team Report included: preliminary results from the acoustic survey conducted this year, potential changes to survey plans for 2025, and proposed changes to GOA groundfish models and apportionments for several of this year's planned stock assessments. The Plan Team, SSC, AP, and Council also received harvest projections for the following GOA stocks or stock complexes, which will not be reviewed again in November but will be used for making final harvest recommendations in December: Flathead sole, Pacific ocean perch (POP), rougheye/blackspotted rockfish (RE/BS), northern and southern rock sole, shallow-water flatfish (SWF), rex sole, deepwater flatfish (DWF), and arrowtooth flounder (ATF).

Halibut Discards Mortality discussion paper

The interagency Halibut DMR Working Group provided an informational report and short presentation on a discussion paper: "Marine Mammals Feeding on Halibut Discards." The report outlined the 3 ways DMRs are calculated to estimate halibut mortality and described how observers record data on marine mammals feeding on discards. The working group could not put forward a recommendation at this time due to the lack of a sampling frame.

Climate Reports

The Council has multiple concurrent efforts planned or underway to build climate resilience in the Council process and the fisheries it manages. These include Inflation Reduction Act (IRA) funding and proposed activities, the June 2024 Climate Scenarios Workshop (CSW) and resulting report and ideas, and the Programmatic Evaluation, as well as the work of the Climate Change Task Force (CCTF), which will hold its final meeting in November 2024 and provide a final report to the Council in December. As such and to coordinate amongst various ongoing initiatives, the Council received two presentations on the CSW report and an overview report on the recent Scientific Coordination Subcommittee 8th National meeting (SCS8). These two discussion items provided the Council an opportunity to consider next steps and further actions in support of developing further guidance, tools, and/or approaches to improve climate readiness in the Council process.

Update on IRA Climate Readiness Funding

The Council's IRA funding provides the resources and staff capacity to invest in a focused climate readiness planning effort. The Council submitted a proposal to NMFS and was approved for $2.5 million in funding. IRA funds must be spent by the end of 2027. While the Council is not constrained to planning within this timeline (and some potential items including any regulatory actions would

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

likely extend beyond this timeline), it is important to consider how to leverage this substantial support strategically and impactfully in the next three years.

The Council's IRA funding proposal focuses on three objectives that build on and advance the Council's current work:

1. Develop a climate-resilient management policy. (This work is intended to be carried out through the Programmatic Evaluation process).
2. Continue work to incorporate local and traditional knowledge.
3. Strengthen the consideration of uncertainty and risk in harvest specifications.

Climate Scenarios Workshop Report

In June 2024, the Council held a two-day Climate Scenarios Workshop with the purpose of generating ideas for short- and long-term management approaches and tools to improve climate resiliency of federally managed fisheries in the North Pacific. The workshop convened over 200 participants in person and virtually to explore four hypothetical future scenarios. No decisions were made at this meeting, and the intent was to generate ideas and not to build consensus or make recommendations. The discussion section of the workshop report is based on detailed meeting notes from all plenary and breakout sessions, and captures the ideas and feedback shared at the workshop as expressed by participants. The report includes ideas relevant to all 3 IRA proposal objectives, as well as other climate readiness planning opportunities, and. As well as some suggestions for moving forward some of the main themes and ideas stemming from the workshop.

The Council also reviewed a brief report on the recent 8th national meeting of the Scientific Coordination Subcommittee (SCS8), which took place in August 2024 in Boston, MA, and focused on the topic of "Applying Acceptable Biological Catch (ABC) Control Rules in a Changing Environment." The meeting convened SSC members from across all eight council regions to discuss this topic in depth. The full meeting summary is anticipated to be available in early 2025. The brief summary report provided some more immediate high level considerations for the Council from the NPFMC delegation to the meeting.

Following discussion of both reports and after hearing from both the SSC, the AP and the public, the Council noted that it looks forward to the Climate Change Task Force final report in December 2024, which, with the Climate Scenarios Workshop report, will allow the Council to further plan and communicate climate resiliency efforts in a comprehensive manner through a tracking tool and/or workplan. The Council also supported the two priorities identified by the SSC resulting from SCS8, both of which support and maintain momentum toward achieving IRA proposal Objective 3: Strengthen the consideration of uncertainty and risk in harvest specifications. The two priorities are the following:

1.Consider to what extent, and whether, to revise groundfish and crab harvest control rules (HCRs) to be more climate-resilient by scheduling an SSC workshop (February or April 2025) as a starting point to frame how to approach and prioritize HCR adjustment opportunities and supports the formation of a technical SSC-Plan Team-agency subgroup to develop the ideas from this workshop.

2. Compile social and economic information to meet the needs of using the best scientific information available and informing Council decision-making and TAC-setting. In doing so, the

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

Council supports efforts of the existing technical SSC economic and socioeconomic subgroup and will review pilot work on sablefish in December 2024

**Commercial Sablefish in State Managed Waters**

The sablefish fisheries in Alaska are governed at both federal and state levels. State-managed fisheries for sablefish are present in Southeast Alaska (both NSEI and SSEI) and Prince William Sound (within District), each with distinct seasons and GHLs (Goethel *et al.,*2023) The Cook Inlet Area fishery operates under open access, with a distinct GHL established based on a historical baseline harvest level, which is changed annually according to the relative change in the ABC of the federal CGOA. A yearly harvest aim for the sablefish fisheries in Clarence and Chatham Strait is established based on survey data, capture per unit effort, and the biological parameters of the population.

The National Marine Fisheries Service (NMFS) and the Alaska Department of Fish and Game (ADFG) do assessment surveys on sablefish in Alaskan waters[114]. The NMFS executes an annual longline survey and a triennial trawl survey in the Gulf of Alaska, whereas ADFG carries out annual longline surveys in Chatham and Clarence Strait. These surveys yield estimates of catch per unit effort, relative abundance, and biological data. Furthermore, tagging experiments are conducted to examine sablefish mobility in federal, state, and Canadian waterways. The ADFG does an annual tagging survey in Chatham Strait as a component of a mark-recapture research to assess population abundance.

The objectives of the state waters sablefish fishery are pointed out in the annual updates to the relevant SSEI and NNEI Subdistrict Fishery Management Plans by the staff of the ADFG's Commercial Fisheries Division[115,116]. The objectives are articulated as management measures and encompass: (i) annual harvest objectives (AHOs), (ii) compulsory fisher registration, (iii) obligatory logbook completion and submission with e-tickets, (iv) optional tagging, (v) bycatch allowances for other species, and (vi) directed catch retention limits.
The management objectives attributed to Alaska's commercial sablefish fishery remained unchanged in 2023.

**Northern Southeast Inside (NSEI) Subdistrict**

The 2023 Northern Southeast Inside (NSEI) Subdistrict commercial sablefish fishery annual harvest objective (AHO) is 1,393,659 round pounds[117]. The AHO is based on the sablefish recommended acceptable biological catch (ABC) with decrements made for sablefish mortality in other fisheries. There are 73 valid Commercial Fisheries Entry Commission (CFEC) permits for 2023, which is the same number of permits as in 2022. The individual equal quota share (EQS) is 19,091 round pounds, a 13% increase from the 2022 EQS of 16,899 round pounds.

The recommended 2023 ABC is 1,573,109 round lb ($F$ABC = 0.063), a 9% increase from the 2022 ABC. The increase in the ABC is attributed to the continued growth and maturation of the strong recruitment events since 2015, highlighted by recruitment in 2018 (the 2016 year class), which is the highest recruitment since 1979.

[114] https://www.adfg.alaska.gov/index.cfm?adfg=sablefish.research
[115] https://www.adfg.alaska.gov/FedAidPDFs/RIR.1J.2022.19.pdf
[116] https://www.adfg.alaska.gov/FedAidPDFs/RIR.1J.2022.18.pdf
[117] https://www.adfg.alaska.gov/static/applications/dcfnewsrelease/1480926625.pdf

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

The principal management measures in effect for the 2023 commercial sablefish fishery were similar to those for the 2022 fishery and included: (i) fisher registration and logbook requirements, (ii) sablefish possession and landing requirements, (iii) bycatch allowances for other species, (iv) specific prohibitions, (v) area and time closures, and (vi) at-sea observer coverage.

**Southern Southeast Inside (SSEI)**
The 2023 Southern Southeast Inside (SSEI) Subdistrict sablefish commercial annual harvest objective (AHO) is 643,360 round pounds, the same as the 2022 AHO[118]. Equal quota share (EQS) for each of the 22 permit holders will be 29,244 round pounds. The number of permits for this fishery did not change for the 2023 season. Each permit holder's 2023 EQS will be adjusted based on any legal overages or losses from 2022 and a personal quota share (PQS) will be assigned.

Management measures in effect for the 2023 commercial sablefish fishery were similar to those for the 2022 fishery and included: (i) legal gear specifications, (ii) registration and logbook requirements, (iii) fish ticket requirements, (iv) possession and landing requirements, (v) bycatch allowances, and (vi) specific prohibitions.

The Alaska Board of Fisheries took the following actions in early 2024 regarding the state managed commercial sablefish fishery[119].

| Month/Year | Actions (Policy, Regulatory) |
|---|---|
| April to December 2022 | No actions regarding state sablefish fisheries |
| January to December 2023 | No actions regarding state sablefish fisheries |
| January, 2024 | Proposal to establish new Kodiak Area commercial sablefish fishery failed by a 7-0 vote. |

3.2. Management measures should limit excess fishing capacity, promote responsible fisheries, take into account artisanal fisheries, protect biodiversity and allow depleted stocks to recover.
The groundfish fisheries in Federal waters off Alaska are managed under the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area (BSAI FMP)[120] and the Fishery Management Plan for Groundfish of the Gulf of Alaska (GOA FMP)[121]. In the Gulf of Alaska (GOA) and Bering Sea and Aleutian Islands (BSAI), groundfish harvests are managed subject to annual limits on the amounts of each species of fish, or of each group of species, that may be taken. The fishery is a closed access fishery managed under an Individual Fishing Quota (IFQ) system[122]. The Pacific halibut fishery is jointly managed by the IPHC and NOAA under a suite of rules, measures and policies that are harmonized and complimentary. Each agency has a multi-year strategic plan that guide fisheries management decisions against a framework of long and short-term objectives that (i) support responsible and sustainable fisheries, (ii) promote economic viability across all sectors, (iii) recognize and respect indigenous treaty rights, and (iv) sustain dependent, rural communities.

The federal Individual Fishing Quota halibut and sablefish fisheries are exclusively closed access fisheries. Except for the little Cook Inlet state fishery, all are closed access fisheries. The Cook Inlet

[118] https://www.adfg.alaska.gov/static/applications/dcfnewsrelease/1471277681.pdf
[119] https://www.adfg.alaska.gov/index.cfm?adfg=fisheriesboard.meetinginfo
[120] https://www.npfmc.org/wp-content/PDFdocuments/fmp/BSAI/BSAIfmp.pdf
[121] https://www.npfmc.org/wp-content/PDFdocuments/fmp/GOA/GOAfmp.pdf
[122] https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/pacific-halibut-and-sablefish-individual-fishing-quota-ifq-program

| 3. | Management objectives shall be implemented through management rules and actions formulated in a plan or other framework. |
|---|---|
| | fishery[123] is regulated using Guideline catch Levels (GHLs) and additional management strategies to maintain the catch within established thresholds. The Individual Fishing Quotas (IFQs) program of the fisheries is specifically designed to mitigate surplus fishing capacity and enhance the economic sustainability of the sector. The quota share system has eliminated surplus fishing capacity, reduced the number of active vessels utilizing less gear, significantly prolonged fishing seasons, and enhanced economic sustainability within the fishing sector.<br><br>The Western Alaska Community Development Quota (CDQ)[124] program has facilitated the development of commercial fisheries in BSAI coastal towns by granting them exclusive access to designated quantities of sablefish and halibut within the BSAI management region. All state and federally regulated fisheries are within target reference points and are not overexploited. |
| References: | Echave, K., M. Eagleton, E. Farley, and J. Orsi. 2012. A refined description of essential fish habitat for Pacific salmon within the U.S. Exclusive Economic Zone in Alaska. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-236, 104<br>Goethel, D.R., Cheng, M.L.H., Echave, K.B., Marsh, C., Rodgveller, C.J., Shotwell, K., and Siwicke, K. 2023. Assessment of the sablefish stock in Alaska. North Pacific Fishery Management Council, Anchorage, AK. |
| Statement of consistency to the RFM Fishery Standard | **The fishery conforms to the requirements of Fundamental Clause 3 of the RFM Fishery Standard** |

[123] https://www.adfg.alaska.gov/FedAidPDFs/FMR19-24.pdf
[124] https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/community-development-quota-cdq-program

### 7.9.2. Section B: Science & Stock Assessment Activities, and the Precautionary Approach

#### 7.9.2.1. Fundamental Clause 4. Fishery data

| **4.** | **There shall be effective fishery data (dependent and independent) collection and analysis systems for stock management purposes.** |
|---|---|
| Summary of relevant changes: | 4.1. All significant fishery removals and mortality of the target species (shall be considered by management. Specifically, reliable and accurate data required for assessing the status of fishery(ies) and ecosystems—including data on retained catch, bycatch, discards, and waste—shall be collected. Data can include relevant traditional, fisher, or community knowledge, provided their validity can be objectively verified. These data shall be collected, at an appropriate time and level of aggregation, by relevant management organizations connected with the fishery, and provided to relevant States regional, and international fisheries organizations.<br><br>**Pacific Halibut**<br>The most recent complete stock assessment was completed at the end of 2023 by the International Pacific Halibut Commission[125]. A comprehensive suite of data to quantify fishery removals and mortality is collected to support this statistical stock assessment model. All fishery removals and mortality of Pacific Halibut are considered in the assessment and used to inform management of the stock. The section "Overview of data sources for the Pacific halibut stock assessment, harvest policy, and related analyses" provides a detailed summary and data characteristics for the fishery-independent and fishery-dependent data used in the assessment. Fishery-dependent data used in the assessment includes commercial fishery landings, directed commercial fishery discards (a combination of mainly sub-legal and some legal-sized fish), recreational, subsistence, and non-directed commercial discard mortality ('bycatch') of Pacific halibut in fisheries targeting other species.<br><br>The fishery-independent data collection are described comprehensively in a series of annually produced IPHC stock assessment summary and supporting documents (including those cited below) that are hosted on the IPHC website (https://www.iphc.int/research-monitoring/). Fishery Independent data are generated using the IPHC's setline survey, the "Fishery-Independent Setline Survey (FISS) (Ualesi *et al*., 2024). The 2023 FISS effort consisted of chartering n = 8 commercial longline vessels (four Canadian and four USA) for a combined 48 trips and 497 charter days. All fishery-independent harvest is accounted for in the assessment model. These data are collected using an integrated, statistically sound, and robust collection scheme. The sampling scheme is described in the "IPHC Fishery-Independent Setline Survey (FISS) design and implementation in 2023". The FISS has evolved over the history of the data collection: The survey data was augmented from 2014-2019 with "expansion" stations that filled identified in gaps in coverage. Prior to 2020, the standard grid of stations comprised n = 1,200 stations. Following the completion in 2019, expansion stations were added to the standard grid in all IPHC Regulatory Areas, now totalling 1,890 stations for the full FISS design, within the prescribed depth range of 18 to 732 metres (10 to 400 fathoms). The IPHC endorsed a FISS design for 2023 that included 958 stations coastwide. The design comprised sampling of subareas within IPHC Regulatory Areas 2A, 2B, 3A, 3B, 4A, and 4B (Figure 2). 2023 sampling in IPHC Regulatory Areas 2C included 100% of the full FISS design. |

[125] https://www.iphc.int/research/stock-assessment/

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

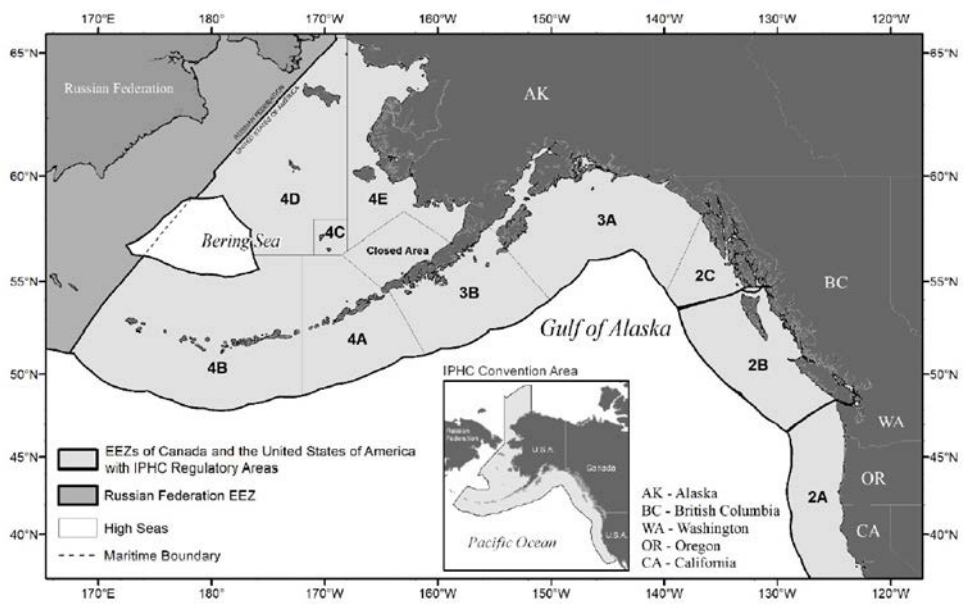



**Figure 2.** IPHC Convention Area (inset) and IPHC Regulatory Areas.

Several data reporting systems are in place to monitor, record, perform quality control, and allow dissemination of Pacific Halibut landings (Figure 3). Landings data are reported to, and quality controlled using the system eLandings system. Data quality is evaluated by NMFS and entered along with observer data into the Catch Accounting System (CAS[126]) which is maintained by NMFS. Data from the eLandings [127,128] are made available to the three collaborating agencies, i.e. NMFS, IPHC, and ADFG concerned with managing and accessing the stock.

Fishery-dependent activities are described comprehensively and publicly disseminated in the annually produced IPHC stock assessment (Stewart and Hicks, 2024) and removals are well quantified spatially and temporally in the annual assessment. Between 1888 and 2023, total mortality amounted to 7.4 billion pounds (approximately 3.3 million metric tons). Since 1923, annual mortality has ranged from 34 to 100 million pounds (16,000–45,000 metric tons), with an average of 63 million pounds (29,000 metric tons). Annual mortality exceeded this long-term average from 1985 to 2010 and averaged 37.4 million pounds (17,000 metric tons) between 2019 and 2023. In 2023, coastwide commercial halibut fishery landings, including research landings, totaled approximately 23.0 million pounds (10,400 metric tons), a 6% decrease from 2022. Discard mortality in the directed commercial fishery dropped by 9% to 1.3 million pounds (590 metric tons), following a 37% increase in 2022. Discard mortality in non-directed fisheries was estimated at 4.8 million pounds (2,200 metric tons) in 2023, down 6% from 2022 and remaining below pre-2019 estimates. Recreational fishery mortality, including discard mortality, was estimated at 6.0 million pounds (2,700 metric tons) in 2023, a 4% decline from 2022. Overall, total halibut mortality

[126] https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/alaska-catch-accounting-system
[127] https://www.fisheries.noaa.gov/alaska/resources-fishing/electronic-reporting-alaska-fisheries
[128] https://elandings.alaska.gov/

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

from all sources decreased by 7% to 35.9 million pounds (16,300 metric tons) in 2023, based on preliminary data.

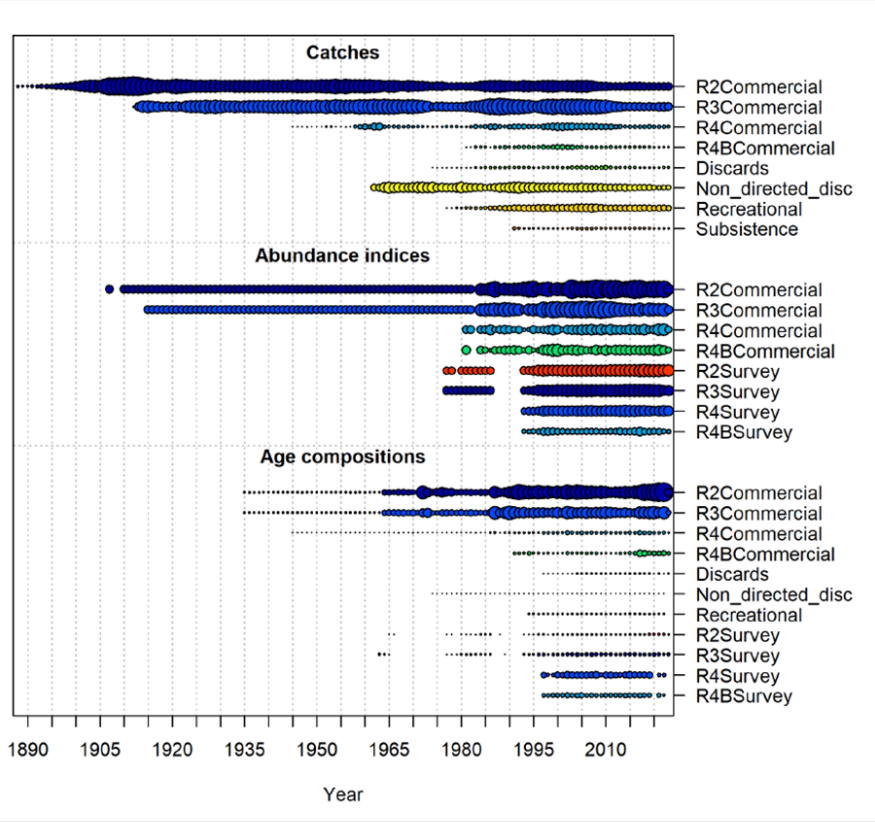



**Figure 3.** Overview of data sources in Stewart and Hicks (2024). Circle areas are proportional to magnitude (mortality/catches) or the relative precision of the data (larger circles indicate greater precision for indices of abundance and age composition data).

**Alaska Sablefish**

All significant fishery removals and mortality of the Alaska Pacific Sablefish stock. Data on retained catch, bycatch, discards, and waste are collected and verified. An effective, comprehensive, and robust monitoring system is used to collect fishery removals and mortality of the Alaska Pacific Sablefish stock and these data are provided to managers and stock assessment scientists. Each source of data is fully implemented and made available to management in the quantitative statistical peer-reviewed stock assessment. The most recent (terminal year 2023, (Goethel *et al.,*2023) stock assessment documents all fishery-independent and fishery-dependent data collection activity. The 2021 assessment (Goethel *et al.,*2021,) is the last benchmark assessment performed for the stock. The catch data included in the model are summarized in Table 7.

The 2021 benchmark stock assessment (Goethel *et al.,* 2021) and the 2023 update (Goethel *et al.,* 2023) include all sources of catch including landings and bycatch (with the assumption that

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

mortality is 100%) and include catches from minor State-managed fisheries in the northern GOA and AI region. Fish caught in State waters are reported using the area code of adjacent Federal waters. Minor State fisheries catch averaged 180 t from 1995-1998, about 1% of the total catch, mostly from the AI region. Catches from the state of Alaska areas with their own assessments and Guideline Harvest levels, such as Prince William Sound and Chatham Strait, are not included. Some catches likely went unreported in the late 1980s. Attempts to estimate unreported catches by comparing reported catches to sablefish imports to Japan led to adjusting reported catches based on discard estimates from 1994-1997 for all years prior to 1993. The assessment reports from 2021 (benchmark) and 2023 (update) document all removals, including non-directed fishery catches. Research catches of sablefish, reported since 2009, are significant due to the annual AFSC longline survey funded by selling the catch. Additional removals come from bottom trawl surveys and the International Pacific Halibut Commission's longline survey. Sport fisheries catch, primarily in State waters, has been increasing. Total non-directed fishery removals have been 239-359 t since 2006, less than 1% of the recommended ABC, posing a low risk to the sablefish stock.

**Table 7.** Data used in the 2023 Sablefish assessment model (Goethel *et al.,* 2023). Years in bold are data new to this assessment.

| Source | Data | Years |
|---|---|---|
| Fixed Gear Fisheries | Catch | 1960 – **2023** |
| Trawl Fisheries | Catch | 1960 – **2023** |
| Non-Commercial Catch | Catch | 1977 – **2023** |
| Japanese Longline Fishery | Catch-per-Unit-Effort (CPUE) | 1964 – 1981 |
| U.S. Fixed Gear Fisheries | CPUE, Length | 1990 – **2022** |
| | Age | 1999 – **2022** |
| U.S. Trawl Fisheries | Length | 1990,1991,1999, 2005 – **2022** |
| Japan-U.S. Cooperative Longline Survey | RPNs, Length | 1979 - 1994 |
| | Age | 1981, 1983, 1985, 1987, 1989, 1991, 1993 |
| NOAA Domestic Longline Survey | RPNs, Length | 1990 – **2023** |
| | Age | 1996 – **2022** |
| NOAA GOA Trawl Survey | Biomass index | 1990, 1993, 1996, 1999, 2003, 2005, 2007, 2009, 2011, 2013, 2015, 2017, 2019, 2021, **2023** |
| | Lengths | 1990, 1993, 1996, 1999, 2003, 2005, 2007, 2009, 2011, 2013, 2015, 2017, 2019, 2021, **2023** |

Regarding the accounting of bycatch, the sablefish IFQ fishery prohibits releasing any sablefish if there is remaining IFQ for the vessel's crew (Goethel *et al.,* 2023). Since 2014, unusually large year classes have led to increased catches of small sablefish, which have lower economic value than larger fish. In December 2019, the North Pacific Fishery Management Council (NPFMC) began considering allowing the release of small sablefish before filling quotas. They developed two alternatives: no action or allowing the voluntary careful release of sablefish. An initial review in February 2021 revealed concerns about the lack of size limits, mechanisms for accounting for release mortalities, and the absence of direct studies on discard mortality rates (DMRs) for sablefish in Alaska. The analysis also highlighted issues with fishery monitoring, catch accounting, and increased uncertainty in sablefish stock assessments. Consequently, the Council suspended further action and sought recommendations from the IFQ Committee, which, in April 2021, confirmed that the release allowance remained a high priority. The Council then decided in October 2021 to prepare a document for consideration of a small sablefish release when time and resources permitted. By-catch in the directed sablefish fishery are recorded by observers and presented in the annual stock assessments. Sablefish discards in groundfish target fisheries are

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

greatest in the hook and line along with trawl gear types, but the predominant source varies over time and across regions. In both the BSAI and GOA in recent years, trawl gears have constituted the primary source of discards. Generally, discards of sablefish in pot gear in non- sablefish fisheries has been low (pot includes halibut and Pacific cod targeting). Pots are emerging as the primary way to harvest Sablefish, in part because they are subject to reduced whale depredation (below).

Marine mammals contribute, in an increasingly smaller way, to mortality in the Alaska Pacific Sablefish fishery (Goethel *et al.,* 2023). Whale depredation is monitored through at-sea observers, electronic monitoring (EM), and logbooks from the hook-and-line (HAL) and pot fisheries. Observers document whale depredation on all fixed gear sets in the HAL fishery to estimate total sablefish removals. Killer whale depredation has been recorded since 1995, primarily on longline gear in the Bering Sea (BS) and Western Gulf of Alaska (WG), with less frequent occurrences in the Aleutian Islands (AI). Annual depredation rates vary between 3-14% on 17-139 observed sets. Sperm whale depredation, more difficult to assess, occurs in the Central Gulf (CG), Western Yakutat (WY), and Eastern Yakutat/Southeast (EY/SE) regions, with lower rates in the WG. Depredation for both species has declined recently to 0-1%, likely due to fewer observed sets. Observed HAL sets decreased by 63% from 2013-2019 to 2020-2022. Preliminary 2023 data indicate increased depredation rates, ranging from 5-6% for sperm whales in some areas and up to 23% for killer whales in the BS. Low sample sizes may affect data reliability.

Depredation of pot gear is minimal, with 1 set affected in 2020-2021, increasing to 13 sets in 2023. Since 2020, EM reviewers have recorded whale presence and depredation but do not note pot gear damage. In 2020, 12 HAL sets showed killer whale depredation and 1 set showed sperm whale depredation. In 2021, only 1 HAL set showed killer whale presence. For pot gear in 2021, 2 sets showed killer whale depredation and 4 showed sperm whale depredation; in 2022, there was 1 set with killer whales. EM only records visible depredation, limiting its accuracy.

Since 2017, HAL logbooks have included voluntary fields for reporting whale presence and depredation. Mammal presence data is recorded in 85-95% of sets, exceeding observer data in quantity. From 2017-2022, 10-35% of logbook sets reported whale presence, totaling 440-1,384 sets per year. Observers recorded depredation on 3-14% of 17-139 sets annually. On average, killer whales were present in 6% of sets in the AI and 8% in the WG, while sperm whale presence was higher in the CG (21%), WY (35%), and EY/SE (25%). Sperm whale presence in the WG and WY decreased, while data for the BS is insufficient. Sperm whale depredation averaged 5%, and killer whale depredation averaged 0.3%. Killer whale depredation occurred in fewer than 50 sets annually, while sperm whale depredation ranged from 100-800 sets.

Depredation rates have decreased over time, with killer whale depredation affecting 15 sets in 2022 and sperm whale depredation affecting 196 sets, an 84% decrease since 2019. Logbook data is more consistent than observer data, with HAL sets decreasing from ~7,000 in 2019 to 300 in 2022. In 2022, 7,951 pot sets included marine mammal data, with marine mammals observed in 14-28% of sets, averaging 19% across all areas except the BS. Killer whale presence in the AI decreased from 38% in 2018 to 8% from 2019-2022, likely due to low sample sizes. Sperm whale presence was highest in the CG (11%), WY (23%), and EY/SE (21%), with a declining trend in EY and WY. Pot depredation was most common in the CG and eastern Gulf of Alaska (GOA) when sperm whales were present. In 2022, slinky pots experienced more depredation than hard pots

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

(31 vs. 9 sets). Damage to gear, sablefish, halibut, and unknown species was recorded, with sablefish being the most affected. Depredation rates remained consistent at 0.4-0.6% of pot sets.

**Table 8.** Whale adjusted catch tables by region (Source: Goethel *et al.,* 2023).

| Year | 2023 | | | | 2024 | | 2025 | |
|---|---|---|---|---|---|---|---|---|
| Region | $OFL_w$ | $ABC_w$ | TAC | Catch* | $OFL_w$ | $ABC_w$** | $OFL_w$ | $ABC_w$** |
| BS | -- | 8,417 | 7,996 | 4,851 | -- | 11,450 | -- | 11,499 |
| AI | -- | 8,884 | 8,440 | 1,924 | -- | 13,100 | -- | 13,156 |
| GOA | -- | 23,201 | 23,201 | 13,581 | -- | 22,596 | -- | 22,695 |
| WGOA | -- | 4,473 | 4,473 | 2,357 | -- | 4,699 | -- | 4,719 |
| CGOA | -- | 9,921 | 9,921 | 5,547 | -- | 9,651 | -- | 9,693 |
| **WYAK | -- | 3,205 | 3,205 | 2,068 | -- | 2,926 | -- | 2,940 |
| **EY/SEO | -- | 5,602 | 5,602 | 3,610 | -- | 5,320 | -- | 5,343 |
| Total | 47,390 | 40,502 | 39,637 | 20,357 | 55,084 | 47,146 | 55,317 | 47,350 |

Commercial fishery landings are reported through two different data collection portals. The first is the "eLandings" system [129,130] an electronic fish ticket system. The eLandings reporting system, required by Alaska Administrative Code 5 AAC 39.130[131], mandates the reporting of specific information to the Alaska Department of Fish and Game (ADF&G) for all harvests from Alaska state waters or of state-managed species. This system includes three applications: the eLandings web application for shoreside and internet-capable vessels, the seaLandings desktop application for vessels without internet access at sea, and the Landings thumb drive application for salmon and other tender or buying station operations. The eLandings system generates an ADF&G fish ticket electronically for signature and submission, consolidating landing, production, IFQ, and electronic logbook reporting. It is currently used for all rationalized crab, IFQ sablefish and halibut, and groundfish harvest reporting throughout the state, both shoreside and in the EEZ. The implementation of eLandings is being expanded incrementally to include salmon fisheries, coordinated with local ADF&G offices.

All catch data, including IFQ/CDQ sablefish and halibut, must be reported via eLandings. Each report is evaluated for quality control and assurance and entered into the NMFS catch accounting system (CAS) along with observer data. The CAS integrates observer and industry data to estimate total catch, complementing the observer program's sampling procedures. Detailed catch reporting and estimation processes are outlined (Callahan *et al.,*2014, Shotwell *et al.,*2023). The second data collection mechanism for the commercial fishery is the Alaska Fisheries Information Network (AKFIN)[132], established in 1997 to provide organized fishery information for decision-making. AKFIN maintains a searchable database of both state and federal commercial landings data relevant to Alaska. Although AKFIN does not collect data, it compiles data from agencies like NMFS Alaska Region, NMFS Alaska Fisheries Science Center, and the Alaska Department of Fish and Game, making it available in usable formats upon request.

4.1.1. Timely, complete, and reliable statistics shall be compiled on catch and fishing effort and maintained in accordance with applicable international standards and practices, and in sufficient detail to allow sound statistical analysis for stock assessment. Such data shall be updated regularly and verified through an appropriate system. The use of research results as a basis for setting

[129] https://www.fisheries.noaa.gov/alaska/resources-fishing/electronic-reporting-alaska-fisheries
[130] https://elandings.alaska.gov/
[131] https://www.adfg.alaska.gov/static/license/fishing/pdfs/5aac39.pdf
[132] https://www.fisheries.noaa.gov/inport/organization/AKFIN

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

management objectives, reference points, and performance criteria, as well as for ensuring adequate linkage between applied research and fisheries management (e.g., adoption of scientific advice) shall be promoted. Results of analysis shall be distributed accordingly as a contribution to fisheries conservation, management, and development.

**Pacific Halibut**
The data production, maintenance, update, and verification of statistical data are made with the greatest possible scrutiny and vetted through a comprehensive peer-reviewed process (Stewart and Hicks, 2024; Ualesi *et al.,* 2024; Soderlund *et al.*, 2012; IPHC, 2023a; IPHC, 2019).
In particular, the FISS process has undergone substantial internal (IPHC) and external review. These are summarized in the narrative above and also fully described in the Pacific Halibut annual stock assessment and supporting documents.

**Alaska Pacific Sablefish**
The production, maintenance, update, and verification of statistical data for Alaska Pacific Sablefish are conducted with rigorous oversight, quality control, and validation (Goethel *et al.,* 2021; Goethel *et al.,* 2023; Shotwell *et al.,* 2023). These data, summarized in reports and executive summaries, are made available throughout the assessment process to support timely resource management, such as quota setting, through agency websites, publications, and are presented and discussed at public meetings. Certain commercial fishing data, such as individuals or vessels in fishery CPUE analysis, are confidential, depending on the number of entities involved, in line with NMFS information confidentiality policies. The Commercial Fisheries Entry Commission (CFEC) manages ADFG fish ticket records[133], which are retained for 45 years and are confidential under Alaska statutes (AS 16.05.815 and 16.40.155), which govern the confidentiality of certain reports and records.

4.2. An observer scheme designed to collect accurate data for research and support compliance with applicable fishery management measures shall be established.
**Pacific Halibut**
The Pacific Halibut fishery has an extensive observer program[134]. The North Pacific Observer Program operates in commercial groundfish and halibut fisheries in the Bering Sea, Aleutian Islands, and Gulf of Alaska. The program annually trains, briefs, debriefs, and oversees observers who collect catch data onboard fishing vessels and at onshore processing plants. This data is used for in-season management, stock assessments, and ecosystem studies. The program ensures the highest quality data through rigorous quality control and assurance processes. The “Observer Program” provides the regulatory framework for NOAA Fisheries certified observers to collect data on groundfish, including halibut, fisheries. Information developed in the observer program information is critical for managing fisheries and developing measures to minimize bycatch. Observers collect biological samples and fishery-dependent data on total catch and interactions with protected species. Managers use this data to monitor quotas, manage groundfish and prohibited species catch, and document and reduce interactions with protected resources. Division staff process the data and make it available to the Sustainable Fisheries Division of the Alaska Regional Office for quota monitoring, to scientists at the Alaska Fisheries Science Center for stock assessments and ecosystem research, and to the fishing industry to monitor quotas and prohibited species catch.

[133] https://www.adfg.alaska.gov/index.cfm?adfg=fishlicense.requests
[134] https://www.fisheries.noaa.gov/alaska/fisheries-observers/observed-and-monitored-catch-tables

| 4. | There shall be effective fishery data (dependent and independent) collection and analysis systems for stock management purposes. |
|---|---|
| | In January 2013, NOAA Fisheries revised the deployment and funding of observers in the partial coverage category, along with the requirements for vessel and processor operations to be observed. These changes increased the statistical reliability of the program's data, addressed cost inequality among fishery participants, and expanded observer coverage to previously unobserved fisheries. This program information constitutes the Small Entity Compliance Guide required under section 212 of the Small Business Regulatory Enforcement Fairness Act of 1996. All participants in the federally managed commercial groundfish fisheries off Alaska (except catcher vessels delivering unsorted cod ends to a "mothership") are subject to Observer Program requirements. Through the Annual Deployment Plan, NOAA Fisheries has the flexibility to decide when and where to deploy observers in the partial coverage category based on a scientifically defensible deployment plan reviewed annually by the Council. Catcher vessels operating in the halibut IFQ or CDQ are in the 'partial coverage category'[135]. Three pools are specified<br>1. No-selection pool: The no-selection pool is composed of vessels that will have no probability of carrying an observer on any trips for the 2019 fishing season. These vessels are:<br>• Fixed-gear vessels less than 40 ft LOA and vessels fishing with jig gear, which includes handline, jig, troll, and "dinglebar" troll gear; and<br>• Four fixed-gear vessels voluntarily participating in EM innovation and research (Appendix D).<br>2. Electronic monitoring (EM) trip-selection pool: NMFS has approved 169 fixed gear vessels in the EM selection pool in 2020. Once NMFS approves a vessel for the EM selection pool, that vessel will remain in the EM selection pool for the duration of the year. Prior to fishing, each vessel must have an NMFS-approved VMP.<br>3. Observer Trip-Selection Pool: There are 3 sampling strata in the trip-selection pool for the deployment of observers:<br>• Hook-and-line: This pool is composed of all vessels in the partial coverage category that is greater than or equal to 40 ft LOA that are fishing hook-and-line gear.<br>• Pot: This pool is composed of all vessels in the partial coverage category that are greater than or equal to 40 ft LOA that are fishing pot gear.<br>• Trawl: This pool is composed of all vessels in the partial coverage category of fishing trawl gear making a trip not covered by the EM EFP, including all trips using non-pelagic gear.<br>4. Trawl EM trip-selection pool: If the EFP application is approved and fishing occurs in 2020, this pool will be composed of all vessels fishing under the EFP permit.<br><br>There are no plans for observer coverage on halibut vessels less than 40' LOA. Previous work by (Mateo *et al.,* 2023), using data provided to us by a joint NFMS and IPHC effort, indicated that there was a high spatial overlap in effort between the two fleets (< 40 ft fleet and > 40 ft fleet). The under-40 ft fleet had more near-shore activity in southeast Alaska than the >40ft vessels. We also found that effort for vessels < 40 ft from 2010-2017 was highest in the Bering 4C area, and 270. Besides Bering 4C, there was a high spatial overlap in effort between the two fleets, though the under 40ft fleet had more near-shore activity in southeast Alaska than the >40ft vessels. The catch of halibut (lbs.) corresponded to the level of effort exerted by the two fleets. Bering Sea 4C and 270 both had a high proportion of vessels over 4 0ft subject to observer coverage (over 75% and 50%, respectively). Observer coverage was low across the southeast region, where < 40ft of vessels comprise roughly 50% of the effort in some regions. However, the effort and volume of catch of halibut is |

[135] https://www.fisheries.noaa.gov/alaska/fisheries-observers/north-pacific-observer-program

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

comparatively low across this region, and thus, it is of less concern that substantial non-target and ETP interactions are going unrecorded. NMFS expects inshore areas to have relatively lower observer coverage rates than outer areas where relatively greater effort is expended. Based on the observer coverage of >40ft fleet and the IPHC logbook effort data, there is decent, and probably representative, observer coverage on the larger fleet in areas where the <40ft fleet operates. Thus, assuming that the catch profiles of the two fleets are similar when fishing in the same statistical area, the collected observer data is believed to be representative of the halibut fishery across the two fleets.

The document "Minimum data collection standards for Pacific halibut by scientific observer programs" IPHC-2023-AM099-16[136] specifies the that the elements of the observer program ensure a robust training, debriefing, certification, and professional development program for observers to maintain high-quality data collection and a strong QAQC process. Sampling methods should be statistically sound, accounting for spatial, temporal, and operational variations to ensure representative and unbiased data. The sub-sampling design for biological data like length, weight, and viability must also be statistically sound. These sampling designs should aim for precise estimates of Pacific halibut removals, with a coefficient of variation under 30% as recommended by industry standards. In fisheries where not all vessels can be monitored by observers, an electronic monitoring system should be deployed on unobserved vessels to achieve near-complete monitoring coverage.

**Alaska Pacific Sablefish**

An extensive industry-funded cooperative on-board observer program exists in Alaskan waters for Alaska Pacific Sablefish and other stocks. These provide fishery catch, length- and age- composition (Callahan and Gasper, 2022). 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. In compliance with the MSA, these amendments restructured the funding and deployment system for observers in the North Pacific groundfish and halibut fisheries and include some vessels less than 60 ft. in length, as well as halibut vessels in the North Pacific Groundfish Observer Program.

The 2023 Annual Deployment Plan (ADP) (NMFS, 2022) documents how the National Marine Fisheries Service (NMFS) assigns fishery observers and electronic monitoring (EM)[137], to vessels and processing plants engaged in halibut and groundfish fisheries in the North Pacific. Observer coverage and EM deployment in the partial coverage category is funded through a system of fees based on the ex-vessel value of groundfish and halibut landed by vessels in the partial coverage category. The sampling design for at-sea deployment of observers and EM in the partial coverage category involves three elements: 1) the selection method to accomplish random sampling; 2) division of the population of partial coverage trips into selection pools or strata; and 3) the allocation of deployment trips among strata. NMFS recognizes the challenging logistics of putting observers on small vessels and recommends that vessels less than 40' LOA be in the no-selection pool for observer coverage. Fishery information is available from longline sets that target sablefish in the IFQ fishery. Records of catch and effort for these vessels are collected by observers and by vessel captains in voluntary and required logbooks. Fishery data from the Observer Program is available since 1990. Logbooks are required for vessels over 60 feet beginning in 1999. Since 2000, a longline fishery catch rate index

[136] https://www.iphc.int/uploads/pdf/am/am099/iphc-2023-am099-16.pdf
[137] https://www.npfmc.org/electronic-monitoring/

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

has been derived from observed sets and logbook data for use in the model and in apportionment calculations. Based on data from NMFS/AFSC/NPFMC, less than 2.5% of the sablefish catch since 2014 was taken by vessels < 40' LOA. The lack of observer coverage in this fishery sector is not considered a major data gap and does not pose a large risk.

4.2.1. Where necessary, fisheries management organizations and regional fisheries management organizations and other such arrangements should strive to achieve a level and scope of observer programs sufficient to provide quantitative estimates of total catch, discards, and incidental takes of living aquatic resources.

**Pacific Halibut**

To ensure adequacy of observer coverage, the IPHC has investigated and implemented data collection standards for by scientific observer program (Wilson and Jannot, 2023). They have identified and incorporated key elements, including robust training, debriefing/briefing, certification, and professional development programs for the observers. This ensures high-quality data at the time of collection as well as a robust QAQC process; Statistically sound methods for sampling catch account for the variance in, and is both representative and unbiased relative to, space, time, vessel size, fishing method, and fishing effort; and statistically sound sub-sampling design for collecting length, weight, viability, and other biological data from Pacific halibut. The estimation of bycatch and discard mortality removals for each fishery or fishery group requires the estimation of the number and the size composition of the discarded Pacific halibut, categorized by injury or condition; the application of a survival (or a mortality) probability (i.e. discard mortality rate, DMR) to those fish in each category to derive the mortality by category; and, finally, aggregating this mortality by fishery and period (IPHC, 2016). Estimates of numbers, size, and condition are obtained from national observer programs.

Estimation of viability of discarded Pacific halibut has been examined in several historical studies involving captive holding experiments, experimental studies of Pacific halibut physiology and response to stressors, survival studies for other species and gears, development of relative viability estimates from condition and injury assessment combined with tag-recapture studies, and modelling studies involving both empirical and experimental observations. Work by Loher *et al.* (2021) aimed to assess the post release mortality of Pacific Halibut discarded in commercial longline fisheries by using acceleration-logging pop-up archival transmitting tags to track 75 fish for periods ranging from 2 to 96 days. The study observed that three fish definitively died between 41 and 80 days post release, while another three may have died 96 days after release. The estimated discard mortality rates (DMRs) over 96 days ranged from 4.2% to 8.4%, aligning with the currently applied discard mortality of 3.5%, although the timing of mortalities observed in situ differed from previous captive studies, where most deaths occurred within 20 days. Work by Kaimmer and Trumble (1998) highlighted the high post release survival of Pacific Halibut following release in various longline fisheries. Their study examined the effectiveness of careful release techniques for Pacific halibut caught as bycatch or intended for discard in US and Canadian longline fisheries. Observers subsampled halibut for fish condition, and tag return rates near Kodiak Island, Alaska, were used to estimate mortality based on release methods, hook removal injury, and condition codes. The results showed that properly applied release techniques generally result in only minor injuries, and the survival rates for moderately and severely injured halibut are 1.5–2 times higher than previously assumed. A study by Trumble *et al.* (2000) aimed to estimate discard mortality rates (DMRs) for Pacific halibut bycatch in groundfish longline fisheries through tagging experiments. The research

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

found that halibut released from smaller hooks (13/0 circle or autoline) experienced lower mortality rates than those released from larger hooks (16/0 circle), indicating that current viability criteria overestimate discard mortality. A study by Rose *et al*. (2019) evaluated the survival rates of Pacific halibut released from trawl catches in the Bering Sea through the use of accelerometer-equipped pop-up satellite archival tags (PSATs) on 160 fish. This approach aimed to reduce halibut mortality by improving expedited release procedures. PSATs tracked swimming activity, validating survival estimates from structured viability assessments, similar to findings in previous studies like Rose *et al.* (1999), which emphasized the importance of accurate discard mortality assessment. The results showed that longer fish length, shorter air exposure, and reduced trawl tow duration improved survival rates, echoing the importance of refined mortality estimation methods. Greater mortality rates have been observed. Richards *et al.* (1995) investigated factors influencing the bycatch mortality of trawl-caught Pacific halibut in U.S. and Canadian fisheries, analysing data from studies conducted in 1970 and 1992. Observers assessed the physical condition of halibut upon release, and these observations were related to variables such as deck time, halibut length, tow depth, catch weight, and tow duration. The study found that all these factors significantly impacted halibut survival, with shorter handling times leading to reduced bycatch mortality. While survival rates were higher in 1992 compared to 1970 for similar conditions, the measured factors did not fully explain this difference, prompting the authors to call for further research to confirm these relationships and improve understanding of halibut survival post-release. Trawl-induced injuries arise from a variety of sources: compression and bleeding of Pacific halibut in the trawl's codend associated with the weight of the target species; clogging of the gills with sand or mud as the trawl net is dragged across the sea floor; lacerations from spines or carapaces of species also caught in the net; and, abrasions from debris or the scales of other species (e.g., sharks), duration of the tow, amount of time on deck before being returned to the water, and potentially predation upon return to the water. The IPHC continues to actively study physiological influences and best practices to both minimize Pacific mortality and refine accuracy to best estimate discards of Pacific halibut.

Longline and pot capture can result in fewer injuries and, in general, better fish condition at release. However, this is not always the case, especially concerning release from longline gear in cases where careful release methods are not practiced. Longline-capture injuries can occur in the form of torn jaws, cheeks, facial areas, eyes, and gills arising from hook removal; gaff wounds also associated with hook removal, amphipod predation while on the hook; and potentially predation upon return to the water. Pot capture injuries are primarily associated with Pacific halibut interactions with other species in the catch (e.g., lacerations, abrasions from contact with other species, or intrusions by sand fleas). Results from these experiments have been summarized into three condition categories used to categorize Pacific halibut discarded in trawl and pot fisheries and four categories for longline fisheries (organized as dichotomous keys used by observer programs, e.g., AFSC 2015) (Stevenson *et al.* 2016).

**Alaska Sablefish**

The Observer Program for Alaska Pacific Sablefish provides the regulatory framework for NOAA Fisheries certified observers to collect data[138]. The information collected by observers provides the best scientific information to manage the fisheries and to develop measures to minimize bycatch. Observers collect biological samples and fishery-dependent information on total catch and interactions with protected species. Managers use data collected by observers to monitor quotas,

[138] https://www.fisheries.noaa.gov/alaska/fisheries-observers/north-pacific-observer-program

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

manage groundfish and prohibited species catch, and document and reduce fishery interactions with protected resources. Division staff process data and make it available to the Sustainable Fisheries Division of the Alaska Regional Office for quota monitoring, to scientists at the Alaska Fisheries Science Center for stock assessment, ecosystem investigations, and an array of research investigations, as well as the fishing industry itself which relies on observer data to monitor quotas and prohibited species catch (PSC).

Like the work done in the Pacific Halibut fishery to understand discard mortality, Stachura *et al.,* (2012) investigated the discard mortality of sablefish in Alaska's longline fisheries by analyzing data from 10,427 fish tagged during research surveys and recovered up to 19 years later. The study found that recapture rates were lower for fish originally caught at shallower depths (210-319 m) and those suffering from severe hooking or amphipod predation injuries. The estimated discard mortality rate was 11.71%, based on an assumed survival rate of 96.5% for fish with minor hooking injuries. The authors noted that this estimate might be lower than actual mortality in commercial fisheries due to less careful handling, and they suggested that incorporating their findings into data on injury severity could lead to improved estimates of total mortality and better fishery management.

The Observer Program is implemented by regulations at subpart E of 50 CFR part 679 which authorize the deployment of observers and EM to collect information necessary for the conservation and management of the Bering Sea and Aleutian Islands and Gulf of Alaska groundfish and halibut fisheries.

4.3. A fisheries management organization, regional fisheries management organizations or arrangements shall compile data and make them available, in a manner consistent with any applicable confidentiality requirements, in a timely manner and in an agreed format to all members of these organizations and other interested parties in accordance with agreed procedures.
As described above, both fisheries under examination have a regional structure (state agency and the IPHC) that distributes data following all confidentiality requirements[139] . When data can be traced back to a single trip or harvester, data are pooled for presentation purposes. If the fishery participants are unknown, at least 3 records must be included for data summaries to be considered non-confidential "Rule of 3". The rule states that data summaries must include at least three entities to be considered non-confidential. This is one of the primary data suppression methods used by fisheries managers. Once an individual has access to the confidential queries, their access and the results of their queries are limited to the program partners with approved access.

4.4. States shall stimulate the research required to support policies related to fish as food.
For both fisheries under examination, state and national policies regarding seafood are guided by the Alaska Seafood Marketing Institute (ASMI), U.S. Food and Drug Administration (FDA), U.S. Department of Agriculture (USDA), and the U.S. National Institute of Health (NIH). ASMI is the state agency primarily responsible for increasing the economic value of Alaskan seafood through marketing programs, quality assurance, industry training, and sustainability certification. ASMI's role includes conducting or contracting for scientific research to develop and discover health, dietetic, or other uses of the state's seafood harvest and processed [140]. Through the University of Alaska Fairbanks, the state of Alaska also operates the Kodiak Seafood and Marine Science Center [141], which

[139] https://www.noaa.gov/organization/administration/nao-216-100-protection-of-confidential-fisheries-statistics
[140] https://www.alaskaseafood.org/industry/quality/
[141] https://alaskaseagrant.org/about/kodiak-seafood-and-marine-science-center/

| 4. | There shall be effective fishery data (dependent and independent) collection and analysis systems for stock management purposes. |
|---|---|
| | directs research efforts in several fields, including seafood processing technology, and seafood quality and safety.<br><br>Socio-economic data collection and economic analyses are required to varying degrees under the Regulatory Flexibility Act (RFA), the MSA, the NEPA, the Endangered Species Act, and other applicable laws. AFSC's Economic and Social Sciences Research Program produces an annual Economic Status Report of the Groundfish fisheries in Alaska[142]. This comprehensive report provides estimates of total groundfish catch, groundfish discards and discard rates, prohibited species catch (PSC) and PSC rates, values of catch and resulting food products, the number and sizes of vessels that participated in the groundfish fisheries off Alaska, and employment on at-sea processors. The report contains a wide range of analyses and comments on the performance of a range of indices for different sectors of the North Pacific fisheries, including sablefish, and relates changes in value, price, and quantity across species, products, and gear types, to changes in the market.<br><br>There are various academic evaluations on the impacts of policymaking on the social, economic, and institutional factors that support policy. Some examples of this are investigations on the ecosystem impacts of alternative management policies (Kroetz *et al.,* 2019), examination of the long-term dynamics of sablefish (Zolotov, 2021), and examination of the IFQ policy (Matulich and Clark, 2003).<br><br>State, federal, and multinational (IPHC) support research of the Pacific Halibut and Alaska Sablefish Stocks. There are numerous scientific publications on *Hippoglossus stenolepis*, covering a range of topics including their spawning behaviour, growth patterns, and bycatch mortality[143]. These studies are essential for managing this species in both U.S. and Canadian waters, where it is of significant economic and ecological importance. For example, studies cited above have explored the dispersal and behaviour of Pacific halibut in the Bering Sea and Aleutian Islands using pop-up archival transmitting tags, providing insights into localized spawning groups and seasonal migrations (Seitz *et al*., 2011). Other research focuses on factors such as survival rates following bycatch, handling injuries, and the impact of fishing methods on halibut populations (Loher *et al.,* 2022). These findings help inform better bycatch management and contribute to stock assessments that are critical for sustainable fisheries. Similarly, there are numerous publications on sablefish, covering various aspects of its biology, ecology, and management. Research focuses on areas like reproductive biology, stock dynamics, migration patterns, and the species' response to environmental factors such as El Niño (Kimura *et al.*, 1998; Shotwell *et al*., 2023). Studies have explored the reproductive life history of sablefish, providing insights into sexual dimorphism, spawning behaviour, and the seasonal changes in gonadal morphology (Rodgveller, 2017) as well as endocrine markers (like plasma sex steroids) that regulate gametogenesis (Shubiger *et al.,* 2021). Additionally, tagging studies have provided valuable information on migration patterns, particularly the effects of environmental changes on their movement and growth in the northeast Pacific (Hanselman *et al*., 2015). The extensive research on this species contributes significantly to improving sustainable management practices for both wild populations and aquaculture development. Much of the scientific work done for both stocks are performed collaboratively or in partnership with biologists in state, federal and multinational agencies. |

[142] https://www.fisheries.noaa.gov/resource/data/2023-economic-status-groundfish-fisheries-alaska
[143] https://www.iphc.int/research-monitoring/

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

4.5. There shall be sufficient knowledge of the economic, social, marketing, and institutional aspects of fisheries collected through data gathering, analysis, and research, as well as comparable data generated for ongoing monitoring, analysis, and policy formulation.

**Pacific Halibut**

Considerable effort has been made for the collection of economic, social, marketing, and institutional knowledge for this fishery[144,145,146]. The IPHC, in collaboration with stakeholders through survey participation continues improving the Pacific Halibut multiregional economic impact assessment (PHMEIA) with an intention to: define the economic importance of the Pacific halibut resource and fisheries at the community, regional, and national levels and to contribute to a wholesome approach to Pacific Halibut management that is optimal from both biological and socioeconomic perspective.

The International Pacific Halibut Commission (IPHC) monitors key factors related to the economic performance of Pacific halibut fisheries through its bio-socioeconomic conditions index[147,148] (Figure 4). This index tracks trends at both a coastwide stock level and within major halibut-producing regions: Alaska, British Columbia, and the USA West Coast (Washington, Oregon, and California). The index is based on four key indicators: fish prices (ex-vessel), fishing cost factors (fuel prices and wages in the fishing sector), and stock condition, which is measured by the weight per unit of effort (WPUE) of legal-size fish (O32) from the IPHC's Fishery-Independent Setline Survey (FISS). The aggregate index is weighted by region-specific indicators, reflecting variations from the 10-year average, and by the Fishery Constant Exploitation Yield (FCEY) adopted by the Commission for each year and region. The FCEY was selected as the weighting variable to reflect the opportunities available to fishers, which may differ from realized catches that depend on user behavior and incentives. Since the index is presented on a relative scale, it measures year-to-year changes rather than providing an absolute assessment of the bio-socioeconomic conditions. For example, the 2021 index showed a 37 percentage point improvement over 2020 and was 23% above the 10-year average, primarily driven by higher fish prices and lower labor costs. Increased biomass (higher WPUE) had minimal impact on the index between 2020 and 2021 (Hutniczak, 2021). While the coastwide index trend generally reflects regional trends, the 2021 improvement was mostly driven by Alaska, with a more modest increase in British Columbia due to slower price growth. The average price for British Columbia was unavailable at the time of publication, so the index for this region was derived from FISS sales and should be interpreted cautiously. In addition to the factors contributing to the economic performance of the fisheries, the index also represents absolute harvest opportunities, depicted by the sum of FCEY across all IPHC Regulatory Areas. Economies of scale, where fixed costs are distributed over larger output, may influence overall profits.

[144] https://iphc.int/
[145] https://www.iphc.int/management/economic-research
[146] https://www.iphc.int/uploads/2023/10/iphc-2021-im097-14.pdf
[147] https://iphc.int/
[148] https://www.iphc.int/uploads/2023/10/iphc-2021-im097-14.pdf

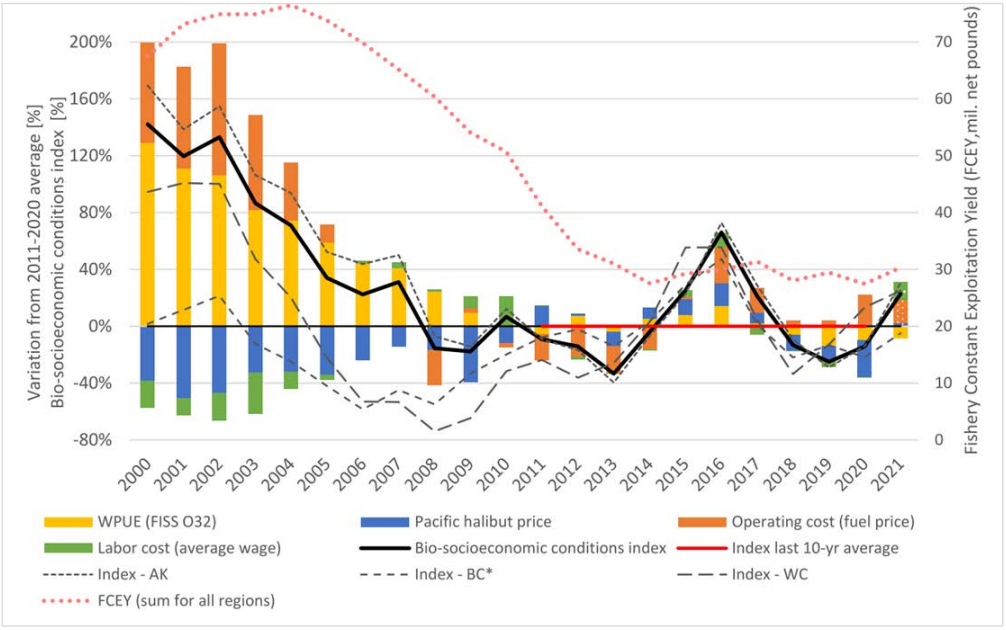



**Figure 4.** Bio-socioeconomic index for Pacific halibut fisheries [(2000-2021) Source: Hutniczak, 2021)].

**Alaska Pacific Sablefish**

For this fishery, there is a system in place for the collection of economic, social, marketing, and institutional knowledge for this fishery. Relevant entities which contribute to these sources of data, for consideration by management. This includes:

**Bering Sea Integrated Ecosystem Research Program** [149] is a $52 million partnership between the NPRB and the National Science Foundation (NSF) that seeks to understand the impacts of climate change and dynamic sea ice cover on the eastern Bering Sea ecosystem. More than one hundred scientists are engaged in field research and ecosystem modeling to link climate, physical oceanography, plankton, fishes, seabirds, marine mammals, humans, traditional knowledge and economic outcomes to better understand the mechanisms that sustain this highly productive region. The NPRB has an informative website that documents the socioeconomic aspects of a variety of fisheries and regions[150] . Two projects in particular highlight the types of research that focuses on socio-economic considerations of fisheries: A project, led by the Pribilof Islands Collaborative (PIC), addresses socioeconomic gaps in fisheries management, identified through a dialogue between various stakeholders including local tribal governments, conservation organizations, researchers, and regulatory bodies. This initiative focuses on collecting socioeconomic data that inform decision-making for sustainable fishery management in the Bering Sea, directly fulfilling the need for comprehensive economic and social data gathering as required by National Standard 8 of the Magnuson-Stevens Act. Specifically, the research identifies the value of fisheries, assesses the impacts of fishery management changes on local communities, and evaluates the economic importance of subsistence harvesting. Additionally, the project develops an integrated fisheries model that examines the socioeconomic impacts of single-species management changes on Alaska's fishing communities. Using data on cross-fishery participation, the project predicts how management actions, such as catch-share programs, could affect the diversification of fishing portfolios, thereby promoting income stability and mitigating risk for local economies. This work directly supports

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

ongoing monitoring, analysis, and policy formulation, ensuring that socioeconomic connections within fisheries are properly understood and addressed.

In December 2018 NPFMC adopted the Bering Sea Fishery Ecosystem Plan (BSFEP)[151]. The Bering Sea FEP establishes a framework for the Council's continued progress towards ecosystem-based fishery management (EBFM) of the Bering Sea fisheries, and relies and builds on the Council's existing processes, advisory groups, and management practice. The Council noted that adoption of the FEP represents a major milestone in what has been a multi-year process to develop this FEP. The FEP builds from the Council's Ecosystem Vision Statement, adopted in 2014, and is a continued commitment by this Council to use the best science to sustainably manage fisheries using a precautionary, transparent, and inclusive process. The BSFEP document identifies management goals and objectives for the FEP and for monitoring of the Bering Sea ecosystem and describes how the FEP framework will support research projects (Action Modules) to address Council priorities. The Council also adopted the five action modules included in the draft, and initiated action on two of them. Since year 2019, NPFMC staff have been working with the BS FEP Team to bring back workplans for how to manage the workload associated with the initiated modules. The two action modules for the Council have been working on are:

- Develop protocols for using Local Knowledge and Traditional Knowledge in management and understanding impacts of Council decisions on subsistence use.
- Evaluate the short- and long-term effects of climate change on fish and fisheries.

In the Council meeting in June 2024, the Council conducted a two-day Climate Scenarios Workshop aimed at developing approaches and tools for enhancing the climate resilience of federally regulated fisheries in the North Pacific, both in the near and long term[152]. The workshop assembled nearly 200 people both in person and online to examine four hypothetical future scenarios. No resolutions were reached during this conference; the objective was to develop ideas rather than to establish consensus or formulate recommendations. The discussion component of the workshop report is derived from comprehensive meeting notes from all plenary and breakout sessions, encapsulating the ideas and feedback articulated by participants. The paper encompasses concepts pertinent to all three IRA proposal objectives, and additional climate readiness planning opportunities. Additionally, a few recommendations for advancing the principal themes and concepts arising from the workshop.

In the Council meeting in October 2024 the Council examined a concise report on the last 8th national meeting of the Scientific Coordination Subcommittee (SCS8), held in August 2024 in Boston, MA, which centered on the theme of "Applying Acceptable Biological Catch (ABC) Control Rules in a Changing Environment."[153] The meeting together SSC members from all eight council regions to examine this matter thoroughly. The whole meeting summary is expected to be accessible in early 2025. The concise summary report included further immediate high-level issues for the Council from the NPFMC delegation during the meeting.

After reviewing both reports and considering input from the SSC, the AP, and the public, the Council expressed anticipation for the final report of the Climate Change Task Force in December 2024. This report, along with the Climate Scenarios Workshop report, will enable the Council to enhance its

[149] https://data.eol.ucar.edu/project/BSIERP
[150] https://nprb.org/project-search/#project-list
[151] https://www.npfmc.org/bering-sea-fishery-ecosystem-plan/
[152] https://www.npfmc.org/june-2024-newsletter/
[153] https://www.npfmc.org/october-2024-newsletter/

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

planning and communication of climate resiliency initiatives through a tracking tool and/or workplan. The Council endorsed the two goals outlined by the SSC from SCS8, both of which facilitate and sustain progress towards the realization of the IRA plan. Objective 3: Enhance the integration of uncertainty and risk in harvest specifications. The two priorities are as follows:

1. Evaluate the degree to which groundfish and crab harvest control rules (HCRs) should be revised for enhanced climate resilience by organizing an SSC workshop in February or April 2025. This workshop will serve as a foundation for identifying and prioritizing HCR adjustment opportunities and will facilitate the establishment of a technical SSC-Plan Team-agency subgroup to further develop the concepts generated during the workshop.
2. Gather social and economic data to fulfill the requirements of utilizing the most reliable scientific knowledge and guiding Council decision-making and Total Allowable Catch (TAC) determination. The Council endorses the initiatives of the current technical SSC economic and social subgroup and will evaluate trial projects on sablefish in December 2024.

Regarding socio-economic data collection, AFSC's Economic and Social Sciences Research Program produces an annual Economic Status Report of the Groundfish fisheries in Alaska[154]. This comprehensive report (Fissel *et al.,* 2023) provides estimates of total groundfish catch, groundfish discards and discard rates, prohibited species catch (PSC) and PSC discards rates, values of catch and resulting food products, the number and sizes of vessels that participated in the groundfish fisheries off Alaska, and employment on at-sea processors. The report contains a wide range of analyses and comments on the performance of a range of indices for different sectors of the North Pacific fisheries, and relates changes in value, price, and quantity, across species, product, and gear types, to changes in the market. This report includes extensive economic data for the commercial sablefish fishery.

Various studies have been conducted on the economic value of sportfishing in Alaska (Lew *et al.,* 2015), which include sablefish, although sablefish is not a major target species for sport fishing. The Alaska Seafood Marketing Institute[155] has contracted studies to determine the value of Alaska's seafood industry, and the University of Alaska, Institute of Social and Economic Research conducts research on the economics of various Alaskan fisheries.

4.6 The fisheries management organization shall investigate and document traditional fisheries knowledge and technologies—in particular those applied to small-scale fisheries—in order to assess their application to sustainable fisheries conservation, management, and development.

**Pacific Halibut**

Historically, indigenous peoples inhabiting the lands bordering the eastern North Pacific Ocean fished for Pacific halibut using elaborately carved cedar hooks and lines made from natural materials. These fishers ventured up to 20 miles offshore in large canoes, using octopus as bait and employing efficient methods such as selectively targeting large fish suitable for drying and smoking. Halibut were a staple in their diet, and the fishery techniques they developed were both advanced and sustainable for their needs[156]. Today, Pacific halibut continues to be crucial to indigenous communities for subsistence and ceremonial purposes. In Washington State, 13 tribes exercise treaty rights to a portion of the Pacific halibut catch, with management overseen by tribal groups and the Northwest Indian Fisheries Commission. In British Columbia, First Nations members have access to both commercial and

[154] https://www.fisheries.noaa.gov/alaska/ecosystems/economic-status-reports-gulf-alaska-and-bering-sea-aleutian-islands
[155] https://www.alaskaseafood.org/industry/quality/
[156] https://www.iphc.int/fisheries/subsistence-fisheries/

| 4. | There shall be effective fishery data (dependent and independent) collection and analysis systems for stock management purposes. |
|---|---|
| | subsistence fisheries, which are managed under the food, social, and ceremonial (FSC) fishery framework. In Alaska, native groups participate in subsistence fisheries, with the Metlakatla tribe having exclusive rights to a specific reserve. These fisheries, though managed in part by tribal entities, are integrated into broader stock assessments and regulations monitored by the International Pacific Halibut Commission (IPHC) and NOAA Fisheries. Traditional knowledge and historical practices, like those documented by Boas (1910), have been investigated and continue to inform modern fishery management and cultural practices today – this is generally done in the context of regularly, well-advertised, public meetings.<br><br>Ceremonial and subsistence (personal use) fishing is a component of small-scale fisheries for Alaskan Halibut. The subsistence halibut fishery off Alaska was formally recognized in 2003 by the NPFMC and implemented by IPHC and National Marine Fisheries Service (NMFS) regulations[157]. The fishery allows the customary and traditional use of halibut by rural residents and members of federally recognized Alaska native tribes. Members of these groups can retain halibut for non-commercial use, food, or customary trade. Subsistence (formerly called Personal use/subsistence) categories include ceremonial and subsistence removals in the Area 2A treaty Indian fishery; the sanctioned First Nations Food, Social, and Ceremonial (FSC) fishery conducted in British Columbia; federal subsistence fishery in Alaska; and U32 halibut retained in Areas 4D and 4E under IPHC regulations. Details for these were reviewed in the 2018 stock assessment documentation (Stewart and Webster, 2018). Specific details on what constitutes subsistence use are also documented in the federal register (US), Title 50, Chapter III, Part 300, Subpart E. This is implemented for the North Pacific Halibut Act of 1982 (Act). The subpart is intended to supplement, not conflict with, the annual fishery management measures adopted by the International Pacific Halibut Commission under the Convention between the United States and Canada for the Preservation of the Halibut Fishery of the Northern Pacific Ocean and Bering Sea[158] (Convention). |

[157] https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/subsistence-halibut-fishing-alaska
[158] https://www.treaty-accord.gc.ca/text-texte.aspx?id=103707

**Table 9.** Subsistence Fishery Removals (Source: IPHC, 2024).

(t = net lb * 0.000453592)
Original subsistence values in millions of pounds to an accuracy of three decimal places were converted to the values below in tonnes

| | Subsistence Fishery Removals (tonnes) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IPHC Regulatory Area | Year | | | | | | | | | | | | | |
| | 2023 | 2022 | 2021 | 2020 | 2019 | 2018 | 2017 | 2016 | 2015 | 2014 | 2013 | 2012 | 2011 | 2010 |
| 2A | 10 | 11 | 15 | 19 | 15 | 13 | 12 | 13 | 15 | 14 | 13 | 15 | 11 | 11 |
| 2B[1] | 184 | 184 | 184 | 184 | 184 | 184 | 184 | 184 | 184 | 184 | 184 | 184 | 184 | 184 |
| 2C[2] | 115 | 115 | 132 | 132 | 166 | 166 | 198 | 198 | 192 | 192 | 180 | 180 | 176 | 193 |
| 3A[2] | 55 | 55 | 80 | 80 | 85 | 85 | 101 | 101 | 109 | 109 | 115 | 115 | 121 | 142 |
| 3B[2] | 5 | 5 | 6 | 6 | 8 | 8 | 6 | 6 | 6 | 6 | 7 | 7 | 10 | 10 |
| 4A[2] | 2 | 2 | 5 | 5 | 6 | 6 | 4 | 4 | 4 | 4 | 4 | 4 | 6 | 7 |
| 4B[2] | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| 4C[2] | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 5 |
| 4D[2] | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 4E[2] | 6 | 6 | 15 | 15 | 11 | 11 | 19 | 19 | 32 | 32 | 4 | 4 | 3 | 5 |
| 4D/4E[2] (CDQ U32) | 0 | 1 | 3 | 5 | 3 | 5 | 3 | 2 | 2 | 2 | 5 | 9 | 8 | 4 |
| Total | 376 | 378 | 442 | 448 | 481 | 480 | 529 | 529 | 546 | 546 | 513 | 519 | 519 | 561 |

[1] British Columbia, CANADA estimates from Fisheries and Oceans Canada/Pêches et Océans Canada have remained consistent from 2010-2023.

[2] Alaska, USA estimates were carried over for the 2013 estimates from 2012; 2015 estimates from 2014; 2017 estimates from 2016; 2019 estimates from 2018; 2021 estimates from 2020; and 2023 estimates from 2022; with the exception that 4D/4E subsistence harvest in the CDQ fishery were updated annually.

Subsistence halibut is defined as halibut caught for personal or family consumption, sharing, or customary trade[159]. Fishermen are required to obtain a Subsistence Halibut Registration Certificate (SHARC) before fishing, and special permits for community harvest, ceremonial, and educational purposes are available to qualified Alaska communities and Native tribes. The species covered under this permit is Pacific Halibut, and permit holders must comply with SHARC registration and reporting requirements to participate in the fishery.

**Alaska Sablefish**

The sablefish fisheries in Alaska are well established and any original knowledge and technologies have been part of the evolution of the mature fisheries. All data from the state and federally managed sablefish fisheries are included in the stock assessments[160]. There is minimal recreational, personal use, or subsistence fishing for sablefish in Alaskan waters, and all estimates are included in the catch data (Goethel *et al.,* 2021, Goethel *et al.,* 2023). At the 2012 Alaska BOF meeting, a regulation was passed to require personal use and subsistence use sablefish permits, and at the 2015 BOF meeting, limits were defined for personal use sablefish fisheries for the number of fish, number of permits per vessel, and number of hooks [161][4].

4.7 If a fisheries management organization is conducting scientific research activities in waters of another State, it shall ensure that their vessels comply with the laws and regulations of that State and international law.

**Pacific Halibut**

The major scientific research effort for Pacific Halibut is the annual setline survey conducted by IPHC, using commercial vessels from USA and Canada (Ualesi *et al.,* 2024) and described in detail above. In 2018 the survey encompassed both nearshore and offshore waters of southern Oregon, Washington, British Columbia, southeast Alaska, the central and western Gulf of Alaska, Aleutian Islands, and the Bering Sea continental shelf (Ualesi *et al.,* 2024). Thus, only the waters under jurisdiction of USA and Canada, the two countries involved in IPHC, were surveyed. Survey activities were compliant with all

| 4. | There shall be effective fishery data (dependent and independent) collection and analysis systems for stock management purposes. |
|---|---|
| | laws and regulations of those countries, registered commercial halibut vessels were chartered, and all catches in the survey were recorded and reported and tallied as harvest for the peer-reviewed stock assessment. This compliance is a feature of the charter requirements to participate in the survey.<br><br>**Alaska Sablefish**<br>Data from the annual setline survey conducted by IPHC, using commercial vessels from USA and Canada, are considered in the annual sablefish assessments (Goethel *et al*., 2021, Goethel *et al*., 2023). In 2023 the survey encompassed both nearshore and offshore waters of southern Oregon, Washington, British Columbia, southeast Alaska, the central and western Gulf of Alaska, Aleutian Islands, and the Bering Sea continental shelf (Ualesi *et al.,* 2024). Thus, only the waters under jurisdiction of USA and Canada were surveyed. Survey activities were compliant with all laws and regulations of those countries, registered commercial halibut vessels were chartered, and all catches in the survey were recorded and reported. Other scientific surveys used directly, or considered, in the sablefish stock assessments include NMFS annual setline and trawl surveys in GOA and BSAI, surveys by ADF&G in state waters, and a trap survey by DFO (Canada) in British Columbia. |
| References: | Boas, F. 1910. Tsimshian Mythology. Bureau of American Ethnology, Annual Report 1909-1910, U.S. Government Printing Office, Washington, D.C., pp. 27-1037.<br>Cahalan, J., and J. Gasper. 2022. The commercial size limit for the Pacific halibut fishery off Alaska and its relationship to observer-derived estimates of at-sea discard. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-432, 42 p.<br>Cahalan, J., J. Gasper, and J. Mondragon. 2014. Catch sampling and estimation in the federal groundfish fisheries off Alaska, 2005 edition. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-286, 46 p.<br>Goethel, D.R.,Hanselman, D.H., Rodgveller, C., Echave, K.B., Williams, B.C., Shotwell, S.K., Sullivan, J.Y., Hulson, P.F., Malecha, P.W., Siwicke, K.A., and Lunsford, C.R. 2021. Assessment of the sablefish stock in Alaska. North Pacific Fishery Management Council, Anchorage, AK.<br>Fissel, B., M. Dalton, B. Garber-Yonts, A. Haynie, S. Kasperski, J. Lee, D. Lew, C. Seung, K. Sparks, M. Szymkowiak, and S. Wise. 2023. "Stock Assessment and Fishery Evaluation Report for the Groundfish Fisheries of the Gulf of Alaska and Bering Sea/Aleutian Island Area: Economic Status of the Groundfish Fisheries off Alaska, 2022'', NPFMC, November, 2023.<br>Goethel, D.R., Cheng, M.L.H., Echave, K.B., Marsh, C., Rodgveller, C.J., Shotwell, K., and Siwicke, K. 2023. Assessment of the sablefish stock in Alaska. North Pacific Fishery Management Council, Anchorage, AK.<br>Hanselman, D.H., J. Heifetz, K.B. Echave, and S.C. Dressel. 2015. Move it or lose it: Movement and mortality of sablefish tagged in Alaska. Canadian Journal of Fish and Aquatic Sciences. 72(5): 238-251.<br>Hutniczak, B. 2021. Bio-socioeconomic conditions index for Pacific halibut fisheries. IPHC-2021-IM097-INF03.<br>IPHC .2024. Subsistence Mortality by IPHC Area. iphc-2024-tsd-020.<br>IPHC 2019 Peer review process for IPHC science products. IPHC-2019-AM095-15.<br>IPHC 2023b. International Pacific Halibut Commission 5-Year program of integrated research and monitoring (2022-26). Seattle, WA, U.S.A. IPHC–2023-5YPIRM, 58 pp. |

[159] (https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/subsistence-halibut-fishing-alaska)
[160] https://www.fisheries.noaa.gov/species/sablefish)
[161] https://www.adfg.alaska.gov/index.cfm?adfg=PersonalUsebyAreaSoutheastGroundfish.regs

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

IPHC. 2016. Report of Assessment and Research Activities RARA2015_01TOC 2015.
Kaimmer SM, Trumble RJ. Injury, condition, and mortality of Pacific halibut bycatch following careful release by Pacific cod and sablefish longline fisheries. 1998. Fish Res. 38: 131–144.
Kroetz, K., Reimer, M. N., Sanchirico, J. N., Lew, D. K., Huetteman, J. 2019. Defining the economic scope for ecosystem-based fishery management. Proceedings of the National Academy of Sciences of the United States of America, 116[10], 4188–4193.
Lew, D. K., & Larson, D. M. 2012. Economic values for saltwater sport fishing in Alaska: a stated preference analysis. North American journal of fisheries management, 32[4], 745-759.
Loher, T., Dykstra, C.L., Hicks, A.C., Stewart, I.J., Wolf, N., Harris, B.P. and Planas, J.V. 2022 Estimation of Postrelease Longline Mortality in Pacific Halibut Using Acceleration-Logging Tags. North Am J Fish Manage, 42: 37-49.
Matulich, S. C., and M. L. Clark. 2003. North Pacific halibut and sablefish IFQ policy design: quantifying the impacts on processors. Mar. Resour. Econ. 18:149–166.
Richards, L.J., Fargo, J.F., & Schnute, J.T. 1995. Factors Influencing Bycatch Mortality of Trawl-Caught Pacific Halibut. North American Journal of Fisheries Management, 15, 266-276.
Rodgveller, C. J. 2017. Female sablefish age-at-maturity in Alaska applicable to stock assessment. AFSC Processed Rep. 2017-12, 23 p. Alaska Fish. Sci. Cent., NOAA, Natl. Mar. Fish. Serv., 7600 Sand Point Way NE, Seattle WA 98115.
Rose CS (1999) Initial tests of a flexible grate for size selection of trawl caught fish. Mar Technol Soc J 33:57–60.
Rose, C.S., Nielsen, J.K., Gauvin, J.R., Loher, T., Sethi, S.A., Seitz, A.C., Courtney, M.B., & Drobny, P. 2019. Survival outcome patterns revealed by deploying advanced tags in quantity: Pacific halibut (*Hippoglossus stenolepis*) survivals after release from trawl catches through expedited sorting. Canadian Journal of Fisheries and Aquatic Sciences, 76, 2215-2224.
Schubiger CB, Gorman ME, Johns JL, Arkoosh MR, Dietrich JP. Sablefish (*Anoplopoma fimbra* Pallas, 1814) plasma biochemistry and hematology reference intervals including blood cell morphology. 2021. PLoS One. 2021 Jun 4;16(6):e0246982.
Seitz AC, Loher T, Norcross BL, Nielsen JL (2011) Dispersal and behavior of Pacific halibut *Hippoglossus stenolepis* in the Bering Sea and Aleutian Islands region. Aquat Biol 12:225-239.
Shotwell S.K., K. Blackhart, C. Cunningham, E. Fedewa, D. Hanselman, K. Aydin, M. Doyle, B. Fissel, P. Lynch, O. Ormseth, P. Spencer & S. Zador. 2023. Introducing the Ecosystem and Socioeconomic Profile, a Proving Ground for Next Generation Stock Assessments, Coastal Management.
Shotwell, S.K., Echave, K., Ferriss, B., Goethel, D., Lunsford, C., Oke, K., Siddon, E., Siwicke, K., Sullivan, J., Szymkowiak, M., and Williams, B., 2023b. Appendix 3C. Ecosystem and Socioeconomic Profile of the Sablefish stock in Alaska - Report Card. In: Goethel, D.R., Cheng, M.L.H., Echave, K.B., Marsh, C., Rodgveller, C.J., Shotwell, K., and Siwicke, K. 2023. Assessment of the Sablefish stock in Alaska. North Pacific Fishery Management Council, Anchorage, AK.
Soderlund, E., Randolph, D. L., and Dykstra, C. 2012. IPHC Setline Charters 1963 through 2003.Int. Pac. Hal. Comm. Tech. Rep. 58.
Stachura M.M., Lunsford C.R, Rodgveller C.J, Heifetz J. Estimation of discard mortality of sablefish (*Anoplopoma fimbria*) in Alaska longline fisheries. Fishery Bulletin. 2012;110: 271–279.
Stevenson, D. E., M. Moon, M. Rickett, and M. Vechter. 2016. Species identification in the North Pacific Observer Program: Training, protocols, and data monitoring. AFSC Processed Rep. 2016-04, 37 p. Alaska Fish. Sci. Cent.,NOAA, Natl. Mar. Fish. Serv., 7600 Sand Point Way NE, Seattle WA 98115.

| 4. | There shall be effective fishery data (dependent and independent) collection and analysis systems for stock management purposes. |
|---|---|
| | Stewart, I., and Hicks, A. 2024. Assessment of the Pacific halibut (*Hippoglossus stenolepis*) stock at the end of 2023. IPHC-2024-SA-01. 39 p.<br>Stewart, I., and Webster, R. 2018. Overview of data sources for the Pacific halibut stock assessment, harvest strategy policy, and related analyses. IPHC-2018-AM094-09. 83 p.<br>Trumble, R.J., Kaimmer, S.M., & Williams, G.H. 2000. Estimation of Discard Mortality Rates for Pacific Halibut Bycatch in Groundfish Longline Fisheries. North American Journal of Fisheries Management, 20, 931-939.<br>Ualesi K., Jack T., Rillera R.,and Coll, K. 2024. IPHC Fishery-Independent Setline Survey (FISS) design and implementation in 2023. IPHC-2024-AM100-08 Rev_1.<br>Wilson D, Jannot J. 2023. Minimum data collection standards for Pacific halibut by scientific observer programs. 2022. IPHC-2023-AM099-16.<br>Zolotov, A. O. 2022. The Long-Term Dynamics of Sablefish (*Anoplopoma fimbria*) Stocks in the Western Bering Sea and Prospects for their Commercial Exploitation. Russian Journal of Marine Biology 2021 47:7, 47[7], 563–582. |
| Statement of consistency to the RFM Fishery Standard | **The fishery continues to conform to the requirements of Fundamental Clause 4 of the RFM Fishery Standard** |

### 7.9.2.2. Fundamental Clause 5. Stock assessment

| | |
|---|---|
| **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.** |
| Summary of relevant changes: | 5.1. An appropriate institutional framework shall be established to determine the applied research required and its proper use (i.e., assess/evaluate stock assessment model/practices) for fishery management purposes.<br><br>**Pacific Halibut**<br>The International Pacific Halibut Commission (IPHC) was established in 1923 by a Convention between the governments of Canada and the United States of America[162]. Its mandate is to perform research on and management of the stock of Pacific Halibut within the Convention waters of both nations. The IPHC receives funding from both the U.S. and Canadian governments to support its administrative staff. The IPHC is composed of professional scientists, researchers, and statisticians tasked with providing research and stock assessment on Pacific Halibut for conservation and management purposes. Appropriate processes exist to ensure proper planning of research projects, as well as ongoing peer review of stock assessment and research activities. The quality, quantity and impact of IPHC's publications are noteworthy. IPHC staff members are involved in collaborative projects with other researchers and institutions.<br><br>Alaska's Pacific Halibut stock assessment program is extensive and comprehensive. The primary focus of the stock assessment is to assess data and research needs for completion of the stock assessment and subsequent management (Stewart and Hicks, 2024). Primary sources of information for this assessment include indices of abundance from the IPHC's annual fishery-independent setline survey (numbers and weight) and commercial CPUE (weight) and biological summaries (length-, weight-, and age- and sex-composition data). Other data from NMFS trawl surveys in the eastern Bering Sea and GOA and various tagging programs are also collected and analyzed. Research capacity in environmental science is also extensive, as outlined in previous clauses and below. For each of these data sources, the assessment team identifies needs that partly focus on reducing uncertainties in the stock assessment.<br><br>Research priorities are closely linked with stock assessment uncertainties have been explored through specific sensitivity analyses conducted in the stock assessment. These analyses have included the effects of unobserved whale depredation and trends in spawning output (due to skip spawning or changes in maturity schedules). The results have supported the prioritization of maturity, fecundity, and skip spawning as current and near-term research foci. The IPHC produces the "5-Year program of integrated research and monitoring (2022-26)" [163]. These activities are summarized in five broad research areas designed to provide inputs into stock assessment and the management strategy evaluation processes, as follows:<br><br>1) Migration and Distribution. Studies are aimed at further understanding reproductive migration and identification of spawning times and locations as well as larval and juvenile dispersal.<br>2) Reproduction. Studies are aimed at providing information on the sex ratio of the commercial catch and to improve current estimates of maturity.<br>3) Growth and Physiological Condition. Studies are aimed at describing the role of some of the factors responsible for the observed changes in size-at-age and to provide tools for measuring growth and |

[162] https://iphc.int/.
[163] https://www.iphc.int/uploads/2024/04/IPHC-2023-5YRIRM-2022-26-18-Dec-23.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. |
|---|---|

physiological condition in Pacific halibut.
4) Discard Mortality Rates (DMRs) and Survival. Studies are aimed at providing updated estimates of DMRs in both the longline and the trawl fisheries.
5) Genetics and Genomics. Studies are aimed at describing the genetic structure of the Pacific halibut population and at providing the means to investigate rapid adaptive changes in response to fishery-dependent and fishery-independent influences.

The IPHC 5-Year Program of Integrated Research and Monitoring (2022-2026)[164], aims to enhance the integration of research in the above areas to improve key inputs for Pacific halibut stock assessments and Management Strategy Evaluation (MSE) processes. The program focuses on short- and medium-term activities while pursuing broader objectives, including cutting-edge fisheries research, applied research, and innovative methodologies. It also seeks to establish collaborations with research agencies, promote international scientific involvement, and engage students and early-career researchers. Key areas of research include data collection, biological and ecological studies, stock assessment improvements, and MSEs, with a goal to provide timely, relevant, and reliable advice for management decisions. Success will be measured based on the timeliness, accessibility, relevance, impact, and reliability of the research outputs, particularly in enhancing stock assessment accuracy and decision-making processes.

**Alaska Pacific Sablefish**

The mission of the NOAA Fisheries is to conduct scientific research to generate data and analysis for understanding, managing, and sustaining living marine resources. Appropriate, adequate, and directed research is conducted for the management of sablefish in Alaska waters. NMFS and ADFG conduct surveys on sablefish in Alaskan waters. The NOAA Fisheries conducts an annual longline survey and a biennial trawl survey in the GOA and the Aleutian Islands (alternating years between the two regions)[165], and an annual trawl survey in the Eastern Bering Sea and ADFG performs annual longline surveys in Chatham and Clarence Strait[166]. These surveys provide estimates of CPUE, relative abundance, and biological data. In addition, tagging studies exist to study sablefish movement for federal, state, and Canadian waters.

In the 2023 sablefish stock assessment (Goethel *et al.,* 2023) moderate changes to the assessment methodology were implemented that include changes to the data and model structure:
Minor updates to data inputs and model structure were made to the 2023 sablefish (*Anoplopoma fimbria*) assessment, aligning with AFSC best practices, and addressing feedback from the NPFMC's SSC. The recommended model for 2023 (model 23.5) retains the primary structure of model 21.12 from the 2021 SAFE.
Data Input Changes:

- 2023 NOAA longline survey (relative abundance and length data).
- 2023 NOAA Gulf of Alaska trawl survey (relative biomass/length data) with removal of 1984 and 1987 data.
- 2022 length data from fixed gear and trawl fisheries.
- 2022 age data from the longline survey and fixed gear fishery.

[164] www.iphc.int/uploads/2024/04/IPHC-2023-5YRIRM-2022-26-18-Dec-23.pdf
[165] https://www.fisheries.noaa.gov/alaska/science-data/sablefish-research-alaska
[166] https://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareasoutheast.sablefish_research

| | |
|---|---|
| **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.** |

- Final 2022 and preliminary 2023 catch data.
- Non-commercial catch (1977-2023) added to fixed gear fishery total catch.
- Whale depredation estimates for 2023 held constant from 2022.
- Updated CPUE data (2022) and new CPUE standardization approach combining hook-and-line and pot gear data.

Assessment Methodology Changes:
Five new model runs were developed, culminating in the author-recommended model 23.5, which integrates all updates:

- Model 21.12: Continuity model with 2023 data.
- Model 23.1: Removed outdated trawl survey data.
- Model 23.2: Added non-commercial catch data.
- Model 23.3: Adjusted bias correction, selectivity, and removed unnecessary fishing mortality parameters.
- Model 23.4: Standardized CPUE index using combined gear data.
- Model 23.5: Integrated all changes from models 23.1-23.4.

The following documents are associated with this report and can be accessed through the provided links on the assessment document.:
Appendix 3C: Ecosystem and Socioeconomic Profile (ESP)[167]
Appendix 3D: Sablefish Bycatch in the Eastern Bering Sea[168]
Appendix 3E: Catch Rates and Observations from the Fixed Gear Fleet[169]
Appendix 3F: Observer Coverage and Sampling of the Sablefish Stock[170]

In addition to the annual stock assessment and its related/supporting work, extensive research is ongoing in Alaskan waters which have relevance for the sablefish stock and Alaskan ecosystems. This work includes:

**North Pacific Research Board (NPRB)[171]**
The NPFB conducts research activities on or relating to the fisheries or marine ecosystems in the North Pacific Ocean, Bering Sea, and Arctic Ocean prioritizing on research efforts designed to address pressing fishery management or marine ecosystem information needs.

**Bering Sea Integrated Ecosystem Research Program[172]** is a $52 million partnership between the NPRB and the National Science Foundation (NSF) that seeks to understand the impacts of climate change and dynamic sea ice cover on the eastern Bering Sea ecosystem. More than one hundred scientists are engaged in field research and ecosystem modeling to link climate, physical oceanography, plankton, fishes, seabirds, marine mammals, humans, traditional knowledge and economic outcomes to better understand the mechanisms that sustain this highly productive region.

[167] https://apps-afsc.fisheries.noaa.gov/Plan_Team/2023/sablefish_appC.pdf
[168] https://apps-afsc.fisheries.noaa.gov/Plan_Team/2023/sablefish_appD.pdf
[169] https://apps-afsc.fisheries.noaa.gov/Plan_Team/2023/sablefish_appE.pdf
[170] https://apps-afsc.fisheries.noaa.gov/Plan_Team/2023/sablefish_appF.pdf
[171] https://nprb.org/
[172] https://data.eol.ucar.edu/project/BSIERP

| | |
|---|---|
| **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.** |
| | **The Gulf of Alaska Integrated Ecosystem Research Project (IERP[173])** is a program of the NPRB that seeks to understand how environmental and anthropogenic processes, including climate change, affect trophic levels and dynamic linkages among trophic levels, with emphasis on fish and fisheries, marine mammals, and seabirds within the GOA. Implementation of the GOA IERP is structured around four separately completed components which willing together to form a fully integrated ecosystem study in the Gulf of Alaska. The four components of this program are Upper Trophic Level, Forage Base, Lower Trophic Level and Physical Oceanography, and Ecosystem Modelling.<br><br>**The Alaska Climate Integrated Modelling (ACLIM) project [174]** is a collaboration of diverse researchers aimed at giving decision makers critical information regarding the far-reaching impacts of environmental changes in the Bering Sea. To better predict and respond to future changes, the ACLIM project will develop cutting-edge and multi-disciplinary models. The models will consist of alternative climate scenarios and the associated estimates of potential impacts or benefits to people, industry, and the Bering Sea ecosystem. The ACLIM team has 19 members and includes oceanographers, ecosystem modelers, socioeconomic researchers and fishery management experts from NOAA Alaska Fisheries Science Center, NOAA Pacific Marine Environmental Laboratory, the University of Washington Joint Institute for the Study of Atmosphere and Ocean (JISAO) and School of Aquatic and Fishery Sciences (SAFS) and the Norwegian Institute for Water Research (NIVA).<br><br>**The North Pacific Marine Science Organization (PISCES[175])** is an intergovernmental scientific organization, established in 1992 to promote and coordinate marine research in the northern North Pacific and adjacent seas. Its present members are Canada, Japan, People's Republic of China, Republic of Korea, the Russian Federation, and the United States of America. Its scientific program named FUTURE[176] (Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Marine Ecosystems) is an integrative program undertaken by the member nations and affiliates of PICES to understand how marine ecosystems in the North Pacific respond to climate change and human activities.<br><br>5.1.2 The fisheries management organization shall ensure that appropriate research is conducted into all aspects of fisheries including biology, ecology, technology, environmental science, economics, and fishery enhancement. Analysis results shall be distributed in a timely and readily understandable fashion in order that the best scientific evidence available contributes to fisheries conservation, management, and development. The fisheries management organization shall also ensure the availability of research facilities and provide appropriate training, staffing, and institution building to conduct the research.<br><br>**Pacific Halibut**<br>As described above, the Pacific Halibut stock assessment program is extensive and comprehensive.[177] A primary focus of the stock assessment and the five-year research plan is to assess data and research |

[173] https://data.eol.ucar.edu/project/BSIERP
[174] https://www.fisheries.noaa.gov/alaska/ecosystems/alaska-climate-integrated-modeling-project
[175] https://meetings.pices.int/
[176] https://meetings.pices.int/members/scientific-programs#:~:text=FUTURE%20(Forecasting%20and%20Understanding%20Trends,and%20human%20activities%2C%20to%20forecast
[177] https://www.iphc.int/uploads/2024/01/IPHC-2024-SA-02.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. |
|---|---|

needs for completion of the stock assessment and subsequent management[178]. Primary sources of information for this assessment include indices of abundance from the IPHC's annual fishery-independent setline survey (numbers and weight) and commercial CPUE (weight), and biological summaries (length-, weight-, and age- and sex-composition data). Other data from NMFS trawl surveys in the eastern Bering Sea and GOA, as well as from various tagging programs, are also collected and analysed. Research capacity in environmental science is also extensive as outlined in previous clauses, and below. For each of these data sources, the assessment team identifies needs that focuses, in part, in reducing uncertainties in the stock assessment. Analysis of data, meta data, collection protocols, and data of the biology, ecology, technology, environmental science, and economics are documented on the IPHC website. The IPHC ensures the availability of research facilities and provide appropriate training, staffing, and institution building to conduct the research and this is achieved through the strategic goals that at the organizational and management levels. These goals are to develop and maintain core scientific programs to fulfill the mandate:

i. identify knowledge gaps and priorities for ecologically sustainable management,
ii. develop scientific programs to address knowledge gaps,
iii. acquire resources necessary for program execution,
iv. communicate results in a professional, understandable, and timely manner for both scientific, stakeholder, and tribal communities,
v. ensure ongoing scientific review of programs; and
vi. provide decision-makers with rigorous, best-available scientific advice, to support their decision making.

**Alaska Sablefish**

Alaska's sablefish stock assessment and research programs (NMFS, ADF&G) are robust, extensive, and comprehensive (Goethel *et al.,* 2023). The process to determine the stock removals used in the assessment and management considerations is described in (Goethel *et al.,* 2023). Similarly, research capacity in environmental science is also substantial. The state of the sablefish stock is monitored mainly through survey and the resulting patterns are evaluated in the context of peer-reviewed stock assessment which is comprised primarily of an age-structured statistical model.

The Alaska Department of Fish and Game (ADF&G) evaluates stock status and establishes the SSEI AHO using commercial fishery and survey catch per unit effort (CPUE) data, fishery, and survey biological data (age, weight, length, and maturity), and stock status trends of sablefish populations in surrounding geographic areas[179,180]. For state-managed fisheries, ADF&G has a well- developed research capacity[181] and conducts stock assessments in State waters to determine safe harvest levels. In 1988, the department began annual longline research surveys in both Southeast inside sub-districts where the majority of state fleet fishing effort is focused, in order to assess the relative abundance of sablefish over time and differing environmental conditions. Biological data is also collected during the surveys and ADF&G has standardized its survey methods with the NMFS longline survey. These data are presented and reviewed as part of the overall annual sablefish assessment process, and ADF&G scientists participate in the NPFMC Plan Team. The Prince William Sound sablefish fishery is managed

[178] https://www.iphc.int/uploads/2024/04/IPHC-2023-5YRIRM-2022-26-18-Dec-23.pdf
[179] https://www.adfg.alaska.gov/FedAidPDFs/RIR.1J.2022.19.pdf
[180] https://www.adfg.alaska.gov/FedAidPDFs/RIR.1J.2022.18.pdf
[181] https://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareasoutheast.sablefish_research

| 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. |
|---|---|

using a GHL [182] and derived from the estimated area of sablefish habitat and a yield-per-unit-area model. For the Clarence and Chatham Strait fisheries (Southeast Inside areas) an annual harvest objective is set with regard to survey and fishery catch per unit effort and biological characteristics of the population. In addition, in Chatham Strait an annual stock assessment is performed which is based, in part, on estimates from mark-recaptured individuals.

5.2. There shall be established research capacity necessary to assess and monitor [1] the effects of climate or other environmental change on stocks and aquatic ecosystems, [2] the status of the stock under State jurisdiction, and [3] the impacts of ecosystem changes resulting from fishing activity, pollution, or habitat alteration.

**Pacific Halibut**

The Bering Sea Project, a partnership between the NPRB and the National Science Foundation, is studying the Bering Sea ecosystem from atmospheric forcing and physical oceanography to humans and communities, as well as socio-economic impacts of a changing marine ecosystem. Scientists and researchers from a number of agencies and universities are involved. Ecosystem modelling, sound data management and education and outreach activities are included in the program.

Since 2002, IPHC has been working cooperatively with the Alaska Department of Environmental Conservation (ADEC) in a project monitoring environmental contaminants in Alaskan fish[183]. Over 91 species of fish have been studied, include salmon (5 species), pollock, P. cod, lingcod, black rockfish, sablefish, and Pacific Halibut. The fish are analyzed for organochlorine pesticides, dioxins, furans, polybrominated diphenyl ethers, PCB congeners, methyl mercury and heavy metals (arsenic, selenium, lead, cadmium, nickel, and chromium). Results from analysis of persistent organic pollutants found that in general these compounds are either undetectable in halibut or well below other marine fish species. This is a positive finding and is likely attributable to the lower fat content in halibut compared to these other species.

As part of IPHC's annual setline survey, which provides data for the Pacific halibut assessment, IPHC conducts an extensive oceanographic monitoring program which includes waters off British Columbia, and into the Gulf of Alaska, Bering Sea, and Aleutian Islands (Ulawesi *et al.,*2024). The IPHC has been collaborating with the Joint Institute for the Study of the Atmosphere and Ocean (JISAO) at the University of Washington and NOAA's Pacific Marine Environmental Laboratory to process the oceanographic data and make them publicly accessible, and a number of years of data up to 2014 are currently available[184].

In addition to the oceanographic monitoring done by IPHC, other data on ecosystem impacts are collected and presented in the annual IPHC reports. These studies include data on seabird occurrence (IPHC, 2023) [185], and impacts of marine mammal on setline depredation (Wong, 2015). As part of its annual management process for Alaskan groundfish, NPFMC also receives extensive presentations on the status of Alaska's marine ecosystems (GOA and BS/AI) at its SSC and Advisory Panel meetings. The Ecosystem Status reports are produced annually to compile and summarize information about the

[182] https://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareapws.groundfish
[183] https://www.iphc.int/research/contaminants-mercury-fukushima-radiation/
[184] https://iphc.int/uploads/pdf/tr/IPHC-2016-TR060.pdf
[185] https://www.iphc.int/uploads/2023/12/iphc-2023-fiss-sbd-000.xlsx

| 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. |
|---|---|

status of the Alaska marine ecosystems for the NPFMC, the scientific community and the public[186]. As of 2023, there are separate reports for the Eastern Bering Sea (EBS), Aleutian Islands (AI), the Gulf of Alaska (GOA), and Arctic (forthcoming) ecosystems. These reports include ecosystem assessments, and ecosystem-based management indicators that together provide context for ecosystem-based fisheries management in Alaska.

**Alaska Sablefish**

The mission of the NOAA Fisheries is to conduct scientific research to generate data and analysis for understanding, managing, and sustaining living marine resources. Appropriate, adequate, and directed research is conducted for the management of sablefish in Alaska waters. NMFS and ADFG conduct surveys on sablefish in Alaskan waters. The NOAA Fisheries conducts an annual longline survey and a biennial trawl survey in the GOA and the Aleutian Islands (alternating years between the two regions), and an annual trawl survey in the Eastern Bering Sea and ADFG performs annual longline surveys in Chatham and Clarence Strait. These surveys provide estimates of CPUE, relative abundance, and biological data. In addition, tagging studies exist to study sablefish movement for federal, state, and Canadian waters.

The ADFG conducts an annual tagging survey in Chatham Strait as part of a mark-recapture study to estimate population abundance. The mark-recapture data is used to determine an annual relative abundance index and to understand movement dynamics (Heifetz and Maloney, 2001). In 2023, the ABL MESA Tag program continued in processing groundfish tag recoveries, managing the tag rewards program, and overseeing the Groundfish Tag Database (Mcdermott *et al.,* 2024). The total tag recoveries for the year amounted to approximately 425 sablefish and 6 SST. Among the retrieved tags, roughly 14 percent were recovered using trawl gear, 51 percent with pot gear, 25 percent via hook and line, and 10 percent during the AFSC longline survey. In 2023, sixteen percent of the recovered sablefish tags had been at liberty for more than ten years. Approximately 42% of the total recoveries in 2023 occurred within 100 nautical miles (nm; great circle distance) of their release location, 31% within 100 to 500 nm, 15% within 500 to 1,000 nm, and 12% beyond 1,000 nm from their release point. The tag with the longest duration of liberty lasted nearly 48 years, while the farthest distance traveled by a sablefish tag found in 2023 was 1,730 nautical miles, originating from a fish tagged in the Aleutian Islands and recovered off Vancouver Island around 4 years later. In 2023, two adult sablefish and one SST, both equipped with archival tags, were recovered. In 2023, the AFSC groundfish longline survey tagged and released 5,987 adult sablefish. In 2023, an additional 214 juvenile (age-1) sablefish were tagged during a tagging research cruise in Sitka, AK.

The assessment document includes extensive treatment of Ecosystem and Socioeconomic Profile and the evaluation of trawl removals of small sablefish in the Bering Sea have both been updated with new data for 2023 (Goethel *et al.,* 2023). Biological characteristics describing updates to weight and growth, maturity, model updates and new parametrizations, and a description of the final proposed model updates and the full factorial model building exercise are included. In addition to the annual stock assessment and its related/supporting work, extensive research is ongoing Alaskan waters which have relevance for the sablefish stock and Alaskan ecosystems.
This work includes:

- North Pacific Research Board (NPRB)

[186] https://www.fisheries.noaa.gov/alaska/ecosystems/ecosystem-status-reports-gulf-alaska-bering-sea-and-aleutian-islands

| | |
|---|---|
| **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.** |

- the Bering Sea Integrated Ecosystem Research Program
- The Gulf of Alaska Integrated Ecosystem Research Project (IERP)
- The Alaska Climate Integrated Modelling (ACLIM)
- The North Pacific Marine Science Organization (PISCES)

As part of IPHC's annual setline survey, which provides data for the sablefish assessment, IPHC conducts an extensive oceanographic monitoring program which includes waters off British Columbia, and into the Gulf of Alaska, Bering Sea, and Aleutian Islands (Ualesi *et al.,* 2024). The IPHC has been collaborating with the Joint Institute for the Study of the Atmosphere and Ocean (JISAO) at the University of Washington and NOAA's Pacific Marine Environmental Laboratory to process the oceanographic data collected and make them publicly accessible. The number of years of oceanographic data goes up to 2014 and are currently available[187].

Also, the Pacific States Marine Fisheries Commission coordinates research activities, monitors fishing activities, collects and maintains databases on marine fish occurring off the California, Oregon, Washington, and Alaska coasts.

Another major ecosystem research report is the AFSC Ecosystem Status Report series [188]. The Ecosystem Considerations reports are produced annually to compile and summarize information about the status of the Alaska marine ecosystems for the North Pacific Fishery Management Council, the scientific community, and the public. As of 2023, there are separate reports for the Eastern Bering Sea (EBS), Aleutian Islands (AI), the Gulf of Alaska (GOA), and Arctic (forthcoming) ecosystems. These reports include ecosystem assessments, and ecosystem-based management indicators that together provide context for ecosystem-based fisheries management in Alaska. In an ecosystem context, NOAA's Alaska Fisheries Science Center produces annual "Alaska Marine Ecosystem Status Reports" which describe oceanographic and productivity characteristics of the Eastern Bearing Sea, Aleutian Islands, and Gulf of Alaska.

For the Eastern Bering Sea they report that along with much of the North Pacific, the eastern Bering Sea has remained in an extended warm phase since approximately 2014. Satellite observations of sea surface temperatures (SSTs) in both the northern and southern Bering Sea have remained higher than the average from 1985-2014. However, after the extremely warm years of 2018 and 2019, conditions in 2020 and 2021 subsided to 1°C above average. The extended warm phase also impacts sea ice formation and extent. Water temperature and winds play key roles in the annual development and retreat of sea ice.

For the Aleutian Islands they report that sea surface temperatures during August and September 2021 in the western and central Aleutians were the highest since the satellite record began in 2003. In the eastern Aleutians, temperatures were mostly cooler relative to last year and closer to the long- term average. Low sea level pressure caused a stormier winter than usual. This was followed by westerly winds in spring, which suppressed transport through eastern passes. Slightly stormier conditions returned in summer in the western and central Aleutians. In general, environmental conditions were near average over much of the year, continuing the largely more favorable conditions for the biota in

[187] https://iphc.int/uploads/pdf/tr/IPHC-2016-TR060.pdf
[188] https://www.fisheries.noaa.gov/alaska/ecosystems/ecosystem-status-reports-gulf-alaska-bering-sea-and-aleutian-islands

| 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. |
|---|---|

2020 relative to recent years. Overall, sea surface temperatures are expected to decrease to average levels through winter 2021 and early spring 2022. Both planktivorous and piscivorous seabirds had reproductive success above the long-term average, suggesting wide availability of prey. The abundance of Eastern Kamchatka pink salmon was the second highest on record. This may be expected to have ecosystem impacts, as increased competition for prey and trophic cascades have been shown in years of high abundance of pink salmon.

Lastly, paralytic shellfish toxins were reported to be 75x above the regulatory limit in Unalaska. This continues to pose a risk to human health and food webs in the region. And for the Gulf of Alaska, they report that the area is in its second consecutive non-marine heatwave year, with average ocean temperatures at surface and depth. There are mixed trends in prey abundance and reduced abundance of groundfish apex predators (Pacific cod, Arrowtooth flounder, Pacific halibut). They speculate that the biological community experiencing continued impacts from the 2014-2016 and 2019 marine heatwave periods.

In 2016, NPFMC appointed 12 people to a Plan Team to begin developing the Council's Bering Sea Fishery Ecosystem Plan (FEP). The Team's primary responsibilities were to develop the core FEP document, to discuss potential and ongoing FEP action modules, make recommendations to the Ecosystem Committee and the Council about future steps, and to help communicate results to the Council. While the team is a scientific and technical team, the focus is also to ensure that FEP action modules interface with the Council's management needs and can be integrated into the Council's decision making and management process.

In December 2018 NPFMC adopted the Bering Sea Fishery Ecosystem Plan (FEP)[189]. The BSFEP document identifies management goals and objectives for the FEP and for monitoring of the Bering Sea ecosystem and describes how the FEP framework will support research projects (Action Modules) to address Council priorities. The Council also adopted the five action modules included in the draft, and initiated action on two of them. For year 2019, NPFMC staff will work with the BS FEP Team to bring back workplans for how to manage the workload associated with the initiated modules. The two action modules for the Council to work on are:

- Develop protocols for using Local Knowledge and Traditional Knowledge in management and understanding impacts of Council decisions on subsistence use.
- Evaluate the short- and long-term effects of climate change on fish and fisheries.

Regarding socio-economic data collection, AFSC's Economic and Social Sciences Research Program produces an annual Economic Status Report of the Groundfish fisheries in Alaska. This comprehensive report (Fissel *et al.,* 2023) [190] provides estimates of total groundfish catch, groundfish discards and discard rates, prohibited species catch (PSC) and PSC discards rates, values of catch and resulting food products, the number and sizes of vessels that participated in the groundfish fisheries off Alaska, and employment on at-sea processors. The report contains a wide range of analyses and comments on the performance of a range of indices for different sectors of the North Pacific fisheries, and relates changes in value, price, and quantity, across species, product, and gear types, to changes in the market. This report includes extensive economic data for the commercial sablefish fishery.

[189] https://www.npfmc.org/bering-sea-fishery-ecosystem-plan/
[190] https://www.fisheries.noaa.gov/resource/data/2023-economic-status-groundfish-fisheries-alaska

| 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. |
|---|---|

Various studies have been conducted on the economic value of sportfishing in Alaska which include sablefish, although sablefish is not a major target species for sport fishing. The Alaska Seafood Marketing Institute has contracted studies to determine the value of Alaska's seafood industry[191], and the University of Alaska, Institute of Social and Economic Research conducts research on the economics of various Alaskan fisheries.

Since 2002, IPHC has been working cooperatively with the ADEC in a project monitoring environmental contaminants in Alaskan fish[192]. The fish being studied include sablefish, and these are analyzed for organochlorine pesticides, dioxins, furans, polybrominated diphenyl ethers, PCB congeners, methyl mercury and heavy metals (arsenic, selenium, lead, cadmium, nickel, and chromium).

The Oil Spill Recovery Institute (OSRI)[193] was established by US Congress in response to the 1989 Exxon Valdez oil spill. OSRI is administered through and housed at the Prince William Sound Science Center, a non-profit research and education organization located in Cordova, AK. The PWS Science Center facilitates and encourages ecosystem studies in the Greater Prince William Sound region. OSRI produces an annual report [194] among other publications. The 2023 report[195] contains several h programs details on their activities, including ongoing research projects, an update of field guide for oil spill response in arctic waters, and shore-zone mapping of the eastern Aleutian Islands.
Some of the ongoing research programs are as follows:

- Impact of anthropogenic climate and oil stressors on the survival potential of Arctic cod during the 1st year of life.
- Cook Inlet circulation modeling
- Cook Inlet HF radar data recovery
- Identifying needs associated with food security
- Oceanography of Cook Inlet tide rips

5.3 Management organizations shall cooperate with relevant international organizations to encourage research in order to ensure optimum utilization of fishery resources.

**Pacific Halibut**
IPHC is an international organization[196]. It was established in 1923 and has a mission for the for the preservation of the Pacific Halibut fishery in waters off Canada and the United States of America. There is extensive cooperation on various aspects of research, stock assessment, and management of Pacific Halibut between the fisheries agencies (e.g., DFO and NMFS) of these two nations. Declaration of the 200- mile EEZ's by both countries in the late 1970's drastically reduced and eventually eliminated halibut fishing in these waters by countries other than Canada and USA. There are cooperative research and surveys carried out on the stock involving other nations (nations other than Canada and the United States), but these are limited. This includes the 1984 US-Japan bottom trawl survey in the GOA (Brown 1986) that is included in the stock assessment. Pacific Halibut caught in Russian areas of

[191] https://www.alaskaseafood.org/wp-content/uploads/MRG_ASMI-Economic-Impacts-Report_2023_WEB-PAGES.pdf
[192] https://www.iphc.int/research/contaminants-mercury-fukushima-radiation/
[193] https://osri.us/.
[194] https://osri.us/resources/docs
[195] https://osri.us/wp-content/uploads/2024/01/FY23-Annual-report.pdf
[196] https://www.iphc.int/about/the-commission/

| | |
|---|---|
| **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.** |

the Bering Seas are believed to be of a different stock, and this information is not considered in the annual IPHC assessments. There is ongoing contact between IPHC and Russian scientists regarding halibut research in the Bering Sea area (I. Stewart, pers. com).

A major international effort for the monitoring of the halibut stock is The Fishery-Independent Setline Survey (FISS) (Ualesi *et al.,* 2024). The FISS provides catch information and biological data on Pacific halibut that are independent of the fishery.

The most recent FISS covers the majority of Pacific halibut fishing grounds within the IPHC Convention Area with a 10 by 10 nautical mile grid of stations ranging from California to the northern Bering Sea including the Aleutian Islands (Figure 5). The FISS often includes an expanded number of stations in IPHC Regulatory Areas to gather additional data. This is part of a multi-year FISS expansion effort into depths and locations beyond the standard FISS stations but where Pacific halibut may be located.

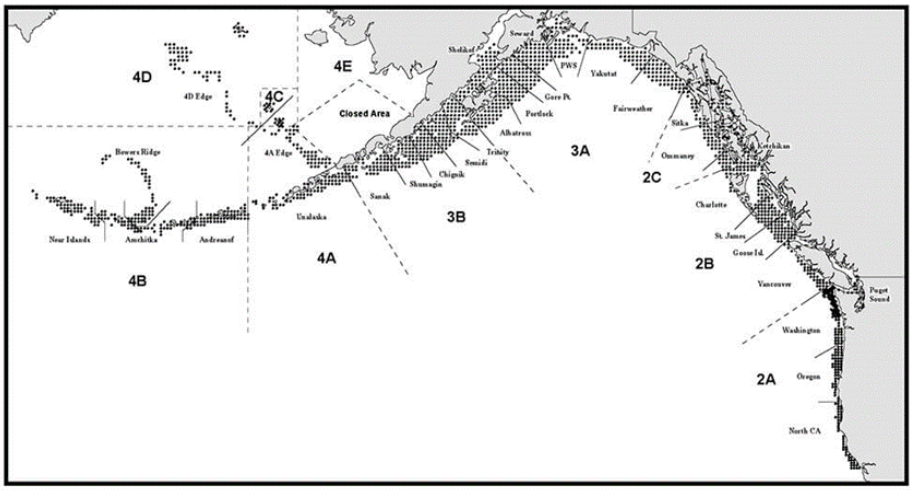



**Figure 5.** Study area and statistical strata for the FISS survey. Details of the survey are found in the sampling manual (Source: IPHC, 2024).

There is considerable discussion and exchange between IPHC and NPFMC on management issues related to Alaska Pacific Halibut. Currently, both organizations are cooperating to develop a Halibut Management Framework [197], designed to improve coordination between the Council and IPHC. One goal is for better alignment of the two management bodies when dealing with needs among the various directed fishery and bycatch user groups.

**Alaska Sablefish**

The only two nations involved in the sablefish fishery in the eastern North Pacific are Canada and the United States. The resources in each nation's waters are managed separately, and each nation conducts surveys that occur in adjacent geographical areas, as well as a survey conducted by IPHC that covers areas in the EEZs of both countries. Japan and USA conducted cooperative longline surveys from 1978 to 1994, these data are used in the current stock assessment as an index of abundance.

[197] https://www.fisheries.noaa.gov/action/pacific-halibut-catch-sharing-plan-and-annual-management-measures-federal-register-rules-and

| | |
|---|---|
| **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.** |
| | There is cooperation on various aspects of research, stock assessment, and management between the fisheries agencies (e.g., DFO and NMFS) of USA and Canada (Goethel *et al.,* 2023). The Alaska Pacific Sablefish assessment (Goethel *et al.,* 2023) documents the concurrent sablefish trends seen in Alaska, Canada, and the West Coast highlights the need to better understand the contribution to Alaska sablefish productivity from other areas. A Pacific Sablefish Transboundary Assessment Team (PSTAT) consisting of scientists from the U.S. (west coast and Alaska regions, including both federal and state scientists) and Canada has been working to better understand the dynamics, population trends, and biology of sablefish across the eastern Pacific Ocean [198]. The group is developing spatially explicit tagging analyses and operating models to estimate connectivity among regions and eventually explore impacts of regional management measures on the coast wide population through management strategy evaluation (MSE). Additionally, age reading groups across agencies have addressed sablefish ageing discrepancies by developing standardized ageing criteria through the Committee of Age Reading Experts (CARE) group.<br><br>5.4. The fishery management organizations shall directly, or in conjunction with other States, develop collaborative technical and research programs to improve understanding of the biology, environment, and status of transboundary, shared, straddling, highly migratory and high seas stocks.<br><br>**Pacific Halibut**<br>The transboundary issues for the Alaskan Pacific Halibut stock are between Canada and USA, and these are dealt with in the IPHC. Both countries have extensive scientific programs for halibut research and assessment and collaborate on research to promote sustainable management. Evidence for this is contained in the IPHC Scientific and Technical reports[199].<br><br>**Alaska Sablefish**<br>The main transboundary issues for the Alaskan sablefish stock are between Canada and USA. Both countries have extensive scientific programs for research and assessment and collaborate on numerous topics related to sablefish science and management. Data from the DFO sablefish surveys in B.C. waters are considered in the NMFS/NPFMC assessment process and SAFE document (Goethel *et al.,* 2023). The similarly low abundance (through 2014) south of Alaska is of concern, and points to the need to better understand the contribution to Alaska sablefish productivity from B.C. sablefish. Some potential ideas which have been discussed are to conduct an area-wide study of sablefish tag recoveries, and to attempt to model the population to include B.C. sablefish and U.S. West Coast sablefish. Recent data from Canadian surveys in BC waters have shown an increase in sablefish abundance and biomass (Figure 6) and reported in (Goethel *et al.,* 2022). |

[198] https://www.pacificsablefishscience.org/
[199] https://iphc.int/library/documents/category/scientific-reports

| | |
|---|---|
| **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.** |

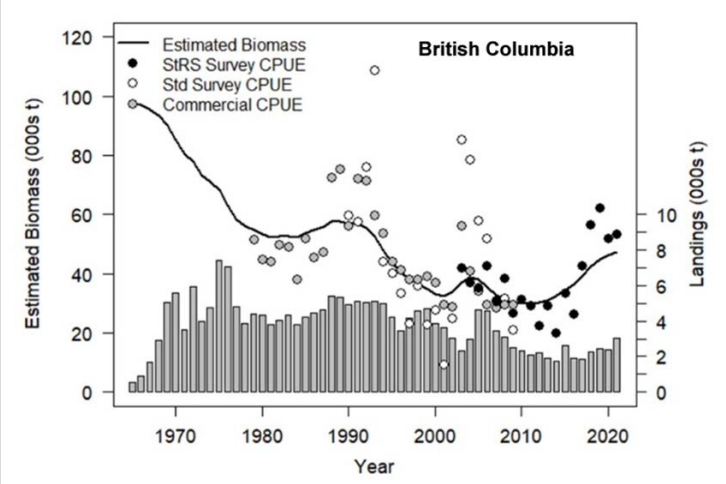



**Figure 6.** Observed landings, commercial CPUE, and survey CPUE, as well as estimated biomass from a surplus production model of British Columbia sablefish (Source: Goethel *et al.,* 2022).

5.5. Data generated by research shall be analyzed and the results of such analyses published in a way that ensures confidentiality is respected, where appropriate.

Data, summarized in reports and executive summaries, are made widely available throughout the assessment process and enable timely resource management, such as quota setting, through the agency websites, publications, and at various public meetings. Data on certain aspects of commercial fishing are confidential, such as individuals or individual vessels in the analysis of fishery CPUE data, depending on the number of individuals or entities involved [200]. Data of this nature for both fisheries under consideration are confidential as defined by Alaska statutes (AS 16.05.815[201] and 16.40.155[202]). These laws are concerned with confidential nature of certain reports and records.

References

Brown, E.S. 1986. Preliminary results of the 1984 U.S.-Japan cooperative bottom trawl survey of the central and western Gulf of Alaska. In R.L. Major (editor), Condition of groundfish resources of the Gulf of Alaska as assessed in 1985, p. 259. U.S. Dep. Commer., NOAA Tech. Memo. NMFS F/NWC-106.

Goethel, D., Rodgveller, C., Echave, K., Shotwell, K., Siwicke, K., Hanselman, D., Malecha, P., Cheng, M., Williams, M., Omori, K., Lunsford, C.R. 2022. Alaska Sablefish Stock Assessment and Fishery Evaluation (SAFE) Report. North Pacific Fishery Management Council Anchorage AK. Pp.182.

Goethel, D.R., Cheng, M.L.H., Echave, K.B., Marsh, C., Rodgveller, C.J., Shotwell, K., and Siwicke, K. 2023. Assessment of the sablefish stock in Alaska. North Pacific Fishery Management Council, Anchorage, AK.

Heifetz, J., Maloney, N.E. 2001. Estimation of tag-reporting rates for sablefish in the northeastern Pacific Ocean. Alaska Fish. Res. Bull. 8: 1–1

IPHC 2024b. IPHC Fishery-Independent Setline Survey Sampling Manual (2024) IPHC–2024–VSM01,39 pp.

[200] https://www.noaa.gov/organization/administration/nao-216-100-protection-of-confidential-fisheries-statistics
[201] https://www.touchngo.com/lglcntr/akstats/statutes/title16/chapter05/section815.htm
[202] https://us.vlex.com/vid/as-16-40-155-960035644

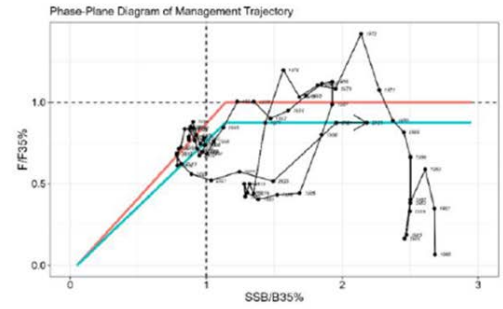
| | |
|---|---|
| **5.** | **There shall be regular stock assessment activities appropriate for the fishery, its range, the species biology, and the ecosystem, undertaken in accordance with acknowledged scientific standards to support its optimum utilization.** |
| | McDermott S., C. Rodgveller, M. Bryan, N. Laman. 2024. Alaska Fisheries Science Center of the National Marine Fisheries Service 2023 Agency Report to the Technical Subcommittee of the Canada-US Groundfish Committee April 2024 80p. |
| Statement of consistency to the RFM Fishery Standard | **The fishery continues to conform to the requirements of Fundamental Clause 5 of the RFM Fishery Standard** |

### 7.9.2.3. Fundamental Clause 6. Biological reference points and harvest control rule

| | |
|---|---|
| **6.** | **The current state of the stock shall be defined in relation to reference points, relevant proxies, or verifiable substitutes that allow effective management objectives and targets to be set. Remedial actions shall be available and taken where reference points or other suitable proxies are approached or exceeded.** |
| Summary of relevant changes: | 6.1. The fishery management organization shall establish safe target reference point(s) for management. Management targets are consistent with achieving maximum sustainable yield (MSY), a suitable proxy, or a lesser fishing mortality—if that is optimal in the circumstances of the fishery (e.g., multispecies fisheries) or is needed to avoid adverse impacts on dependent predators.<br><br>**Pacific Halibut**<br>Full, age-structured, statistical stock assessments are conducted annually, and fisheries management and conservation are based on precautionary and ecosystem-based approaches, including the use of reference points for spawning biomass and harvest rate (Stewart and Hicks, 2024). Since 1985, the IPHC 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. The apportionment percentages and the target harvest rate for each regulatory area together result in a target distribution for the annual TCEY. The scale of this distribution is based on the estimate of the coastwide exploitable biomass at the beginning of year *t*+1 from the stock assessment in year *t*.<br><br>The IPHC's current interim management procedure specifies a reference level of fishing intensity of *F43%*, based on the Spawning Potential Ratio (SPR). For 2024, the relative spawning biomass is estimated at 42% (credible interval: 20-56%), slightly higher than the 41% estimated for 2023. There is a 26% probability that the stock is below the SB30% level at the beginning of 2023, with only a 1% chance of falling below SB20%. Two long-term models (coastwide and areas-as-fleets) offer differing estimates when comparing the current stock size to the historical low in the 1970s. The AAF model suggests that the current stock size is well below those historical levels (44%), while the coastwide model places it above (168%). These differences reflect uncertainties in historical data (particularly from IPHC Regulatory Areas 4A-4CDE before the 1970s) and the simplified nature of the models, which only approximate spatial and population dynamics.<br><br>**Alaska Sablefish**<br>**Status Determination**<br>Under the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act, the Secretary of Commerce is required to report on the status of each U.S. fishery with respect to overfishing. The official catch estimate for the most recent complete year (2022) is 26,900 t, which is less than the 2022 OFL of 34,500 t. Therefore, the stock is not being subjected to overfishing. Because 2023 SSB is at *B52%* (i.e., above *B35%*), sablefish are not overfished. Similarly, given that the 2025 SSB is projected to be at *B70%* (i.e., above *B35%*), sablefish are not approaching an overfished condition. Thus, overfishing is not occurring on Alaskan sablefish and the stock is not overfished nor is it approaching an overfished condition (Goethel *et al.,* 2023).<br><br>**Acceptable Biological Catches (ABCs) and Overfishing Limits (OFLs)**<br>Sablefish are managed under Tier 3 of the NPFMC harvest control rule, which aims to maintain the population at *B40%* (Goethel *et al.,* 2023) (Figure 7). The updated point estimate of *B40%* is 119,960 t. Since projected female spawning biomass (combined areas) for 2024 is 185,079 t (equivalent to |

**6. The current state of the stock shall be defined in relation to reference points, relevant proxies, or verifiable substitutes that allow effective management objectives and targets to be set. Remedial actions shall be available and taken where reference points or other suitable proxies are approached or exceeded.**

*B62%*), sablefish is in sub-tier "a" of Tier 3. The updated point estimates of *F40%,* and *F35%* from this assessment are 0.086 and 0.101, respectively. Thus, the maximum permissible value of *FABC* under Tier 3a is 0.086, which translates into a 2024 ABC (combined areas, before whale adjustments) of 47,367 t. The OFL fishing mortality rate is 0.101, which translates into a 2024 OFL (combined areas) of 55,385 t. After adjusting for whale depredation, the final author recommended ABCw is 47,146 t in 2024 and 47,350 t in 2025. The whale adjusted OFLw is 55,084 t in 2024 and 55,317 t in 2025.




| Quantity | 2022 SAFE (Projections for 2023) | 2023 SAFE (Projections for 2024) |
|---|---|---|
| $B_{100\%}$ | 305,595 | 299,901 |
| $B_{40\%}$ | 122,238 | 119,960 |
| $SSB_{(Terminal\_Yr+1)}$ | 159,788 | 185,079 |
| $SSB_{(Terminal\_Yr+1)}/B_{100\%}$ | 52% | 62% |
| $F_{ABC(Terminal\_Yr+1)}$ | 0.081 | 0.086 |
| $ABC_{w(Terminal\_Yr+1)}$ | 40,502 | 47,146 |
| $OFL_{w(Terminal\_Yr+1)}$ | 47,390 | 55,084 |

*SSB projections are based on specified catch for the terminal year. $ABC_w$ and $OFL_w$ are the recommended values after whale depredation has been taken into account.

**Figure 7.** Stock status of Alaskan sablefish from the 2023 assessment (Source: Goethel *et al*., 2023).

For state-managed sablefish fisheries, the Cook Inlet, Prince William Sound, and the Aleutian Islands state fisheries have guideline harvest limits (GHL) and are managed using NMFS assessment data (and therefore federal reference points), historical catches and effort, projected catch and effort, and a yield-per- unit-area model, among other parameters.

The 2024 Northern Southeast Inside (NSEI) Subdistrict commercial sablefish fishery annual harvest objective (AHO) is 1,542,444 round pounds[203]. The AHO is based on the sablefish recommended acceptable biological catch (ABC) with decrements made for sablefish mortality in other fisheries. There are 73 valid Commercial Fisheries Entry Commission (CFEC) permits for 2024, the same as 2023. The individual equal quota share (EQS) is 21,129 round pounds, an 11% increase from the 2023 EQS of 19,091 round pounds. The recommended 2024 ABC is 1,809,075 round lb ($FF$ABC = 0.061), a 15% increase from the 2023 ABC. The increase in the ABC is attributed to the continued growth and maturation of the strong recruitment events since 2015, highlighted by recruitment in 2018 (the 2016-year class) which is the highest since 1979.

The ABC determination process uses a statistical catch-at-age model, first implemented in 2020. The model reduces the reliance on the annual mark-recapture project to estimate recruitment, abundance, and spawning stock biomass of NSEI sablefish by integrating multiple indices of abundance and biological data (e.g., catch by age, mark-recapture abundance estimates, longline survey, and fishery CPUE, longline survey length and age compositions). As in previous years, maximum ABC is defined by $FF$50, the fishing mortality rate that reduces spawning biomass to 50% of equilibrium unfished levels.

[203] https://www.adfg.alaska.gov/static/applications/dcfnewsrelease/1581267685.pdf

| | |
|---|---|
| **6.** | **The current state of the stock shall be defined in relation to reference points, relevant proxies, or verifiable substitutes that allow effective management objectives and targets to be set. Remedial actions shall be available and taken where reference points or other suitable proxies are approached or exceeded.** |

The 2024 Southern Southeast Inside (SSEI) Subdistrict sablefish commercial annual harvest objective (AHO) remains at 643,360 round pounds, identical to the 2023 AHO[204]. Each of the 22 permit holders is allocated an equal quota share (EQS) of 29,244 round pounds, with no changes in the number of permits from the previous year. Adjustments to individual 2024 EQS will account for any overages or underage from 2023, and a personal quota share (PQS) will be assigned accordingly.

The Alaska Department of Fish and Game (ADF&G) determines the AHO using data from commercial fisheries and surveys, including catch per unit effort (CPUE), biological metrics (age, weight, length, and maturity), and stock trends from nearby areas. Since direct abundance estimates for the stock are unavailable, indirect indices such as CPUE are used for assessment.

Longline survey CPUE showed a 40% increase from 2022 to 2023 but a preliminary 21% decline from 2023 to 2024, while pot fishery CPUE rose by 10% from 2022 to 2023. Due to confidentiality concerns, longline CPUE comparisons from 2022 are unavailable, as fewer than three vessels participated. Tagging studies indicate that 30% of sablefish in SSEI move out of the area within a year, typically migrating to the eastern Gulf of Alaska (GOA) and British Columbia (BC). However, the observed absence of older, larger fish, especially older fecund females, cannot be fully explained by migration patterns. A positive sign is the strong recruitment from the 2014, 2016, 2017, and 2018 age classes, which also shows up in neighboring fisheries. Maintaining the same AHO from 2023 to 2024 ensures stability and sustainability through conservative management practices.

6.2. The fishery management organization shall establish appropriate limit reference point(s) for exploitation (i.e., consistent with avoiding recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible; Appendix 1, Part 1). When a limit reference point is approached, measures shall be taken to ensure that it will not be exceeded. For instance, if fishing mortality (or its proxy) is above the associated limit reference point, actions should be taken to decrease the fishing mortality (or its proxy) below that limit reference point.

**Pacific Halibut**

The IPHC's interim management procedure uses a relative spawning biomass of 30% as a fishery trigger, reducing the reference fishing intensity if relative spawning biomass decreases further toward a limit reference point at 20%, where directed fishing is halted due to the critically low biomass condition (Stewart and Hicks, 2024). The relative spawning biomass at the beginning of 2024 was estimated to be 42% (credible interval: 20-56%), slightly higher than the estimate for 2023 (41%). The probability that the stock is below SB30% is estimated to be 26% at the beginning of 2023, with a 1% chance that the stock is below SB20%. The IPHC's current interim management procedure specifies a reference level of fishing intensity of a Spawning Potential Ratio (SPR) corresponding to an F43%; this equates to the level of fishing that would reduce the lifetime spawning output per recruit to 43% of the unfished level given current biology, fishery characteristics and demographics. Based on the 2023 assessment, the 2023 fishing intensity is estimated to correspond to an F52% (credible interval: 31-66%). Stock projections were conducted using the integrated results from the

[204] https://www.adfg.alaska.gov/static/applications/dcfnewsrelease/1571032940.pdf

| | | |
|---|---|---|
| **6.** | **The current state of the stock shall be defined in relation to reference points, relevant proxies, or verifiable substitutes that allow effective management objectives and targets to be set. Remedial actions shall be available and taken where reference points or other suitable proxies are approached or exceeded.** | |
| | | stock assessment ensemble, details of IPHC Regulatory Area-specific catch sharing plans and estimates of mortality from the 2023 directed fisheries and other sources of mortality. There is at least a 45% probability of stock decline in 2024 for all yields greater than the status quo. The 2024 "3-year surplus" alternative, corresponds to a TCEY of 39.1 million pounds (17,700 t), and a projected SPR of 49% (credible interval 28-64%). At the reference level (a projected SPR of 43%), the probability of spawning biomass declines from 2024 to 2025 is 74%, decreasing to 72% in three years. The one-year risk of the stock dropping below SB30% is 24-26% across all alternatives. Retrospective analyses for each of the four models, and a discussion of major sources of uncertainty are also included in this document.<br><br>**Alaska Sablefish**<br>Sablefish are managed under Tier 3 of the NPFMC harvest control rule, which aims to maintain the population at *B40%*. The updated point estimate of *B40%* is 119,960 t (Goethel *et al.,* 2023) Since projected female spawning biomass (combined areas) for 2024 is 185,079 t (equivalent to *B62%*), sablefish is in sub-tier "a" of Tier 3. The updated point estimates of *F40%,* and *F35%* from this assessment are 0.086 and 0.101, respectively. Thus, the maximum permissible value of *FABC* under Tier 3a is 0.086, which translates into a 2024 ABC (combined areas, before whale adjustments) of 47,367 t. The OFL fishing mortality rate is 0.101, which translates into a 2024 OFL (combined areas) of 55,385 t. After adjusting for whale depredation, the final author recommended ABCw is 47,146 t in 2024 and 47,350 t in 2025. The whale adjusted OFLw is 55,084 t in 2024 and 55,317 t in 2025.<br><br>6.3. Data and assessment procedures that measure the position of the fishery in relation to the reference points shall be established. Accordingly, the stock under consideration shall not be overfished (i.e., above limit reference point or proxy) and the level of fishing permitted shall be commensurate with the current state of the fishery resources, maintaining its future availability, and taking into account that long-term changes in productivity can occur due to natural variability and/or impacts other than fishing (Appendix 1, Part 1).<br><br>For both Pacific Halibut and Alaska Sablefish Data and assessment procedures (i.e., stock assessment process) are in place to measure the position of the fishery in relation to the target and limit reference points are well documented above (Stewart and Hicks, 2024; Goethel *et al.,* 2023).<br><br>**Halibut Stock Status**<br>The IPHC's interim management strategy employs a relative spawning biomass threshold of 30% as a trigger, below which the reference fishing intensity decreases (Stewart and Hicks, 2024). Directed fishing ceases when the relative spawning biomass limit reaches 20%, indicating a critically low biomass state. This calculation relies on current biological parameters: weight-at-age and projected recruitments affecting the stock. Consequently, the 'dynamic' approach solely assesses the impact of fishing on the spawning biomass, excluding natural variations attributable to recruitment variability and weight-at-age. The predicted relative spawning biomass for 2024 is 42% (credible interval: 20-56%), just exceeding the 2023 prediction of 41%. The likelihood of the stock being beneath the SB30% threshold is projected at 26% at the outset of 2023, with a 1% probability of the stock falling below SB20%. Consequently, the stock is regarded as 'not overfished.' |

| | | |
|---|---|---|
| **6.** | **The current state of the stock shall be defined in relation to reference points, relevant proxies, or verifiable substitutes that allow effective management objectives and targets to be set. Remedial actions shall be available and taken where reference points or other suitable proxies are approached or exceeded.** | |
| | | **Sablefish Stock Status**<br>Sablefish are regulated under Tier 3 of the NPFMC harvest control rules, which seeks for maintaining the population at B40% (Goethel *et al.,* 2023). Projected female spawning biomass for 2024 over combined areas is comparable to B62%, categorizing sablefish in sub-tier "a" of Tier 3. The spawning biomass is expected to rise significantly in the near future, with the maximum allowable value of FABC under Tier 3a set at 0.086, resulting in a Tier 3a maximum permitted 2024 ABC (combined areas) of 47,367 tons. Upon accounting for whale depredation, the final author proposed that the ABC is 47,146 t. The Overfishing Limit (OFL) fishing mortality rate is 0.101, resulting in a 2024 OFL (combined regions) of 55,385 metric tons. Current model forecasts show that the Alaskan sablefish stock is neither subject to overfishing nor overfished and is not approaching an overfished status.<br><br>**State of Alaska**<br>In the Southeast Region, the department employs mark-recapture techniques utilizing external tags and fin clips to assess the abundance and exploitation rates of sablefish in the NSEI Subdistrict (ADFG, 2024). Sablefish are harvested with pot gear in May or June, tagged, fin-clipped, and subsequently released. Tags are retrieved from the fisheries, and fish are enumerated in the processing facilities while being examined for fin clips.<br><br>Alongside the mark-recapture study, an annual longline survey is performed in NSEI to furnish biological data and relative abundance statistics. In the NSEI Subdistrict, the proposed ABC for 2023 was 713.6 mt, reflecting a 9% rise from 2022[205]. The ABC was derived from a statistical catch-at-age (SCAA) model, which diminishes dependence on the annual mark-recapture project by incorporating various indices of abundance and biological data, including catch, mark-recapture abundance estimates, survey, and fishery CPUE, as well as survey length and age composition data.<br><br>In the SSEI Subdistrict, the annual harvest target (AHO) for 2023 was established at 291.8 metric tons, identical to the AHO for 2022. An annual longline survey is done by SSEI to provide biological data and relative abundance statistics. In contrast to NSEI, the department does not now assess the total abundance of SSEI sablefish. Significant migration of sablefish into and out of the SSEI area undermines the concept of a closed population; therefore, Peterson mark-recapture estimations of abundance or exploitation rates are unfeasible for this fishery. The SSEI sablefish population is managed according to relative abundance trends derived from survey and fishery CPUE data, with biological data from surveys and fisheries that characterize the population's age and size structure and identify recruitment events.<br><br>**State of Alaska Management**<br>Alaska has three distinct internal water regions with state-regulated limited-entry commercial sablefish fisheries. The NSEI and SSEI (Southeast Region) along with the PWSA Inside District (Central Region) possess distinct seasons and GHLs. The CIA oversees a state-managed open-access sablefish fishery with a distinct GHL.<br><br>Since 1984, both the SSEI and NSEI sablefish fisheries in the Southeast Region have been regulated under a license limitation program. In 1994, the BOF instituted legislation that established an equal |

[205] https://www.psmfc.org/tsc-drafts/2024/ADFG_2024_TSC_Report.pdf

| | |
|---|---|
| **6.** | **The current state of the stock shall be defined in relation to reference points, relevant proxies, or verifiable substitutes that allow effective management objectives and targets to be set. Remedial actions shall be available and taken where reference points or other suitable proxies are approached or exceeded.** |

share quota system, whereby the annual GHL was distributed equally among permit holders, and the season was prolonged to facilitate a more orderly fishery. In 1997, the BOF instituted this equal share method as a permanent management strategy for both the NSEI and SSEI sablefish fisheries.

At the February 2009 BOF conference, no alterations were made to the regulation of commercial sablefish fisheries; however, bag and possession limits were instituted for the sablefish sport fishery. During the 2012 BOF meeting, a regulation was enacted mandating personal use and subsistence sablefish home fishing permits. Limits for personal use sablefish fishing, established at the 2015 Board of Fisheries meeting, include a bag restriction of 50 fish per permit, a vessel limit of 200 fish per vessel, and a hook limit of 350 per permit. In 2017, the CFEC sanctioned a public petition allowing SSEI longline permit holders to utilize pot gear in response to whale depredation and rockfish bycatch concerns, thereby converting the permit into a longline/pot permit.

The NSEI fishery was limited exclusively to longline gear during this period. In 2018, the BOF revised the SSEI sablefish longline and pot seasons to a concurrent period from June 1 to November 15, established new regulations mandating that commercial sablefish pots be equipped with two 4-inch circular escape rings, and permitted the possession of live sablefish for delivery as a live product. In 2018, the BOF approved the utilization of pots in the personal use sablefish fishery, imposing a restriction of two pots per individual and eight pots per vessel. In 2022, the BOF and CFEC sanctioned a public petition allowing NSEI longline permit holders to utilize pot gear in response to whale depredation and rockfish bycatch concerns, so converting the permit into a longline/pot permit identical to SSEI. The BOF has decreased the size of the circular escape ring for commercial pots from 4 inches to 3.75 inches; likewise, all personal use and subsistence pots must include a minimum of two escape rings and tunnel eye holes with a diameter of 3.75 inches to conform to commercial pot standards.

The Southeast Outside District lacks an open-access sablefish fishery due to the limited regions inside state waters that are sufficiently deep to sustain sablefish populations. In certain regions of the Gulf, the state initiates the fishery simultaneously with the opening of the EEZ. The fisheries located in the CIA's North Gulf District and the Aleutian Island District have open access in state waters, as the state is currently unable to lawfully enforce IFQ management. The fishery GHLs are determined by historical catch averages and are suspended once these limits are attained.

In the Central Region, the CIA sablefish GHL is established based on a historical baseline harvest level, which is modified annually according to the proportional variation in the ABC of the federal CGOA. In 2004, the BOF implemented a sablefish fishery-specific registration, logbook mandate, and a 48-hour trip limit of 1.8 metric tons in the CIA. In 1996, PWSA implemented a limited-entry program that incorporated gear limits and defined vessel size classifications. From 1996 to 2014, the PWSA fisheries GHL was established at 110 metric tons, representing the midpoint of the harvest range determined by a habitat-based assessment. Tagging experiments performed by NMFS and ADF&G suggest that sablefish populations across the Gulf of Alaska, including Prince William Sound, are likely intermingled. Consequently, the GHL was modified by incorporating the annual relative variation in the NMFS GOA sablefish ABC, as determined by NMFS stock assessment surveys.

| | |
|---|---|
| **6.** | **The current state of the stock shall be defined in relation to reference points, relevant proxies, or verifiable substitutes that allow effective management objectives and targets to be set. Remedial actions shall be available and taken where reference points or other suitable proxies are approached or exceeded.** |
| | The GHL was modified starting in 2015 by utilizing the relative variation in the GOA-wide ABC for sablefish retroactively to 1994; this modification persisted into 2021. The PWSA fisheries management evolved through access limitation and, in 2003, transitioned into a shared quota system in which permit holders receive allocations of the GHL. Shares are uniform within each of the four vessel size categories but vary between categories. In 2009, the BOF implemented regulations that established a registration deadline, logbook maintenance, and catch reporting obligations; new season dates of April 15 to August 31 were also instituted. The new season opening date, now one month later than in previous years, was established to mitigate the risk of whale depredation on hooked sablefish, which primarily occurred before May 1.<br><br>The exclusive sablefish fishery in the Westward Region is located in the Aleutian Islands. The GHL for the Aleutian Islands is established at 5% of the aggregate Bering Sea Aleutian Islands ABC. Between 1995 and 2000, the fishing commenced simultaneously with the EEZ IFQ sablefish fishery. In 2001, the BOF revised the commencement date of the state-waters fishery to May 15, allowing small vessel operators to capitalize on potentially improved weather conditions. Between 1995 and 2000, all legal groundfish gear types were authorized for use in the fishery. As of 2001, longline, pot, jig, and hand troll were designated as the sole allowed gear types. Vessels engaged in the fishery must register and complete logbooks supplied by ADF&G. In 2013, the BOF altered the starting and ending dates of the season to align with the federal IFQ season.<br><br>6.4. Management actions shall be agreed to in the eventuality that data sources and analyses indicate that these reference points have been exceeded. Accordingly, contingency plans shall be agreed in advance to allow an appropriate management response to serious threats to the resource as a result of overfishing, adverse environmental changes, or other phenomena that may have adverse e on impacts on the fishery resource (Appendix 1, Part 2). Such measures may be temporary and shall be based on best scientific evidence available.<br><br>Although for both stocks, reference points have not been exceeded, there are mechanisms in place if reference points are exceeded.<br><br>**Pacific Halibut**<br>The IPHC's interim management procedure uses a relative spawning biomass of 30% as a fishery trigger, reducing the reference fishing intensity if relative spawning biomass decreases further toward a limit reference point at 20%, where directed fishing is halted due to the critically low biomass condition (Stewart and Hicks, 2024)<br><br>**Alaska Sablefish**<br>Sablefish are managed under Tier 3 of the NPFMC harvest control rule, which aims to maintain the population at B40%. Since projected female spawning biomass (combined areas) for 2024 is equivalent to B62%, sablefish is in sub-tier "a" of Tier 3. (NPFMC, 2024a, NPFMC, 2024b)<br>Tier 3 Information available: reliable point estimates of B, B40% , F35% , and F40% .<br>3a) Stock status: B/B40% > 1<br>FOFL = F35%<br>3b) Stock status: a < B/B40% ≤ 1<br>FOFL = F35% × (B/B40% – a)/(1 – a) |

| | | |
|---|---|---|
| **6.** | **The current state of the stock shall be defined in relation to reference points, relevant proxies, or verifiable substitutes that allow effective management objectives and targets to be set. Remedial actions shall be available and taken where reference points or other suitable proxies are approached or exceeded.** | |
| | 3c) Stock status: B/B40% ≤ a<br>FOFL = 0<br>For tier 3, the term B40% refers to the long-term average biomass that would be expected under average recruitment and F=F40%.<br><br>6.5 Measures shall be introduced to identify and protect depleted stocks and those stocks threatened with depletion, and to facilitate the sustained recovery/restoration of such stocks. Also, efforts shall be made to ensure that resources and habitats critical to the well-being of such stocks, which have received adverse impacts by fishing or other human activities, are restored.<br><br>The fishery reference points ensure that if the stocks become depleted there is a recovery plan – primarily through the reduction of fishing mortality (Stewart and Hicks, 2024; Goethel *et al.,* 2023). Similarly, for both stocks under consideration, NOAA identifies habitats essential for managed species and conserves habitats from adverse effects on those habitats[206].<br><br>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 and NPFMC must describe and identify EFH in fishery management plans (FMPs), minimize to the extent practicable the adverse effects of fishing on EFH, and identify other actions to encourage the conservation and enhancement of EFH. Federal agencies that authorize, fund, or undertake actions that may adversely affect EFH must consult with NMFS, and NMFS must provide conservation recommendations to federal and state agencies regarding actions that would adversely affect EFH. | |
| References: | ADFG. 2024. State of Alaska Groundfish fisheries associated investigations in 2023. Report prepared for the Sixty-fourth Annual Meeting of the Technical Subcommittee of the Canada-United States Groundfish Committee. 50 pages.<br>Goethel, D.R., Cheng, M.L.H., Echave, K.B., Marsh, C., Rodgveller, C.J., Shotwell, K., Siwicke, K. 2023. Assessment of the sablefish stock in Alaska. North Pacific Fishery Management Council, Anchorage, AK.<br>NPFMC. 2024a. Fishery Management Plan for the Groundfish fisheries of the Gulf of Alaska.<br>NPFMC. 2024b. Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area.<br>Stewart, I., Hicks, A. 2024. Assessment of the Pacific halibut (*Hippoglossus stenolepis*) stock at the end of 2023. IPHC-2024-SA-01. 39 p. | |
| Statement of consistency to the RFM Fishery Standard | | **The fishery continues to conform to the requirements of Fundamental Clause 6 of the RFM Fishery Standard** |

[206] https://www.fisheries.noaa.gov/national/habitat-conservation/essential-fish-habitat

### 7.9.2.4. Fundamental Clause 7. Precautionary approach

| | |
|---|---|
| **7.** | **Management actions and measures for the conservation of stock and the ecosystem shall be based on the precautionary approach. Where information is deficient a suitable method using risk management shall be adopted to consider uncertainty.** |
| Summary of relevant changes: | 7.1. The precautionary approach shall be applied widely to conservation, management, and exploitation of ecosystems to protect them and preserve the ecosystem. This should take due account of fishery enhancement procedures, where appropriate. Absence of scientific information shall not be used as a reason for postponing or failing to take conservation and management measures. Relevant uncertainties shall be taken into account through a suitable method of risk management, including those associated with the use of introduced or translocated species.<br>For both stocks under consideration the precautionary approach is used to protect stocks and preserve the ecosystem. That there are management measures in place and that these follow laws that dictate precautionary approach management are documented above.<br><br>The IPHC's interim management procedure uses a relative spawning biomass of 30% as a trigger, below which the reference fishing intensity is reduced (Stewart and Hicks, 2024). At a spawning biomass limit of 20%, directed fishing is halted due to the critically low biomass condition. Beginning with the 2019 stock assessment, this calculation has been based on recent biological conditions rather than a long-term static average. By using current weight-at-age and estimated recruitments that are influencing the current stock only, the 'dynamic' calculation measures the effect of fishing on the spawning biomass. The relative spawning biomass decreased continuously over the period 1992-2012 to near 30%. Since 2016, the relative spawning biomass has increased slightly to 42% at the beginning of 2023 (credible interval: 20-56%). This result indicates that recruitment and size-at-age have generally been more important to the trend in spawning biomass than fishing, particularly over the last few years. The probability that the stock is below the *SB30%* level is estimated to be 26% at the beginning of 2023, with a 1% chance that the stock is below *SB20%*. The Alaska Sablefish stock is managed using a Tier system, based on knowledge and uncertainties of the stock in question (the quality of the data, precision in the model). Sablefish harvest specifications are made annually by NPFMC (Goethel *et al.,* 2023) and include the Overfishing Level (OFL), acceptable biological catch (ABC), and total allowable catch (TAC). TACs are generally set more conservatively than ABCs, which in turn are generally set more conservatively than OFLs. Since OFLs are consistent with MSY and catches are generally within TAC levels, harvests tend to always be at the conservative side of MSY. As can be seen below, recent catches of Alaska sablefish have been well within recommendations, indicating that the harvest control rules continue to work well and within precautionary set limits. Sablefish have been managed under Tier 3 of NPFMC harvest rules.<br><br>**State of Alaska Management**<br>There are three separate internal water areas in Alaska which have state-managed limited-entry commercial sablefish fisheries (ADFG, 2024)[207]. The NSEI and SSEI (Southeast Region) and the PWS Inside District (Central Region) each have separate seasons and GHLs. In the Cook Inlet Area, there is a state- managed open access sablefish fishery with a separate GHL. In the Southeast Region both the SSEI and NSEI sablefish fisheries have been managed under a license limitation program since 1984.<br><br>In 1994 the BOF adopted regulations implementing an equal share quota system where the annual GHL was divided equally between permit holders and the season was extended to allow for a more orderly fishery. In 1997 the BOF adopted this equal share system as a permanent management |

[207] https://www.psmfc.org/tsc-drafts/2024/ADFG_2024_TSC_Report.pdf

| 7. | Management actions and measures for the conservation of stock and the ecosystem shall be based on the precautionary approach. Where information is deficient a suitable method using risk management shall be adopted to consider uncertainty. |
|---|---|

measure for both the NSEI and SSEI sablefish fisheries. During the February 2009 BOF meeting, the BOF made no changes affecting the regulation of commercial sablefish fisheries; however, bag and possession limits were established for the sablefish sport fishery. At the 2012 BOF meeting, a regulation was passed to require personal use and subsistence sablefish household fishing permits. Bag (50 fish per permit), vessel (200 fish per vessel) and hook (350 per permit) limits were adopted for personal use sablefish fishing at the 2015 BOF meeting.

In 2017, the CFEC approved a public petition for SSEI longline permit holders to fish pot gear due to whale depredation and rockfish bycatch issues, thus making the permit a longline/pot permit (ADFG, 2024). The NSEI fishery is restricted to longline gear only. In 2018, the BOF amended SSEI sablefish longline and pot seasons to a concurrent season occurring from June 1 to November 15, adopted new regulations to require commercial sablefish pots to have two 4-inch circular escape rings and allowed for the possession of live sablefish for delivery as a live product. In 2018, the BOF also approved the use of pots in the personal use sablefish fishery with a limit of two pots per person, 8 pots per vessel. There is no open-access sablefish fishery in the Southeast Outside District as there are limited areas that are deep enough to support sablefish populations inside state waters. In some areas of the Gulf, the state opens the fishery concurrent with the EEZ opening.

These fisheries, which occur in Cook Inlet Area's North Gulf District and the Aleutian Island District, are open access in state waters, as the state cannot legally implement IFQ management at this time (ADFG, 2024)[208]. The fishery GHLs are based on historic catch averages and closed once these have been reached. In Central Region, the Cook Inlet Area sablefish GHL (ADFG, 2024) is set using a historic baseline harvest level adjusted annually by the relative change to the ABC in the federal CGOA. In 2004, the BOF adopted a sablefish fishery-specific registration, logbook requirement, and 48-hour trip limit of 1.8 mt in the Cook Inlet Area. For PWS, a limited-entry program that included gear restrictions and established vessel size classes was adopted in 1996. Between 1996 and 2014, the PWS fishery GHL was set at 110 mt, which is the midpoint of the harvest range set by a habitat-based estimate. Tagging studies conducted by NMFS and ADF&G indicate that sablefish populations throughout GOA including PWS are likely mixed.

Therefore, the GHL was adjusted by applying the relative change each year in the NMFS GOA sablefish ABC, which is derived from NMFS stock assessment surveys. The GHL was adjusted beginning in 2015 by applying the relative change in the GOA-wide ABC for sablefish back to 1994; this adjustment continued in 2021. PWS fishery management developed through access limitation and in 2003 into a shared quota system wherein permit holders are allocated shares of the GHL. Shares are equal within each of four vessel size classes but differ between size classes. In 2009, the BOF adopted regulations which included a registration deadline, logbooks, and catch reporting requirements; new season dates of April 15August 31 were also adopted. The new season opening date, one month later than in previous years, was adopted to reduce the opportunity for whale depredation on hooked sablefish which predominately occurred prior to May 1.
The sole Westward Region sablefish fishery occurs in the Aleutian Islands (ADFG, 2024). The GHL for the Aleutian Islands is set at 5% of the combined Bering Sea Aleutian Islands TAC66. The state GHL can be adjusted according to recent state-waters harvest history when necessary. From 1995 to 2000 the fishery opened concurrently with the EEZ IFQ sablefish fishery. In 2001 the BOF changed the

[208] https://www.psmfc.org/tsc-drafts/2024/ADFG_2024_TSC_Report.pdf

| 7. | Management actions and measures for the conservation of stock and the ecosystem shall be based on the precautionary approach. Where information is deficient a suitable method using risk management shall be adopted to consider uncertainty. |
|---|---|

opening date of the state-waters fishery to May 15 to provide small vessel operators an opportunity to take advantage of potentially better weather conditions. From 1995 to 2000 all legal groundfish gear types were permissible during the fishery.

Effective in 2001, longline, pot, jig and hand troll became the only legal gear types. Vessels participating in the fishery are required to register and fill out logbooks provided by ADF&G. In 2013, the BOF changed the season opening and closing dates reverting them back to coincide with the federal IFQ season.

7.1.1. In implementing the PA, the fishery management organization shall take into account, inter alia, uncertainties relating to the size and productivity of the stocks, reference points, stock condition in relation to such reference points, levels and distribution of fishing mortality, the impact of fishing activities (including discards) on non-target and associated or dependent predators, and environmental and socioeconomic conditions.

**Pacific Halibut**

The stock assessment for Pacific halibut includes a broad representation of uncertainty in stock levels compared to assessments of many other species (Stewart and Hicks, 2023[209]). This is due to the inclusion of both within-model (parameter or estimation uncertainty) and among-model (structural) uncertainty. Given the many uncertainties in Pacific halibut biology and population dynamics, a high degree of uncertainty in stock scale and trends will continue to be part of the annual management process, leading to variable mortality limits each year.

Potential solutions to reduce this variability include multi-year management approaches, which are being tested within the MSE framework. Basic convergence checks for all models included successful calculation of the Hessian matrix, reasonable uncertainty in and correlations among estimated model parameters, and tracking of results through sequential model or data changes to ensure plausible outcomes. Final model runs were also tested using a wide range of starting values (jittering with at least 100 starting points), ensuring no model found a better likelihood than the one used in the final assessment.

A sensitivity analysis followed the stepwise introduction of new data in the 2023 stock assessment to isolate the data set with the largest effect on the results. The commercial fishery CPUE time series showed a strong drop in 2022 and 2023, which significantly impacted the lower spawning biomass estimates at the end of the time series (2020 onward). When the ensemble estimates excluded this data source, the results were more consistent with recent stock assessments. During the development of the 2022 stock assessment, extensive bridging and sensitivity analyses were conducted, which identified important sources of uncertainty.

Key contributors to estimates of population trend and scale included the sex ratio of commercial fishery landings, treatment of historical selectivity in long time-series models, and natural mortality. Likelihood profiles were used to explore sources of information on natural mortality and agreement among data sets. The 2022 assessment also evaluated the effect of the PDO as a covariate with average recruitment, though this had little impact on stock trend estimates, and no better method

[209] https://www.iphc.int/uploads/pdf/sa/2023/iphc-2023-sa-01.pdf

| 7. | Management actions and measures for the conservation of stock and the ecosystem shall be based on the precautionary approach. Where information is deficient a suitable method using risk management shall be adopted to consider uncertainty. |
|---|---|

was identified to explain historical variation. Research priorities linked to assessment uncertainties have been explored through sensitivity analyses in recent assessments. These analyses have considered the effects of unobserved whale depredation and trends in spawning output (due to skip spawning or changes in maturity schedules), leading to a focus on research into maturity, fecundity, and skip spawning.

**Alaska Sablefish**

The assessment of multiple forms of uncertainty is an integral part of the management procedure for Alaska Pacific Sablefish (Goethel et al.,2021)[210].

The NPFMC and SSC now request that all authors submit risk table analyses for all full stock assessments. The risk table approach is used to highlight externalities to the assessment that may indicate potential issues that should be considered when managers are determining future ABC recommendations, but which are not directly accounted for in the assessment model. In particular, high risk table scores can be used justify setting an ABC below the maximum permissible ABC (as determined from standard projections and the NPFMC harvest control rules). Risk table categories and associated examples of issues to consider are provided in Table 10 along with definitions of the risk table scores. Risk level is determined by evaluating the severity of four types of considerations that could be used to support a scientific recommendation to reduce the ABC from the maximum permissible.

These considerations are stock assessment considerations; population dynamics considerations; environmental and ecosystem considerations; and fishery performance considerations. Examples of the types of concerns that might be relevant include the following:

1. Assessment considerations
   a. Data-inputs: biased ages, skipped surveys, lack of fishery-independent trend data.
   b. Model fits: poor fits to fits to fishery or survey data, inability to simultaneously fit multiple data inputs.
   c. Model performance: poor model convergence, multiple minima in the likelihood surface, parameters hitting bounds.
   d. Estimation uncertainty: poorly estimated but influential year classes
   e. Retrospective bias in biomass estimates
2. Population dynamics considerations
   a. Decreasing biomass trend
   b. Poor recent recruitment
   c. Inability of the stock to rebuild.
   d. Abrupt increase or decrease in stock abundance.
3. Environmental/ecosystem considerations
   a. Adverse trends in environmental/ecosystem indicators
   b. Ecosystem model results
   c. Decreases in ecosystem productivity
   d. Decreases in prey abundance or availability e. Increases in predator abundance

[210] https://apps-afsc.fisheries.noaa.gov/refm/docs/2021/sablefish.pdf

**7. Management actions and measures for the conservation of stock and the ecosystem shall be based on the precautionary approach. Where information is deficient a suitable method using risk management shall be adopted to consider uncertainty.**

4. Fishery performance considerations
   a. Rapid change in fishing mortality by a gear type
   b. Change in fishery effort or catch-per-unit-effort (CPUE)
   c. Change in value of size categories resulting altered selectivity or spatial distribution.
   d. Change in regulations that affect fishery behavior.

**Table 10.** Risk table definitions and example scoring (Source: Goethel *et al.,* 2021).

| | *Assessment-related Considerations* | *Population Dynamics Considerations* | *Environmental/Ecosystem Considerations* | *Fishery Performance* |
|---|---|---|---|---|
| Level 1: Normal | Typical to moderately increased uncertainty/minor unresolved issues in assessment. | Stock trends are typical for the stock; recent recruitment is within normal range. | No apparent environmental/ecosystem concerns | No apparent fishery/resource-use performance and/or behavior concerns |
| Level 2: Substantially increased concerns | Substantially increased assessment uncertainty/ unresolved issues. | Stock trends are unusual; abundance increasing or decreasing faster than has been seen recently, or recruitment pattern is atypical. | Some indicators showing an adverse signals relevant to the stock but the pattern is not consistent across all indicators. | Some indicators showing adverse signals but the pattern is not consistent across all indicators |
| Level 3: Major Concern | Major problems with the stock assessment; very poor fits to data; high level of uncertainty; strong retrospective bias. | Stock trends are highly unusual; very rapid changes in stock abundance, or highly atypical recruitment patterns. | Multiple indicators showing consistent adverse signals a) across the same trophic level as the stock, and/or b) up or down trophic levels (i.e., predators and prey of the stock) | Multiple indicators showing consistent adverse signals a) across different sectors, and/or b) different gear types |
| Level 4: Extreme concern | Severe problems with the stock assessment; severe retrospective bias. Assessment considered unreliable. | Stock trends are unprecedented; More rapid changes in stock abundance than have ever been seen previously, or a very long stretch of poor recruitment compared to previous patterns. | Extreme anomalies in multiple ecosystem indicators that are highly likely to impact the stock; Potential for cascading effects on other ecosystem components | Extreme anomalies in multiple performance indicators that are highly likely to impact the stock |

<u>Assessment related considerations</u>

Data and model uncertainty are typically considered first under this category for a stock assessment, which can typically be summarized by data quality, data fits, and model diagnostics[211]. The sablefish assessment is data-rich and the quality of the data that goes into the model is generally considered to be quite high. For instance, it is one of the few stocks with a long-term dedicated survey (i.e., the longline survey) and multiple sources of age and size composition with high yearly sample sizes (e.g., > 1,000 otoliths aged per year for both the longline survey and fixed gear fishery (Goethel *et al*., 2021).

Given the breadth and quality of data, there are no data concerns for sablefish, especially considering that the longline survey was able to be completed in 2020 and 2021 despite ongoing limitations for other surveys due to the COVID-19 pandemic.

The sablefish assessment is one of only a few assessments in the North Pacific that is fit to multiple abundance indices, including fishery CPUE data. Although all indices now generally indicate population growth, there are varying signals on the rate of population increase. The longline survey abundance index (relative population numbers) increased 47%, 32%, and 9% year over year for the last three years. Similarly, the trawl survey biomass was at a time series low in 2013 but has increased

[211] https://apps-afsc.fisheries.noaa.gov/refm/docs/2021/sablefish.pdf

| 7. | Management actions and measures for the conservation of stock and the ecosystem shall be based on the precautionary approach. Where information is deficient a suitable method using risk management shall be adopted to consider uncertainty. |
|---|---|

almost five-fold since that time, with a 38% increase from 2019 to 2021. The fishery CPUE index was at the time series low in 2018 but increased 20% in 2019. Conflicting signals in the indices is expected, especially given that CPUE indices are impacted by socioeconomic factors, such as targeting. In addition, surveys like the GOA trawl survey that capture fish at earlier life stages will respond to large incoming recruitment events sooner than other indices that may better reflect the adult dynamics. However, all indices share common recent growth trends, while the model is able to fit these data quite well. Moreover, the age and length composition data continue to indicate strong year classes in 2014, 2016, 2017, and a potentially strong, albeit highly uncertain, 2018-year class. However, indications of extremely large recent year classes from the composition data conflicts to some degree with signals of overall population growth from the indices of abundance. These conflicting signals in the magnitude of recent recruitment events are an important source of model tension.

There are two main interpretations of these data: 1) recent recruitment is extremely large as indicated in the composition data, but survey indices are not increasing as fast as expected based on these recruitment events (model 16.5_Cont); 2) recent recruitment is very large but has also been accompanied by increasing availability of certain age classes to the various gears (model 21.12_Proposed_No_Skip_Spawn). Assuming the former (i.e., using model 16.5_Cont) leads to model estimates of recruitment that appear to be overly optimistic and that are eventually retroactively downgraded as more years of composition data become available, while also resulting in poor fits to the survey indices. Conversely, using the latter assumption (i.e., model 21.12_Proposed_No_Skip_Spawn) results in more consistent estimates of recruitment over time, albeit with an associated degradation in fit to the fixed gear fishery age composition data. However, it does appear that model 21.12_Proposed_No_Skip_Spawn is better able to account for cohort decay in the fishery age composition data. Thus, these results indicate that either recent year classes are smaller than it appears based solely on compositional data or fish in these recent year classes have lower survival to older ages (or are not being observed at as high of rates as expected).

Although there are clearly some diverging signals in the compositional and index data, there is general agreement that the population is increasing due to recent high recruitment.

The proposed model is able to adequately balance fitting the two data sources, though some uncertainty remains about the assumption utilized regarding the potential for increased availability of young, small fish to the fishery and survey (i.e., allowing a recent selectivity time block). Thus, until these recent cohorts have been observed for a number of years in the compositional data, there is moderate uncertainty regarding the size of the cohorts.

Despite some data conflicts, the suite of diagnostic analyses implemented demonstrate that the proposed sablefish assessment is robust and consistent. Retrospective patterns have been effectively eliminated. Thus, there are no longer any strong concerns about overestimating ABCs due to overestimated recent cohort strength. However, it is expected that the 2018-year class is being driven by the 2021 trawl survey and may be downgraded when the 2021 age composition data is included in next year's assessment. As such, projections may be slightly overoptimistic due to overestimation of the 2018-year class, but not to the extent observed for model 16.5_Cont.

As noted, there are a number of potential sources of process error for the assessment, such as lack of time varying natural mortality or fully time-varying selectivity. Although the proposed model is

| 7. | Management actions and measures for the conservation of stock and the ecosystem shall be based on the precautionary approach. Where information is deficient a suitable method using risk management shall be adopted to consider uncertainty. |
|---|---|

believed to better reflect rapidly changing sablefish dynamics, the potential mechanisms that may be driving changes in availability and associated selectivity are not well understood. Similarly, the current assessment model also does not account for spatial processes, because it assumes a single homogenous population across the entire Alaska federal management area. Despite there being a genetically panmictic population of sablefish throughout Alaskan waters, there is clear evidence of spatiotemporal heterogeneity in both the distribution of the resource and the removals. Although high movement rates and connectivity among regions may limit the potential for localized depletion of the resource, the lack of spatial structure in either fleet or population dynamics should be considered a source of potential assessment uncertainty in the current model.

In summary, the variety of data sources available for sablefish tend to show general agreement regarding population growth, and the proposed model is able to adequately fit all available data[212]. Moreover, retrospective patterns and recruitment estimation difficulties associated with previous sablefish models (16.5_Cont) have been greatly reduced. Although there is uncertainty in the magnitude of recent year classes, particularly the 2018 year class, there are no major assessment related concerns for sablefish at this time. Therefore, we rated the assessment related concern as 'level 1 – normal'.

Overall, productivity remains high, and the 2018 year class was estimated to be of similar magnitude as recent year classes, while there is evidence that the 2019 year class may also be large. Thus, what was originally identified as an anomalous and unprecedented 2014 year class during the 2017 assessment appears to be a proven, consistent, and encouraging trend. However, because of the uncertainty associated with estimating the size of the recent year classes, the systematic truncation of the age structure over the last decade, and uncertainty in how many of these new recruits will actually survive to become mature spawners, there is moderate population dynamics concerns. Hence, we rate the population dynamics as a 'level 2 – increased concern'.

Overall, indicators suggest stable temperatures at depth, moderate to warm surface temperature conditions, a mix of average to below average indicators of foraging conditions, no apparent increases in predation pressure, and reduction in potential competition due to juvenile sablefish moving off the shelf into adult slope habitat. Given that no major concerns are apparent for sablefish, we scored the environmental/ecosystem concern as 'level 1 – normal'.

Overall, the highest score for sablefish in 2021 is a 'Level 2—Increased Concern'. Since the SSC prefers not rating the risk table overall on the highest score, we also note that 2 of the 4 scores are Level 2 with the remaining 2 scores being categorized as a Level 1. Given the lack of major concerns for sablefish along with the improved model performance of the proposed assessment compared to the 2020 model, no deductions in ABC are being recommended. However, the lack of fish > 10 years of age for an extremely long-lived species is disconcerting. Additionally, the projected maximum ABC would represent the largest catch since the late 1980s and before that in the early 1970s. Both periods were associated with declines in biomass and SSB, due to high catches and extended periods of poor recruitment. Given that sablefish are such a long-lived species along with the cyclic nature of sablefish dynamics, exploration of a capped (i.e., implementing a maximum cap on the ABC) management procedure (or an 'inventory management' strategy) for sablefish may be worthwhile.

[212] https://apps-afsc.fisheries.noaa.gov/refm/docs/2021/sablefish.pdf

| 7. | Management actions and measures for the conservation of stock and the ecosystem shall be based on the precautionary approach. Where information is deficient a suitable method using risk management shall be adopted to consider uncertainty. |
|---|---|
| | Compared to using a maximum yearly catch strategy, capped HCRs could aid in stabilizing long-term sablefish dynamics (i.e., help to prevent long-term cyclical declines as the resource transitions between high and low recruitment regimes), while also maximizing economic metrics (i.e., years with high catch of larger, more valuable fish; Licandeo *et al.,* 2020). Similarly, alternate metrics of spawning potential, which better emphasize fully mature age classes (e.g., the biomass of ages > 10), could help maintain a strong spawning portfolio and avoid future contraction of the age structure, thereby improving resilience of the sablefish resource (Hixon *et al.,* 2014; Lowerre-Barbieri *et al.,* 2016; Licandeo *et al.,* 2020). |
| References: | ADFG. 2024. State of Alaska Groundfish fisheries associated investigations in 2023. Report prepared for the Sixty-fourth Annual Meeting of the Technical Subcommittee of the Canada-United States Groundfish Committee. 50 pages.<br>Goethel, D.R., Cheng, M.L.H., Echave, K.B., Marsh, C., Rodgveller, C.J., Shotwell, K., and Siwicke, K. 2023. Assessment of the sablefish stock in Alaska. North Pacific Fishery Management Council, Anchorage.<br>Goethel, D.R.,Hanselman, D.H., Rodgveller, C., Echave, K.B., Williams, B.C., Shotwell, S.K., Sullivan, J.Y., Hulson, P.F., Malecha, P.W., Siwicke, K.A., and Lunsford, C.R. 2021. Assessment of the sablefish stock in Alaska. North Pacific Fishery Management Council, Anchorage, AK.<br>Hixon, M.A., Johnson, D.W., and Sogard, S.M. 2014. BOFFFFs: on the importance of conserving old-growth age structure in fishery populations. ICES J. Mar. Sci. 71(8): 2171-2185.<br>Licandeo, R., Duplisea, D.E., Senay, C., Marentette, J.R., and McAllister, M.K. 2020. Management strategies for spasmodic stocks: a Canadian Atlantic redfish fishery case study. Can. J. Fish. Aquat. Sci. 77(4): 684-702.<br>Lowerre-Barbieri, S., DeCelles, G., Pepin, P., Catalan, I.A., Muhling, B., Erisman, B., Cadrin, S.X., Ospina-Alvarez, A., Stachura, M.M., Tringali, M.D., Burnsed, S.W., and Paris, C.B. 2016. Reproductive resilience: a paradigm shift in understanding spawner-recruit systems in exploited marine fish. Fish Fish. 18(2): 285-312.<br>Stewart and Hicks. 2023. Assessment of the Pacific halibut (Hippoglossus stenolepis) stock at the end of 2022. IPHC-2023-SA-01.<br>Stewart, I., and Hicks, A. 2024. Assessment of the Pacific halibut (Hippoglossus stenolepis) stock at the end of 2023. IPHC-2024-SA-01. 39 p. |
| Statement of consistency to the RFM Fishery Standard | **The fishery continues to conform to the requirements of Fundamental Clause 7 of the RFM Fishery Standard** |

### 7.9.3. Section C: Management Measures, Implementation, Monitoring, and Control

#### 7.9.3.1. Fundamental Clause 8. Management measures

| | |
|---|---|
| **8.** | **Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.** |
| Summary of relevant changes: | 8.1 Conservation and management measures shall be designed to ensure the long-term sustainability of fishery resources at levels which promote optimum utilization, and are based on verifiable and objective scientific and/or traditional, fisher, or community sources**.**<br>**EVIDENCE:**<br>The components of the IPHC's management system for the Pacific halibut fishery at the binational level for the IPHC's Regulatory Areas (and NPFMC national level for the GOA and BSAI Areas) continued to reflect various long-term and short-term objectives as prescribed by established statutes, rules, and measures. The Pacific halibut fishery is managed collaboratively between the IPHC, the NPFMC and NOAA - NMFS[213]. The processes remain highly integrated and timed throughput the year to allow for an assortment of scientific, economic, and social data to be collected. modelled and evaluated against various management objectives. Established rules continue to be applied and result in annual adjustments to the FMPs for the GOA and BSAI[214]. The plans themselves are composites of several sub-plans such as those for (i) at-sea observer deployments, (ii) electronic monitoring, (iii) ecosystem management, and (iv) research. The IPHC continues to add to its Management Strategy Evaluation (MSE) process[215] with the aim of developing a formal process of evaluating existing and 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.<br><br>**NPFMC**<br>The Council's annual groundfish harvest specifications process is to apply the harvest strategy to the best available scientific information to derive annual harvest specifications. The Council's Groundfish Plan Teams and Scientific and Statistical Committee (SSC) use stock assessments to calculate biomass, overfishing levels, and acceptable biological catch (ABC) limits for each species or species group for specified management areas. Overfishing levels and ABCs provide the foundation for the Council and NMFS to develop the total allowable catch (TAC) for each species or species group[216,217]. Overfishing levels and ABC amounts reflect fishery science, applied in light of the requirements of the FMPs. The TACs recommended by the Council are either at or below the ABCs. The sum of the TACs for each area (the BSAI or GOA) is constrained by the optimum yield established for that area. The annual harvest specifications also set or apportion the prohibited species catch (PSC) limits.<br><br>**NPFMC and NOAA - NMFS**<br>The groundfish fisheries in Federal waters off Alaska are managed under the FMP for Groundfish of the BSAI and the FMP for Groundfish of the GOA[218] In these areas, groundfish harvests are managed subject to annual limits on the amounts of each species of fish, or of each group of species, that may be taken. The fishery is a closed access fishery managed under an Individual Fishing Quota (IFQ) system. |

[213] https://www.iphc.int/fisheries/commercial-fisheries/
[214] https://www.npfmc.org/library/fmps-feps/
[215] https://www.iphc.int/research/management-strategy-evaluation/#:~:text=MSE%20uses%20a%20simulation%20tool,achieve%20the%20chosen%20management%20objectives.
[216] https://www.npfmc.org/wp-content/PDFdocuments/membership/SSC/SSChandbook.pdf
[217] https://www.npfmc.org/about-the-council/plan-teams/bsai-and-goa-groundfish/
[218] https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/alaska-groundfish-fisheries-management

| | |
|---|---|
| **8.** | **Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.** |

Each agency has a multi-year strategic plan that guides fisheries management decisions against a framework of long and short-term objectives that (i) support responsible and sustainable fisheries, (ii) promote economic viability across all sectors, (iii) recognize and respect indigenous treaty rights, and (iv) sustain dependent, rural communities.

**ADFG - ABoF**

Sablefish in federal waters are managed by regions to distribute exploitation. The acceptable biological catch (ABC) is apportioned between these regions and then allocated between gear types. A stock assessment is performed annually for the federal fishery using an age-structured model; this assessment is reviewed by the North Pacific Management Council. The sablefish fishery's management plan for 2022 for the state's NSEI and SSEI subdistricts included a small number of regulatory provisions and rules as needed to ensure that management measures reflected decisions made and were legally binding and enforceable[219,220]. Typically, these included changes to fleet and area allocation tables, fishing gear characteristics, quota sharing, bycatch provisions, area closures, opening and closing dates etc.

8.1.1. When evaluating alternative conservation and management measures, the fishery management organization shall consider their cost-effectiveness and social impact.

All federal and state management agencies are required by their enabling statutes, practices and policies to consider the cost effectiveness and social impacts of potential new or modified management measures. National Standard 8 of the MSA requires that conservation and management measures take into account the importance of fishery resources to fishing communities by utilizing economic and social data that are based upon the best scientific information available[221].

The NPFMC is required to analyze potential economic, social, and/or biological impacts of proposed regulatory changes in support of Council initiatives to develop and modify management programs for the Federal groundfish fishery off Alaska. Using the NEPA process, implicated agencies evaluate the environmental and related social and economic effects of their proposed actions. Agencies also provide opportunities for public review and comment on those evaluations[222].

The U.S. Presidential Executive Order 12866 (1993) requires benefit-cost analysis for any new regulation that is "economically significant," which is defined as having "an annual effect on the economy of $100 million or more or adversely affecting in a material way the economy, a sector of the economy, productivity, competition, [or] jobs," or creating an inconsistency with other law, or any of several other conditions[223]. Executive Order 13563 (2011) requires agencies to quantify anticipated benefits and costs of proposed rulemakings as accurately as possible using the best available techniques[224].

[219] https://www.adfg.alaska.gov/FedAidPDFs/RIR.1J.2022.18.pdf
[220] https://www.adfg.alaska.gov/FedAidPDFs/RIR.1J.2022.18.pdf
[221] https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&SID=6b0acea089174af8594db02314f26914&mc=true&r=SECTION&n=se50.12.600_1345
[222] https://www.npfmc.org/wp-content/PDFdocuments/CM/2017/021717/CompanionManual.pdf
[223] https://www.archives.gov/files/federal-register/executive-orders/pdf/12866.pdf
[224] https://www.federalregister.gov/reader-aids/office-of-the-federal-register-announcements/2011/02/executive-order-13563-and-incorporation-by-reference

| | |
|---|---|
| **8.** | **Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.** |

8.1.2. Responsible fisheries management organizations shall adopt and implement measures necessary to ensure the management of bycatch and reduction of discards as part of fisheries management [1] in accordance with the PA, as reflected in Article 6 of the UN Fish Stocks Agreement, and as set out in Article 6.5 and 7.5 of the Code; [2] in accordance with the responsible use of fish as set out in the Code; and [3] based on the best scientific evidence available, taking into account fishers' knowledge.

**Pacific Halibut Fishery - bycatch and discards**

When situations arise that would give cause for concern, the IPHC's regulations provide for in-season actions that may include, but are not limited to, establishment or modification of the following: (a) closed areas; (b) fishing periods; (c) fishing period limits; (d) gear restrictions; (e) recreational (sport) bag limits; (f) size limits; or (g) vessel clearances[225]. The regulations further require that all Pacific halibut that are caught but not retained shall be immediately released outboard of the roller and returned to the sea with a minimum of injury by: (a) hook straightening; (b) cutting the gangion near the hook; or (c) carefully removing the hook by twisting it from the Pacific halibut with a gaff.

Other measures that are available to manage bycatch and discard occurrences include modifications to: (a) fishing period, (b) closed areas, (c) gear types and restrictions, and (d) size limit.

The NPFMC reports that Pacific halibut are taken as bycatch by vessels using all types of gear (trawl, hook-and-line, pot, and jig gear) in both the GOA and BSAI areas but primarily occurs in the trawl and hook-and-line groundfish fisheries[226]. Regulations require that all halibut caught incidentally in groundfish fisheries must be discarded, regardless of whether the fish is living or dead. Halibut bycatch is controlled in the groundfish fisheries using prohibited species catch (PSC) limits for specific target fisheries, gear types, and seasons. Groundfish fishing is prohibited once a halibut PSC limit has been reached for a particular sector or season, and in some years, this has resulted in the closure of specific groundfish fisheries prior to harvesting the total allowable catch (TAC) for the year.

**Sablefish Fishery - bycatch and discards**

Sablefish discards in groundfish target fisheries are highest in the hook and line along with trawl gear types, but the predominant source varies over times and across regions. In both the BSAI and GOA in recent years, trawl gears have constituted the primary source of discards. (Goethel *et al.,* 2023) Generally, discards of sablefish in pot gear in non-sablefish fisheries has been low (pot includes halibut and Pacific cod targeting).

Bycatch of targeted groundfish in the sablefish fishery has consistently been dominated by GOA shortspine thornyhead, rockfish, and sharks (Witherell and Fey, 2023; Goethel *et al.,* 2023). On average 75% of the shortspine thornyhead are retained and none of the shark. There is also substantial bycatch of GOA shortraker rockfish and arrowtooth flounder. The next most abundant species are GOA other skates, longnose skate, and GOA rougheye rockfish.

Habitat areas of particular concern (HAPC) biota and non-target species are also caught in the sablefish fishery as bycatch (Goethel *et al*., 2023). Every year the highest bycatch group are grenadiers. The

[225] https://www.iphc.int/uploads/2024/02/IPHC-Fishery-Regulations-2024-5-Feb.pdf
[226] https://www.npfmc.org/fisheries-issues/bycatch/halibut-bycatch/

| | | |
|---|---|---|
| **8.** | **Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.** | |
| | | predominant prohibited species catch (PSC) in the BSAI sablefish fisheries is golden king crab, of which nearly all are caught in pot gear. Other crab species catches are highly variable. Pacific halibut PSC is mostly in the GOA hook and line fishery.<br><br>Under current NOAA regulations, release of any sablefish by the sablefish IFQ fishery is prohibited so long as there is remaining IFQ for persons onboard the fishing vessel. Unusually large year classes of sablefish since 2014 have led to increased fishery catches of small sablefish with much lower economic value than more desirable (i.e., larger) market categories. The NPFMC initiated action to consider allowing sablefish to be released by the IFQ fishery, prior to filling their quota, in December 2019. The NPFMC conducted an initial review of the sablefish release allowance during its February 2021 meeting. While the intent of this action was to allow fishermen to release small sablefish, the elements/options did not include a size limit for sablefish or a mechanism for release mortalities to be deducted from IFQ accounts in-season.<br><br>At the February 2021 NPFMC meeting, the Council suspended further action on this issue and requested that the IFQ Committee provide recommendations on the action's relative priority[227]. The IFQ Committee's report to the Council in April 2021 indicated that the sablefish release allowance continued to be a high priority for the majority of the IFQ fleet. Given these recommendations, the Council made a motion at their October 2021 meeting to prepare and schedule for Council consideration of a small sablefish release Initial Review document when time and resources allowed.<br><br>At the June 2024 meeting, the Council proposed a preliminary preferred alternative for the release of small sablefish, incorporating modifications to the purpose and need statement as well as the alternatives[228]. The proposed action would permit the release of sablefish measuring under 22 inches in total length within the IFQ and CDQ fixed gear fisheries and establish a new incidental harvest allowance (ICA) for sablefish that are not kept. The proposed measure, progressing through the Council process since 2018, addresses the reduced economic worth of small sablefish that have overwhelmed commercial catches in recent years.<br><br>The suggested action encompasses many alternatives for the Council and factors evaluated in the analysis. During this meeting, the Council rescinded an option permitting the voluntary release of sablefish of any size. The Council also eliminated the opportunity to include a sunset provision for this measure. The Council also recommended the establishment of careful release rules for fixed gear sablefish fisheries, although this recommendation was not incorporated into its PPA.<br><br>The analysis outlined the implementation aspects that must be taken into account for advancing this step. A discard mortality rate (DMR) will be implemented for discarded sablefish. The SSC would endorse this DMR during its yearly harvest standards process, and it would be utilized in both the sablefish stock assessment and the in-season management of the fishery. To address sablefish that are not maintained in the fishery, NMFS must adopt either one or two distinct ICAs. The prospective effects of the establishment of these ICAs and the individuals impacted will be elaborated upon in the subsequent iteration of the analysis. |

[227] https://www.npfmc.org/february-2021-newsletter/
[228] https://www.npfmc.org/june-2024-newsletter/

| | |
|---|---|
| **8.** | **Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.** |

The study, incorporating amendments from SSC and Council discussions, will be subject to final action at a subsequent meeting.

8.2.The fishery management organization shall prohibit dynamiting, poisoning, and other similar destructive fishing practices.
The U.S. Code of Federal Regulations prohibits destructive fishing practices by stipulating what type of fishing gear may be used within the U.S. EEZ. Subparts 679.2 and 679.24 of Part 679, Title 50, Chapter VI define the types of authorized fishing gear that may be used and the limitations therein, respectively.

The only gears allowed for use in the IPHC fishery are hook and line gear with the exception of Pacific halibut taken with longline or single pot gear if such retention is authorized by NOAA Fisheries. All other gears and methods are strictly prohibited. There is no allowance for any destructive fishing practice such as dynamiting and poisoning in Alaska or in US waters[229].

The GOA and BSAI FMPs and Federal regulations make clear that the only legal gears for taking sablefish in Alaska are those that are authorized by the CFR Title 50, Chapter VI, Part 679 (Fisheries of the EEZ off Alaska), subparts 679.2 (Authorized gear) and 679.24 (Gear limitations) (NPFMC, 2024a, NPFMC, 2024b). No destructive practices such as dynamite or poison are permitted, nor is there any evidence that such gears are being used illegally.

8.3. The fishery management organization shall seek to identify domestic parties having a legitimate interest in the use and management of the fishery. When deciding on use, conservation, and management of the resource, due recognition shall be given, where relevant, in accordance with national laws and regulations, to the traditional practices, needs, and interests of indigenous people and local fishing communities which are highly dependent on these resources for their livelihood. Arrangements shall be made to consult all the interested parties and gain their collaboration in achieving responsible fisheries.

**IPHC**
The Commission currently apportions the quota shares for the halibut fishery among commercial, sport and personal use subsistence sectors coastwise in the US and Canada[230]. The NPFMC, on the other hand, is responsible for allocation of the halibut resource among user (e.g., commercial, sport, customary) groups in Alaska waters. ADFG licenses anglers and sport fishing businesses and guides, monitors and reports on sport and subsistence harvests, and assists federal agencies with preparation of regulatory analyses in Alaska waters.

The Conference Board (CB) is a panel representing Canadian and American commercial and sport halibut fishers. Created in 1931 by the Commission, the Board gives the IPHC the fishers' perspective on Commission proposals presented at Annual Meetings in January. Members are designated by union and vessel owner organizations from both nations[231]. As of 2021 there were 66 representative members and two officers in the CB34.

[229] https://www.ecfr.gov/current/title-50/chapter-VI/part-679
[230] https://www.adfg.alaska.gov/index.cfm?adfg=halibut.management
[231] https://www.iphc.int/about/structure-of-the-commission/

| | |
|---|---|
| **8.** | **Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.** |

The Processor Advisory Board (PAB) represents halibut processors. Like the Conference Board, PAB lends its opinion regarding Commission proposals and offers recommendations at IPHC Annual Meetings.

**NPFMC**

The Council is responsible for allocation of the sablefish resource among user groups in Alaska waters. In addition, the Alaskan Board of Fisheries (ABoF)[232] public meetings process provides a regularly scheduled public forums for all interested individuals, fishermen, fishing organizations, environmental organizations, Alaskan Native organizations, and other governmental and non-governmental entities that catch sablefish off Alaska to participate in the development of legal regulations for fisheries.

The Western Alaska Community Development Quota (CDQ) Program created by the NFMC in 1992 provides western Alaska communities opportunities to participate in the BSAI fisheries. There are 65 communities participating in the program[233]. The Gulf of Alaska parallel to the CDQ program is the Community Quota Entity Program, which authorizes 45 eligible communities in areas 2C, 3A and 3B and one community in the Aleutian Islands to form Community Quota Entities (CQEs) that may purchase commercial halibut and sablefish quota share (QS) for lease to community residents. The overarching purpose of this program is to remedy barriers to participation in remote coastal communities and to provide these communities with long-term opportunities to access the halibut and sablefish resources.

The Council formed the Community Engagement Committee in June 2018[234] to identify and recommend strategies for the Council to provide effective community engagement with rural and Alaska Native communities. The Community Engagement Committee develops tools and processes to facilitate improved communication and understanding between rural communities and tribes and the Council.

**Alaska**

At the state level, Advisory committees (AC) are local groups that meet to discuss fish and wildlife issues, provide a local forum for those issues, and make recommendations to the ABoF[235]. Their purpose as established by the Joint Board of Fisheries and Game includes developing regulatory proposals, evaluating regulatory proposals, and making recommendations to the appropriate fish or game board, providing a local forum for fish and wildlife conservation and use, including matters relating to habitat, consulting with individuals, organizations, and agencies. The regulations governing the advisory committee are 5 AAC Chapters 96 and 97[236,237]. More than 700 Alaskans belong to 84 advisory committees up and down the coast and throughout the interior, arctic and southcentral. It is through these individuals that the ABoF develops regulations that are responsive to local needs.

[232] https://www.adfg.alaska.gov/index.cfm?adfg=fisheriesboard.main
[233] https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/community-development-quota-cdq-program
[234] https://www.npfmc.org/june-2022-newsletter/
[235] https://www.adfg.alaska.gov/index.cfm?adfg=process.advisory
[236] https://www.law.cornell.edu/regulations/alaska/title-5/part-6/chapter-96
[237] https://www.law.cornell.edu/regulations/alaska/5-AAC-97-005

| | |
|---|---|
| **8.** | **Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.** |
| | 8.4. Where excess capacity exists, mechanisms shall be established to reduce capacity to levels commensurate with sustainable use of the resource. Fleet capacity operating in the fishery shall be measured and monitored. The fishery management organization shall maintain, in accordance with recognized international standards and practices, statistical data, updated at regular intervals, on all fishing operations and a record of all authorizations to fish allowed by them.<br>**Pacific Halibut**<br>The Halibut fishery in Alaska is a closed access fishery managed using an IFQ system[238]. The number of vessels participating in the fleet has decreased significantly since implementation of the IFQ program in the mid 1990's. Annually, NMFS issues eligible QS holders an IFQ fishing permit that authorizes participation in the IFQ fisheries. Those to whom IFQ permits are issued may harvest their annual allocation at any time during the eight plus-month IFQ halibut and sablefish seasons. NMFS monitors allocations and subsequent landings.<br><br>**Sablefish**<br>Amendment 20 to the GOA FMP and Amendment 15 to the BSAI FMP established IFQ management for sablefish beginning in 1995[239]. These amendments also allocated 20% of the fixed gear allocation of sablefish to a CDQ reserve for the BSAI. According to NOAA, since the implementation of IFQs, the number of longline vessels with sablefish IFQ harvests experienced a substantial anticipated decline from 616 in 1995 to 362 in 2011 (Goethel *et al*., 2020). This decrease was expected as shareholders have consolidated their holdings and fish them off fewer vessels to reduce costs.<br><br>IFQ management has increased fishery catch rates and decreased the harvest of immature fish. Catching efficiency (the average catch rate per hook for sablefish) increased 1.8 times with the change from an open access to an IFQ fishery (Goethel *et al*., 2020). The change to IFQ also decreased harvest and discard of immature fish which improved the chance that these fish will reproduce at least once. Thus, the stock can provide a greater yield under IFQ at the same target fishing rate because of the selection of older fish.<br><br>All the federal IFQ fisheries and the three major state fisheries are limited access fisheries. Exploitation is regulated and controlled through TACs in federal fisheries and GHL/TACs in state fisheries. None of these fisheries is considered depleted or overexploited.<br><br>The number and size of fishing vessels involved in Alaskan fisheries is recorded and reported annually by NMFS/AFSC. In the years after IFQ was implemented, the average annual decrease in the number of active vessels fishing Pacific halibut was about 4%, with 863 active vessels in the halibut IFQ fishery in 2016, compared to 2,060 in 1995. This demonstrates a clear ability to control and reduce capacity as necessary.<br><br>According to NOAA, since the implementation of IFQs, the number of longline vessels with sablefish IFQ harvests experienced a substantial anticipated decline from 616 in 1995 to 362 in 2011 (Goethel |

[238] https://www.npfmc.org/fisheries-issues/catch-shares-allocations/ifq/
[239] https://meetings.npfmc.org/CommentReview/DownloadFile?p=d57b49c4-592e-4a88-9202-07e1b923daa9.pdf&fileName=B1%20IFQ%20Amendment%20Summaries.pdf

| | |
|---|---|
| **8.** | **Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.** |

*et al.,* 2021). This decrease was expected as shareholders have consolidated their holdings and fish them off fewer vessels to reduce costs.

Both federal and state permitting agencies maintain records on all fishing operations as well as records of all authorizations to fish allowed by them.

8.4.1 Studies shall be promoted that provide an understanding of the costs, benefits, and effects of alternative management options designed to rationalize fishing, especially options relating to excess fishing capacity and excessive levels of fishing effort.

**Halibut**

The IPHC's Economic Research Program provides stakeholders with an accurate and all-sectors-encompassing assessment of the socioeconomic impact of the Pacific halibut resource that includes the full scope of Pacific halibut's contribution to regional economies of Canada and the U.S.A[240]. To that end, the IPHC developed the Pacific Halibut Multiregional Economic Impact Assessment (PHMEIA) model that informs stakeholders on the importance of the Pacific halibut resource and fisheries to their respective communities, but also broader regions and nations, and contributes to a wholesome approach to Pacific halibut management that is optimal from both biological and socioeconomic perspective, as mandated by the Convention (Hutnizcak, 2021).

**Sablefish**

For federally-managed fisheries, the MSA's National Standard 7 requires that conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication[241]. When considering alternative management measures, the Standard's guidance requires that the measures should not impose unnecessary burdens on the economy, on individuals, on private or public organizations, or on Federal, state, or local governments. Factors such as fuel costs, enforcement costs, or the burdens of collecting data may well suggest a preferred alternative. The guidance also calls for supporting analyses to demonstrate that the benefits of fishery regulation are real and substantial relative to the added research, administrative, and enforcement costs, as well as costs to the industry of compliance. In determining the benefits and costs of management measures, each management strategy considered and its impacts on different user groups in the fishery should be evaluated.

Finally, federally-managed fisheries for which amendments are proposed are subject to a formal review process that includes public inputs. The NEPA process is invoked to account for a variety of environmental impacts that include socioeconomic impacts and analyses of the alternative measures' options under consideration[242]. This would extend to any possible fishery rationalization impacts.

8.5. Technical measures regarding the stock under consideration shall be taken into account, where appropriate, in relation to fish size, mesh size, gear, closed seasons or areas, areas reserved for particular (e.g., artisanal fisheries), and protection of juveniles or spawners.

**Pacific Halibut**

[240] https://iphc.int/management/research-and-monitoring/economic-research
[241] https://www.ecfr.gov/current/title-50/chapter-VI/part-600/subpart-D/section-600.340
[242] https://www.fisheries.noaa.gov/topic/laws-policies/national-environmental-policy-act

| | |
|---|---|
| **8.** | **Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.** |
| | Updated IPHC regulations covering the directed halibut fisheries (commercial and sport) can be found on the IPHC website[243]. The full suite of NMFS fishery regulations for Alaskan waters can be found on their website[244]. Concerning specific technical measures, a brief summary by category, as contained in these IPHC regulations, is show below.<br><br>Fishery regulations include vessel licensing, provisions for in-season actions to establish or modify current management measures, seasonal closures per regulatory areas, other closed areas, IFQ and CDQs shares specifications, fishing period limits, size limits (currently 32 inches with head on, 24 inches with head off), careful release specifications for non-retained halibut, logbooks for any vessels above 27 feet in length, fishing gear allowed (main gear being hook and line but single pot extensions for sablefish exist), supervision of unloading and weighing of halibut by authorized officers, retention of tagged halibut, customary, traditional and aboriginal fishing catches, and sport fishing regulations. Such measures are meant for the protection of the entire halibut stock, including adult and juveniles, taking into account commercial, sport and traditional, customary users.<br><br>Incidental halibut catch is controlled in the groundfish fisheries (i.e., non-halibut-sablefish IFQ fisheries) using PSC limits in the GOA and the BSAI. Areas closed to halibut fishing are defined in IPHC regulations and include specific waters in the Bering Sea in Isanotski Strait[245]. A large number of areas in GOA and BSAI waters are closed to trawling (and thus to halibut bycatch outside the directed fisheries) NPFMC, 2024a, NPFMC, 2024b). Details on these closures for habitat protection are available on the NPFMC website.<br><br>Further to these, trawl sweep gear modification has been required by the Council for the trawl flatfish fisheries in the Bering Sea and the central Gulf of Alaska. Elevating devices (e.g., discs or bobbins) are required to be used on the trawl sweeps, to raise the sweeps off the seabed and limit adverse impacts of trawling on the seafloor. Such modifications have been shown to be effective in limiting habitat damage as well as unobserved mortality of crab species.<br><br>**Sablefish**<br>A summary of the NPFMC management measures that govern the GOA and BSAI groundfish fisheries[246,247] are contained in the FMPs and are summarized below.<br><br>Fish size. The fishery is primarily managed through IFQ and through Maximum Retainable Allowances for other fisheries to account for incidental catches of sablefish in those fisheries. Minimum size requirements are not currently in use. However, a recent discussion paper on sablefish discard allowance (Armstrong and Cunningham, 2018) provides information on biological and economic impacts for introducing minimum size regulations for sablefish. In 2018, there was a marked increase in sablefish landings for small (1-3 pound) sablefish in the BSAI fisheries, most notably the midwater pollock fishery, and an associated large decrease in value for these same sized fish (Armstrong and Cunningham, 2018). |

[243] https://www.iphc.int/uploads/2024/02/IPHC-Fishery-Regulations-2024-5-Feb.pdf
[244] https://www.fisheries.noaa.gov/alaska/rules-and-regulations/regulations-acts-treaties-and-agreements-federal-fisheries-alaska
[245] https://www.iphc.int/uploads/2024/02/IPHC-Fishery-Regulations-2024-5-Feb.pdf
[246] https://www.npfmc.org/wp-content/PDFdocuments/fmp/GOA/GOAfmp.pdf
[247] https://www.fisheries.noaa.gov/management-plan/groundfish-bering-sea-and-aleutian-islands-management-plan

| | | |
|---|---|---|
| **8.** | **Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.** | |
| | | Gear. Sablefish in Alaska are caught with longline, pot and bottom trawl gear(NPFMC, 2024a, 2024b). In short, longliners use streamer lines to avoid seabird bycatch, demersal trawls are required to carry raised bobbins when targeting flatfish and cod in the BSAI and the Central GOA. Research has demonstrated that this gear modification reduces unobserved mortality of Red king crab, Tanner crab, and Snow crab, reducing contact with the ocean floor by as much as 90%. In addition to this there are extensive habitat closures in Alaska. Pot gear carry biodegradable panels to avoid ghost fishing in case of gear loss, as well as escape rings in State fisheries. Mesh size for the relevant gear is specified in CFR regulation 679 (on the management of fisheries within Alaska's EEZ).<br><br>Closed seasons/areas. In 1995, Individual Fishery Quotas (IFQ) were implemented for hook-and-line vessels along with an 8- month season. The season dates have varied by several weeks since 1995, but the monthly pattern has been from March to November with the majority of landings occurring in May - June. Extensive trawl closures have been implemented to protect benthic habitat or reduce bycatch of prohibited species (i.e., salmon, crab, herring, and halibut) in the BSAI and GOA. Seasonal closures are used to reduce bycatch by closing areas where and when bycatch rates had historically been high. Over 95% of the AI management area is closed to bottom trawling (277,100 $nm^2$). With the Arctic FMP closure included (an area roughly 150,000 sq $nm^2$), almost 65% of the U.S. EEZ off Alaska is closed to bottom trawling.<br><br>Artisanal fisheries. At the time the Federal Government began the IFQ program, the State established two minor fisheries in Cook Inlet and the Aleutian Islands, so that open-access fisheries were available to fishermen that were not allowed to participate in the IFQ program. Three major state fisheries exist which are limited entry and are located in Prince William Sound, Chatham, and Clarence Strait[248].<br><br>8.5.1 Appropriate measures shall be applied to minimize catch, waste, and discards of non-target species (both fish and non-fish species), and impacts on associated, dependent, or endangered species. The MSA requires that bycatch be minimized to the extent practicable. In the Alaska Region, the NPFMC and NOAA Fisheries have adopted measures to limit the catch of species taken incidentally in groundfish fisheries. Certain species are designated as "prohibited species" in the fishery management plans because they are the target of other, fully utilized domestic fisheries. Prohibited species catch (PSC) include Pacific halibut[249].<br><br>As documented in Supporting Clause 8.5, a number of management measures are in place in the Pacific halibut and Sablefish fisheries to minimize the catch, waste and discarding of non-target species and the impact of the fishery on associated, dependent, and ETP species[250]. Historically, only hook-and-line gear was allowed to target Pacific halibut. In recent years, vessels fishing with pot gear in certain areas or fisheries may retain Pacific halibut although this has been at very low levels. Commercial fishermen predominantly use bottom longlines (setlines), which minimally impact habitat. Setlines can incidentally catch seabirds, but widespread use of seabird avoidance devices (called streamers) in the fishery has reduced seabird bycatch by up to 90 percent per vessel. In general, the commercial Pacific halibut fishery is fairly selective in the fish it catches because of the size of hook needed to harvest |

[248] https://www.adfg.alaska.gov/index.cfm?adfg=fishresearch.sablefish
[249] https://www.npfmc.org/fisheries-issues/bycatch/halibut-bycatch/
[250] https://www.federalregister.gov/documents/2024/03/18/2024-05481/pacific-halibut-fisheries-catch-sharing-plan-2024-annual-management-measures#:~:text=For%202024%2C%20the%20IPHC%20adopted,entire%20season%3B%20and%203)%20a

| 8. | Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources. |
|---|---|

such a large fish. Using a large hook generally reduces bycatch of smaller fish. Fishermen use circle hooks to increase catch rates, and these hooks also improve the survival of any undersized Pacific halibut caught and released. Pacific halibut are also caught in commercial fisheries targeting other species. Regulations, such as gear and fishery restrictions, are in place to reduce bycatch of Pacific halibut in those fisheries.

This National Bycatch Reduction Strategy (2016) sets national-level objectives and actions for all of NOAA Fisheries' bycatch reduction programs across its science and management enterprise to better able to fulfill its statutory obligations[251]. The five objectives outlined below support the goal of national Strategy, to guide and coordinate NOAA Fisheries' efforts to reduce bycatch and bycatch mortality in support of sustainably managing fisheries and recovering and conserving protected species.

- Monitor and estimate the rates of bycatch and bycatch mortality in fisheries to understand the level of impact and the nature of the interaction.
- Conduct research to improve our bycatch estimates, understand the impacts of bycatch on species and community dynamics, and develop solutions to reduce bycatch and bycatch mortality.
- Conserve and manage fisheries and protected species by implementing measures to reduce bycatch and its adverse impacts.
- Enforce fishery management measures, including those aimed at reducing bycatch and bycatch mortality, to ensure compliance with applicable laws.
- Communicate to develop a common understanding of bycatch, to share information on our efforts to address bycatch, and to identify areas where we can improve.

In May 2016, NOAA issued the final rule to implement Amendment 111 to the BSAI Groundfish FMP[252]. The rule reduced bycatch limits, also known as prohibited species catch limits, for Pacific halibut in the BSAI by specific amounts in four groundfish sectors: (i) the Amendment 80 sector (non-pollock trawl catcher/processors); (ii) the BSAI trawl limited access sector (all non-Amendment 80 trawl fishery participants); (iii) the non-trawl sector (primarily hook-and-line catcher/processors); and (iv) the Western Alaska Community Development Quota Program.

NOAA's Action Plan for Fish Release Mortality Science (2016) has as its purpose to "guide NMFS science efforts related to reducing fish release mortality, improving estimates of release mortality, and better incorporating improved release mortality estimates into stock assessments and management processes (Benaka et al.,2016)." The goals of the Action Plan are to:

- Enable the use of planning tools to help managers, scientists, and other stakeholders determine which fish species, complexes, and/or fisheries would benefit most from improved mortality rate estimates.
- Facilitate the development of improved fish mortality rate estimates.
- Support effective and efficient research that leads to reduced release mortality for high priority species, complexes, and/or fisheries.
- Ensure that improved fish mortality rate estimates are incorporated effectively into stock assessments and existing management processes.

[251] https://www.fisheries.noaa.gov/international/bycatch/national-bycatch-reduction-strategy
[252] https://www.fisheries.noaa.gov/action/amendment-111-fmp-groundfish-bering-sea-and-aleutian-islands-management-area

| | |
|---|---|
| **8.** | **Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.** |

An important contribution is made through the publication of ecosystem status reports. The reports are produced annually to compile and summarize information about the status of the Alaska marine ecosystems for the NPFMC, the scientific community and the public. As of 2023, there are separate reports for the Eastern Bering Sea, Aleutian Islands, the Gulf of Alaska, and Arctic ecosystems[253]. These reports include ecosystem report cards, ecosystem assessments, and ecosystem and ecosystem-based management indicators that together provide context for ecosystem-based fisheries management in Alaska.

The reports are the product of collaboration between federal, state, academia, and not-for-profits organizations that (i) create strong links between Alaska ecosystem research and fishery management, and (ii) spur new understanding of the connections between ecosystem components by bringing together the results of diverse research efforts.

8.6 Fishing gear shall be marked in accordance with the State's legislation in order that the owner of the gear can be identified. Gear marking requirements shall take into account uniform and internationally recognizable gear marking systems.

**Pacific Halibut - Federal**

The IPHC gear regulations specify that all gear marker buoys carried on board or used by any United States of America vessel used for Pacific halibut fishing shall be marked with one of the following: (a) the vessel's State license number; or (b) the vessel's registration number. These markings shall be in characters at least four inches in height and one-half inch in width in a contrasting color visible above the water and shall be maintained in legible condition. These same requirements are mirrored in the *Federal Register* halibut catch sharing plan regulation[254].

**Sablefish - Federal**

Regulations pertaining to vessel and gear markings in the sablefish fishery are established in NMFS regulations, as prescribed in the annual management measures published in the *Federal Register* (part 679.24)[255]. They state:

1. Marking of hook-and-line, longline pot, and pot-and-line gear.
   (a) All hook-and-line, longline pot, and pot-and line marker buoys carried on board or used by any vessel regulated under this part shall be marked with the vessel's Federal fisheries permit number or ADFG vessel registration number.
   (b) Markings shall be in characters at least 4 inches (10.16 cm) in height and 0.5 inch (1.27 cm) in width in a contrasting color visible above the water line and shall be maintained so the markings are clearly visible.
   (c) Each end of a set of longline pot gear deployed to fish IFQ sablefish in the GOA must have attached a cluster of four or more marker buoys including one hard buoy ball marked with the capital letters "LP" in accordance with paragraph (a)[2] of this section, a flag mounted on a pole, and radar reflector floating on the sea surface.

[253] https://www.npfmc.org/library/fmps-feps/
[254] https://www.federalregister.gov/documents/2024/03/18/2024-05481/pacific-halibut-fisheries-catch-sharing-plan-2024-annual-management-measures#:~:text=For%202024%2C%20the%20IPHC%20adopted,entire%20season%3B%20and%203)%20a
[255] https://www.ecfr.gov/current/title-50/chapter-VI/part-679/subpart-B/section-679.24

| | | |
|---|---|---|
| **8.** | **Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.** | |
| | | **Pacific halibut and Sablefish - State**<br>Gear marking requirements are stipulated in the ADFG's 2023 - 2024 Statewide Commercial Groundfish Fishing Regulations[256]. According to 5 AAC 28.050 (Lawful gear for groundfish): (a) Unless otherwise provided or restricted by specific groundfish regulations in this chapter, groundfish may be taken only by trawls, hand troll gear, seines, mechanical jigging machines, dinglebar troll gear, longlines, or pots, except that (b) All commercial longline or skate gear buoys, or kegs and buoys for groundfish pots, must be marked with the permanent ADF&G vessel license plate number of the vessel operating the gear.<br><br>5 AAC 28.051. Gear for halibut<br>(a) Unless otherwise specified in this chapter, halibut may be taken only by hand troll gear, mechanical jigging machines, dinglebar troll gear, pots, and longlines.<br>(b) All commercial buoys or kegs must be marked with the permanent vessel license plate number of the vessel operating the gear.<br>(c) A vessel registered for another pot fishery that has a pot limit in effect may not have on board or in the water more pots in the aggregate allowed in that fishery.<br><br>5 AAC 28.130. Lawful gear for Eastern Gulf of Alaska Area<br>(a) In the Northern Southeast Inside Subdistrict and Southern Southeast Inside Subdistrict, sablefish may be taken only with longlines and pots.<br>(f) In the Eastern Gulf of Alaska Area, pots may not be longlined, except that pots may be longlined in the Northern Southeast Inside Subdistrict and Southern Southeast Inside Subdistrict sablefish fishery. At least one buoy on each groundfish pot must be legibly marked with only the permanent department vessel license plate number of the vessel operating the gear. The number must be placed on the top one-third of the buoy in numerals at least four inches high and one-half inch wide, must be in a color contrasting to the color of the buoy, and must be visible above the water surface when the buoy is attached to the groundfish pot.<br><br>5 AAC 28.230. Lawful gear for Prince William Sound Area<br>(c) A groundfish pot may not be attached to a line connected to another groundfish pot, except that in the Prince William Sound sablefish fishery groundfish pots may be connected if each end of the buoy line is marked as specified in (d) of this section.<br>(d) At least one buoy on each groundfish pot must be legibly marked with the permanent ADF&G vessel license plate number of the vessel operating the gear. The buoy may bear only a single number - that of the vessel operating the gear. The number must be placed on the top one-third of the buoy in numerals at least four inches high, one-half inch wide, and in a color that contrasts with the color of the buoy. The buoy must be visible on the buoy above the water surface when the buoy is attached to the groundfish pot.<br>(f) In the Prince William Sound Area, nonpelagic trawl gear may not be used to take groundfish, except that sablefish may be taken with shrimp trawl gear operated as specified in 5 AAC 31.225(b).<br>(i) In the Prince William Sound Area, the holder of a CFEC permit in a fixed gear or net gear sablefish fishery may use groundfish pots only if two or more pots are connected as specified in (c) of this section. |

[256] https://www.adfg.alaska.gov/static/regulations/fishregulations/pdfs/commercial/cf_groundfish_regs_2023_2024.pdf

| | | |
|---|---|---|
| **8.** | **Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.** | |
| | | 5 AAC 28.330. Lawful gear for Cook Inlet Area<br>(a) Except as provided in (b) of this section, groundfish may be taken only by pelagic trawls, hand troll gear, longlines, pots, or mechanical jigging machines.<br>(c) A groundfish pot may not be attached to a line connected to another groundfish pot, except that in the Cook Inlet Area sablefish fishery, groundfish pots may be connected by a line if at least one buoy is attached to each end of the line and each buoy is marked as specified in (d) of this section; no more than 15 groundfish pots may be attached to the same line.<br>(d) At least one buoy on each groundfish pot must be legibly marked with the permanent ADF&G vessel license plate number of the vessel operating the gear. The buoy may bear only a single number - that of the vessel operating the gear.<br><br>5 AAC 28.430. Lawful gear for Kodiak Area<br>(b) At least one buoy on each groundfish pot must be legibly marked with the permanent ADF&G vessel license plate number of the vessel operating the gear. The buoy may bear only a single number - that of the vessel operating the gear. The number must be placed on the top one-third of the buoy in numerals at least four inches high, one-half inch wide, and in a color that contrasts with the color of the buoy. The buoy markings must be visible on the buoy above the water surface when the buoy is attached to the groundfish pot.<br><br>5 AAC 28.530. Lawful gear for Chignik Area<br>(c) At least one buoy on each groundfish pot must be legibly marked with the permanent ADF&G vessel license plate number of the vessel operating the gear. The buoy may bear only the number of the vessel operating the gear. The number must be placed on the top one-third of the buoy in numerals at least four inches high, one-half inch wide, and in a color that contrasts with the color of the buoy. The buoy markings must be visible on the buoy above the water surface when the buoy is attached to the groundfish pot.<br><br>5 AAC 28.570. Lawful gear for South Alaska Peninsula Area<br>(e) At least one buoy on each groundfish pot must be legibly marked with the permanent ADF&G vessel license plate number of the vessel operating the gear. The buoy may bear only the number of the vessel operating the gear. The number must be painted on the top one-half of the buoy in numerals at least four inches high, one-half inch wide, and in a color that contrasts with the color of the buoy. The buoy markings must be visible on the buoy above the water surface when the buoy is attached to the groundfish pot.<br>(f) Sablefish may be taken only with pots, longlines, mechanical jigging machines, and hand troll gear as described in 5 AAC 28.640.<br><br>5 AAC 28.629. Lawful gear for Bering Sea-Aleutian Islands Area<br>(a) Unless otherwise specified in this section, groundfish may be taken with the gear specified in 5 AAC 28.050.<br>(g) Sablefish may be taken only with pots, longlines, mechanical jigging machines, and hand troll gear as described in 5 AAC 28.640.<br><br>8.7. The fishery management organization and relevant groups from the fishing industry shall measure performance and encourage the development, implementation, and use of selective, environmentally |

| | |
|---|---|
| **8.** | **Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.** |

safe, and cost-effective gear, technologies, and techniques that are sufficiently selective as to minimize catch, waste, discards of non-target species (both fish and non-fish species), and impacts on associated or dependent predators. The use of fishing gear and practices that lead to discarding the catch shall be discouraged, and the use of fishing gear and practices that increase survival rates of escaping fish shall be promoted. Inconsistent methods, practices, and gears shall be phased out accordingly.

The level of waste and discards in the Pacific Halibut and Sablefish fisheries is not considered to be significant nor problematic. Neither stock is depleted, nor overfished, nor is overfishing occurring[257,258]. Fishing gear selectivity and impacts on other species are evaluated along technological, environmental, and benefit-cost lines when new gear types or changes to existing gear configurations are proposed by industry. Reports are produced, consultations with stakeholders are scheduled, and, where necessary, regulations are amended. When a new gear type is proposed, experimental permits may be issued on a limited basis and a testing protocol established to account for all observed impacts on the ecosystem.

NOAA has championed fishing gear studies for many years and has produced the Mobile Fishing Gear Effects Bibliography Database which is a comprehensive listing of scientific and popular literature on demersal, mobile fishing gear and the potential effects of its use[259]. The primary focus is on trawling, dredging, and raking, and the resulting direct disturbance to marine habitats and the associated biological communities. NOAA's Alaska Fisheries Science Centre's publications database includes a number of scientific studies on fishing gear, such as (i) Mobile fishing gear effects on benthic habitats, (ii) Coral impacted by fishing gear in the GOA, (iii) Ghost fishing gear, (iv) Some consequences of lost fishing gear, and (v) Principles and innovations in commercial fishing gear.

**Pacific Halibut**

Pacific halibut are captured in large numbers by vessels fishing for other species, primarily using trawl, pot, and longline gear that are targeting groundfish species such as cod, flatfish, rockfish and other species. IPHC regulations require that the fish be targeted and caught with demersal longline gears. For those hook and line fisheries, Article 15 (Careful Release of Pacific Halibut) of the 2024 fishing regulations state the following: *All Pacific halibut that are caught and are not retained shall be immediately released outboard of the roller and returned to the sea with a minimum of injury by: (a) hook straightening; (b) cutting the gangion near the hook; or (c) carefully removing the hook by twisting it from the Pacific halibut with a gaff*. The reasons for releasing halibut in this manner are so that post release mortality can be calculated and minimized[260].

The IPHC has studied and is continuing to research discard mortality and survival of halibut. The IPHC website lists research information on the physiological condition and hook injury survival (hook type, size, bait, effect of fish size) and discard survival assessment[261].

In terms of bycatch of halibut in trawl fisheries, the groundfish trawl industry in Alaska has deployed halibut excluder devices in their gear with success[262]. The NMFS, in collaboration with the Pacific States

[257] https://www.fisheries.noaa.gov/s3/2024-02/BSAIintro.pdf
[258] https://www.fisheries.noaa.gov/s3/2024-02/GOAintro.pdf
[259] https://apps-afsc.fisheries.noaa.gov/mfge/search.php
[260] https://www.iphc.int/uploads/2024/02/IPHC-Fishery-Regulations-2024-5-Feb.pdf
[261] https://www.iphc.int/research/discard-survival-assessment-in-the-commercial-pacific-halibut-fishery/
[262] https://marineconservationalliance.org/seafacts-the-development-of-halibut-excluders/

| | |
|---|---|
| **8.** | **Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.** |

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%.

Longline vessels in Alaska are required to deploy streamer lines and weighted lines in order to reduce bycatch of seabirds. Demersal trawl vessels such as those targeting flatfish in the BSAI and cod in the GOA are required to use modified gear with raised bobbins, found to decrease crab mortality and decrease habitat impacts.

**Sablefish**

The federal sablefish fishery is managed under an IFQ system (Goethel *et al.,* 2023). The fishery is for the most part a demersal longline fishery. Longline is typically not associated with as much ghost fishing as some other fishing gears, such as gillnets and some types of traps. Longline gear is also required to carry streamer lines to avoid seabird interactions and fishermen deploy weighted lines that sink faster and further decrease possible interactions with these animals.

In recent years, an increasing percentage of sablefish is also caught and retained with pot gear, due to depredation by whales in longline gear (Goethel *et al.,* 2023). Groundfish pots are required to comply with a number of specifications, including use of a biodegradable panel, and tunnel openings (rigid or soft) which must not exceed maximum dimensions. These gear constructions minimize impacts of ghost fishing and of catch of certain non-target species and sizes, hence reducing waste, discards, and mortality in case of gear loss. Escape rings in pots are required in some sablefish state fisheries as per 2024-2025 state regulations[263].

In one the newest developments to reduce wastage and discards in the IFQ fishery, the NPFMC, in October 2018 took final action to allow for: (i) more efficient harvest of the halibut resource by decreasing the wastage of legal-size halibut discarded in the BSAI sablefish pot fishery, and (ii) reduced whale depredation of halibut caught on hook-and-line gear by allowing operators that hold both halibut IFQ or CDQ the opportunity to retain halibut in pot gear[264]. This action includes the following elements: (i) an exemption to the 9-inch maximum width of the tunnel opening on pots, (ii) VMS and logbook requirements for all vessels using pot gear to fish IFQ/CDQ, and (iii) in the event that the overfishing limit for a shellfish or groundfish species is approached, regulations would allow NMFS to close IFQ fishing for halibut as necessary. Additionally, the Pribilof Islands Habitat Conservation Zone would be closed to all fishing with pot gear.

Sablefish also are caught incidentally during directed trawl fisheries for other species groups such as rockfish and deep-water flatfish (Witherell and Fay, 2023; Goethel *et al.,* 2023). Trawl catches in 2023 were about 26% of the total catches, while in 2022 catches were about 20% (Goethel *et al.,* 2023). Research has demonstrated that trawl sweep gear modification required in the trawl flatfish fisheries in the EBS (since 2010) and the central GOA (since 2013) reduces unobserved mortality of red king crab, Tanner crab, and snow crab (NPFMC, 2013).

[263] https://www.adfg.alaska.gov/static/regulations/fishregulations/pdfs/commercial/cf_groundfish_regs_2024_2025.pdf
[264] https://www.npfmc.org/october-2018-newsletter/

| | | |
|---|---|---|
| **8.** | **Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.** | |
| | | All new proposals, for and resulting developments to reduce waste and discards in the sablefish and other groundfish fisheries, are made available to all fishers through the NPFMC/NMFS[265],[266] and ABoF[267] processes and published online for all relevant stakeholders.<br><br>8.8. Technologies, materials, and operational methods or measures—including, to the extent practicable, the development and use of selective, environmentally safe, and cost effective fishing gear and techniques—shall be applied to minimize the loss of fishing gear, the ghost fishing effects of lost or abandoned fishing gear, pollution, and waste.<br>According to NOAA, "ghost fishing" is a part of the global marine debris issue that impacts marine organisms and the environment[268]. Lost or discarded fishing gear that is no longer under a fisherman's control becomes known as derelict fishing gear (DFG), and it can continue to trap and kill fish, crustaceans, marine mammals, sea turtles, and seabirds. The most common types of DFG to ghost fish are gillnets and crab pots/traps, with longlines and trawls less likely to do so.<br><br>Ghost fishing can impose a variety of harmful impacts, including: the ability to kill target and non-target organisms, including endangered and protected species; causing damage to underwater habitats such as coral reefs and benthic fauna; and contributing to marine pollution. Factors that cause gear to become DFG include poor weather conditions, gear conflicts with other vessels or bottom topography, gear overuse, and too much gear being used. The types of DFG most often cited for ghost fishing are, in the order of prevalence and amount of available information (a) gill nets, (b) pots/traps, (c) bottom trawls, and (d) longlines.<br><br>New fishing gears have seldom been allowed for halibut fishing, where longlines are the de facto fishing method of catching halibut under IPHC management. However, since January 2017, Amendment 101 to the Groundfish FMP for GOA authorizes the use of longline pot gear in the GOA sablefish IFQ fishery[269]. In addition, this final rule establishes management measures to minimize potential conflicts between hook-and-line and longline-pot gear used in the sablefish IFQ fisheries in the GOA.<br><br>It is noteworthy to say that around the time of scoring this clause the assessment team noted that while the impacts of ghost fishing have been established in numerous other fisheries, its impacts in regard to the Pacific Halibut and Sablefish commercial fisheries specifically, and pollution and waste more generally, have not been adequately evaluated such as through peer reviewed environmental assessments or studies (Mateo *et al*., 2023). There is insufficient evidence to fully assess this Evaluation Parameter.<br><br>On April 7, 2023, in response to a potential NC, AFDF provided a summary of fishery regulations and voluntary measures in the halibut and sablefish commercial fisheries to minimize gear loss and prevent ghost fishing. AFDF also summarized information on gear loss collected by the relevant management |

[265] https://www.npfmc.org/
[266] https://www.fisheries.noaa.gov/about/alaska-regional-office
[267] https://www.adfg.alaska.gov/index.cfm?adfg=fisheriesboard.main
[268] https://marinedebris.noaa.gov/why-marine-debris-problem/wildlife-entanglement-and-ghost-fishing
[269] https://www.federalregister.gov/documents/2016/12/28/2016-31057/fisheries-of-the-exclusive-economic-zone-off-alaska-allow-the-use-of-longline-pot-gear-in-the-gulf

| | | |
|---|---|---|
| **8.** | **Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.** | |
| | | bodies for both Pacific halibut and sablefish. Consequently, the potential NC was closed. (Mateo *et al*., 2023).<br><br>8.9. The intent of fishing selectivity and fishing impacts-related regulations shall not be circumvented by technical devices. Information on new developments and requirements shall be made available to all fishers.<br>The principal federal and state management agencies have made communications with the fisheries sectors, stakeholders, and the public a priority in their annual or multi-year strategic plans. Newsletters, press releases, and various social platforms are used to disseminate information in real time to their audiences. Information on gear regulations, including any and all amendments or modifications, as well as on gear technology is readily available to fishers and the general public through the websites of NPFMC[270], NOAA/NMFS[271], ADFG[272] and industry organizations, and through various meetings.<br><br>8.11. International cooperation shall be encouraged for research programs involving fishing gear selectivity, fishing methods and strategies, dissemination of the results of such research programs, and the transfer of technology.<br>The International Pacific Halibut Commission (IPHC) is an international organization established by a Convention between Canada and the United States of America[273]. The IPHC's overarching objective is to "develop the stocks of Pacific halibut in the Convention waters to those levels which will permit the optimum yield from the fishery and to maintain the stocks at those levels."<br><br>The organization's strategic plan (2023-2027)[274] includes five [5] enduring strategic goals in the execution of its mission and vision. They are to:<br>• Operate in accordance with international best practice.<br>• Be a world leader in scientific excellence and science-based decision making.<br>• Foster collaboration (within Contracting Parties and internationally) to enhance our science and management advice.<br>• Create a vibrant IPHC culture.<br>• Set the standard for fisheries commissions globally.<br><br>The fostering collaboration goal (refer to 2017-2021 collaborative research plan projects) is informed by several strategies, including:<br>• Maintaining and developing interagency cooperation in management programs.<br>• Fostering interagency cooperative research programs.<br>• Maintaining and enhancing participation of stakeholders (public and private sectors) in the design and execution of Commission programs.<br>• Enhancing knowledge sharing with Tribal and First Nation groups in the Pacific Northwest and Alaska. |

[270] https://www.npfmc.org/library/
[271] https://www.fisheries.noaa.gov/about/alaska-regional-office
[272] https://www.adfg.alaska.gov/index.cfm?adfg=news.main
[273] https://www.iphc.int/
[274] https://www.iphc.int/uploads/pdf/sp/iphc-2023-sp27.pdf

**8. Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.**

- Enhancing the Commission's role in public understanding of fishery science and management.
- Continuing to promote interdisciplinary activities, partnership development and engagement.
- Incorporating talented students and early career researchers in research activities.

**Table 11**. IPHC Biological and Ecosystem Science Research Program and Management Implications (2017-2021) (Source: IPHC, 2024c).

| ***Primary Research Areas*** | ***Main Objectives*** | ***Management implications*** |
|---|---|---|
| **Migration** | Improve understanding of migration throughout all life stages (larval, juvenile, adult feeding, and reproductive migrations). | Stock distribution, regional management |
| **Reproduction** | Information on sex ratios of commercial landings and improved maturity estimates | Female stock spawning biomass |
| **Growth** | Improve understanding of factors responsible for changes in size-at-age and development of tools for monitoring growth and physiological condition. | Biomass estimates |
| **DMRs and discard survival** | Improve estimates of DMRs in the directed longline and guided recreational fisheries. | Discard mortality estimates |
| **Genetics and genomics** | Improve understanding of the genetic structure of the population and create genomic tools (genome). | Stock distribution, local adaptation |

**Table 12.** IPHC Externally-funded Collaborative Research (2017-2021) (Source: IPHC, 2024c).

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

Section 15 of the Commission's Rules of Procedure (2023[275]) requires that:

- A report be adopted at the end of each Session of the Commission and shall be recorded in accordance with instructions of the Commission.
- The report shall embody the Commissions decisions and recommendations, including, when requested, a statement of minority views.
- Copies of final reports shall be forwarded by the Executive Director to the Contracting Parties and to the Commissioners no later than 15 days after the close of the Session.
- The Commission shall publish additional reports from time to time as it may deem desirable.
- All reports published by the Commission shall be available at the Commission's website

The IPHC Secretariat is undertaking research to devise techniques for modifying fishing gear to mitigate Pacific halibut depredation and bycatch. The specific objectives in this domain are: 1) to explore novel techniques for whale avoidance and deterrence to mitigate Pacific halibut depredation by whales (e.g., catch protection strategies), and 2) to examine the behavioral and physiological responses of Pacific halibut to fishing gear to decrease bycatch. The significant management implications of our findings involve enhancing mortality calculations of Pacific halibut in the directed commercial fisheries, which will result in more accurate assessments of stock productivity. Based on the projected extent of whale depredation, this may be incorporated as an additional explicit source of mortality in the stock assessment and mortality limit determination procedure.

Whale predation: Research on the advancement of gear-based strategies for catch protection to reduce whale depredation in the Pacific halibut longline fishery[276].

The physical removal of catch from longline fishing gear by marine animals, especially toothed whales (suborder Odontoceti), is an increasing challenge to both commercial fishers and researchers assessing fish stock abundance (Sigler *et al*., 2008; Tixier *et al*., 2021). Whales interacting with longline gear pose difficulties for fishers (loss of catch, diminished efficiency), fisheries managers (precise removal

| 8. | Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources. |
|---|---|

estimation), and the whales themselves (risk of injury, disruption of social structures, and the potential development of artificial dependence on non-primary food sources susceptible to fishery dynamics). In the long term, depredation may result in the depletion of productive fishing areas.

The IPHC Secretariat has identified research aimed at equipping the Pacific halibut fisheries with strategies to mitigate whale depredation as a high priority. This research is now incorporated as one of the five principal research domains within the 5-year Program of Integrated Research and Monitoring (2022-2026). To achieve this objective, the IPHC secretariat has been examining gear-based strategies for catch protection to reduce whale depredation in Pacific halibut and other longline fisheries. The aims of this study are to: 1) collaborate with fishermen and gear manufacturers through direct communication and an International Workshop to ascertain effective strategies for safeguarding hook-captured flatfish from predation; and 2) devise and pilot two straightforward, cost-effective catch-protection designs that can be efficiently implemented using existing longline fishing methods on vessels operating in the Northeast Pacific Ocean.

The published report of the Workshop summarized common successes and failures of various protection approaches, emphasizing elements that can be adapted for the protection of longline-captured Pacific halibut. The project's second step involved integrating the optimal catch protection design results from the workshop into functioning prototypes and doing field-testing during longline sea trials. The two chosen catch protection mechanisms were: a) an underwater shuttle and b) a branch gear with a sliding shroud mechanism.

The underwater catch-protection shuttle was produced by Sago Solutions. The aluminum shuttle functions by descending down the groundline during the hauling process, engaging the hooks and capture at the bottom, mechanically detaching fish and collecting them in the storage chamber Upon securing the catch, the device meets a stopper and is retrieved to the surface containing fish. The equipment is elevated onto the vessel using a boom and winch.

Branch line fishing is an adaptation of longline fishing, in which hooks are attached to weighted lateral branches instead of the primary groundline. This structure facilitates the incorporation of a shroud device that descends to conceal the hooks and related catch during the hauling process.
Field test of these two methods has begun in 2023/2024 to examine the logistics of deploying, operating, and retrieving the two pilot capture protection devices, and assess the fundamental performance of the gear regarding catch rates and fish size in comparison to conventional gear.

The IPHC has undertaken this research with financial support from NOAA's Bycatch Research and Engineering Program (BREP) (NOAA Award NA21NMF4720534).

Gear modifications for bycatch mitigation: Research on gear improvements aimed at decreasing bycatch of Pacific halibut in trawl fisheries and non-Pacific halibut bycatch in the Pacific halibut longline fishery[277].

[275] https://www.iphc.int/uploads/pdf/basic-texts/iphc-rop-current.pdf
[276] https://www.iphc.int/research/whale-depredation/
[277] https://www.iphc.int/research/gear-modifications-for-bycatch-reduction/

| | |
|---|---|
| **8.** | **Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.** |

In the Pacific halibut fisheries of the United States, yelloweye rockfish (*Sebastes ruberrimus*) bycatch presents a concern, as their stock status along the West Coast is currently "rebuilding" from previous overfishing (NMFS, 2019), whereas the Southeast Alaska stock remains at decreased levels relative to those reported in the mid-1990s (ADFG, 2020; NPFMC, 2021). The IPHC has collaborated with the Pacific States Marine Fisheries Commission in studies aimed at assessing various techniques that reduce yelloweye rockfish bycatch in the targeted Pacific halibut longline fishery. The initial technique involved evaluating the impact of circular hook size and adjustments by integrating appendages at a 45-degree angle. The findings of this study demonstrated that hook size did not substantially impact the catch efficiency of Pacific halibut and yelloweye rockfish. The study's results indicated that hooks with appendages captured considerably less yelloweye rockfish compared to standard circle hooks (Lomeli et al., 2023). The second strategy involved examining the efficacy of semi-demersal longline gear compared to demersal longline gear in minimizing yelloweye rockfish bycatch while preserving its efficiency in capturing Pacific halibut, given that yelloweye rockfish are typically less susceptible to non-demersal fishing gear. The data from this study are now undergoing processing.

**Sablefish**

AK Groundfish longline fisheries must employ gear and technology that are demonstrably environmentally sustainable, economically viable, and adequately selective to minimize bycatch, waste, and discards, while also utilizing methods that enhance the survival rates of escaping fish[278]. The implementation of highly selective pots to minimize the capture of target species and bycatch of non-target species, along with the advancement of handling techniques to decrease mortality of rejected catch, has been a crucial aspect of managing AK Sablefish commercial fisheries. Comprehensive research has been conducted on all aspects of gear efficacy and discard mortality. On-board observers document discards in all fisheries, and total discard mortality estimates are incorporated into overall fishery removals. This has provided a significant motivation to minimize undesired catch to the fullest extent. Records indicate that legal size of sablefish predominates captures, with markedly lower quantities of other species (Witherell and Fay, 2023; Goethel *et al*.,2023).

To mitigate the loss of equipment and the adverse effects of ghost fishing from lost or abandoned gear, as well as pollution and waste, Longline pot fisheries have developed and instituted selective, environmentally sustainable, and economically viable fishing gear and methodologies. Commercial fishermen are constructing pots with wider mesh on the panels to allow juvenile fish to escape prior to retrieving the gear. State regulations mandate that sablefish longline pots must be equipped with escape rings and such measures to mitigate the risk of ghost fishing[279]. Before each fishing season, the ADFG examines pots and vessel holding tanks. The Alaska Wildlife Troopers (AWT) police maritime regulations, while the Alaska Department of Fish and Game's (ADFG) on-board observer program gathers data for enforcement purposes. No evidence exists to suggest that devices were employed to circumvent the gear regulations. Professional associations and the licensing system provide harvesters with information regarding new equipment advancements and associated regulatory obligations[280]. Before its implementation, novel fishing technologies (i.e., innovative gear, strategies, and operations)

[278] https://www.fisheries.noaa.gov/alaska/commercial-fishing/longline-pot-gear-gulf-alaska-ifq-sablefish-fishery-frequently-asked
[279] https://www.adfg.alaska.gov/static/regulations/fishregulations/pdfs/commercial/cf_groundfish_regs_2023_2024.pdf
[280] https://www.fisheries.noaa.gov/alaska/science-data/alaska-cooperative-research#more-information

| 8. | Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources. |
|---|---|
| | undergo comprehensive assessment to ascertain their potential impact on groundfish essential fish habitats and ecosystems[281]. Any commercial-scale implementation of an innovative fishing technique must undergo a comprehensive evaluation process before to its launch, establish regulatory compliance, and be subject to ongoing monitoring. No new fishing technologies pertinent to AK Sablefish fisheries have been documented since the re-assessment.<br><br>8.12 The fishery management organization and relevant institutions involved in the fishery shall collaborate in developing standard methodologies for research into fishing gear selectivity, fishing methods and strategies, and on the behavior of target and non-target species regarding such fishing gear—as an aid for management decisions and with a view to minimizing non-utilized catches.<br>The principal federal and state management agencies have maintained a longstanding practice of promoting and supporting fisheries research activities within their staple of core activities[282],[283],[284]. Research drives innovation in fisheries development and management practices such that when projects are completed and peer reviewed, there typically follows a period of internal and external discussions on whether and how the findings can provide benefits to the management schemes, or resolve issues, and whether they should be accepted and implemented.<br><br>The principal federal and state management agencies have formal collaborative research arrangements in place typically with non-governmental entities that span a variety of research activities[285],. Projects involve an array of biological and environmental disciplines that frequently lead to management options for minimizing non-utilized catches. While gear selectivity may not always be a focal point of the research, how the gear interacts within its environment is usually part of the analytical component of a project. (Refer to Supporting Clause 8.11 for examples of IPHC collaborative research projects from 2017 to 2021). |
| References: | ADFG. 2020. 2021 demersal shelf rockfish fisheries. DSR Fisheries Announcement December 31, 2020.<br>Armstrong, J., S. Cunningham. 2018. Discussion Paper: Sablefish Discard Allowance. Report to North Pacific Fisheries Management Council, 605 W 4th Ave, Suite 306, Anchorage, AK 99501. 32 p.<br>Benaka, L. R., L. Sharpe, K. Abrams, M. Campbell, J. Cope, F. Darby, E.J. Dick, J. Hyde, B. Linton, C. Lunsford, D. Rioux, and Y. Swimmer. 2016. Action Plan for Fish Release Mortality Science. U.S. Dept. of Commer., NOAA. NOAA Technical Memorandum NMFS-F/SPO-161, 29 p.<br>Goethel, D. R., D. H. Hanselman, C. J. Rodgveller, K. H. Fenske, S. K. Shotwell, K. B. Echave, P. W. Malecha, K. A. Siwicke, C. R. Lunsford. 2020. Assessment of the Sablefish Stock in Alaska. In Stock assessment and fishery evaluation report for the groundfish resources of the Bering Sea and Aleutian Islands. North Pacific Fishery Management Council, Anchorage. 257 p<br>Goethel, D.R., Cheng, M.L.H., Echave, K.B., Marsh, C., Rodgveller, C.J., Shotwell, K., and Siwicke, K. 2023. Assessment of the sablefish stock in Alaska. North Pacific Fishery Management Council, Anchorage, AK.<br>Hutniczak, B. 2021. Bio-socioeconomic conditions index for Pacific halibut fisheries. IPHC-2021-IM097-INF03 |

[281] https://www.fisheries.noaa.gov/resource/document/environmental-assessment-final-regulatory-impact-review-amendment-101-fmp
[282] https://www.fisheries.noaa.gov/about/alaska-fisheries-science-center
[283] https://www.iphc.int/research-monitoring/
[284] https://www.adfg.alaska.gov/index.cfm?adfg=fishingResearch.main
[285] https://www.fisheries.noaa.gov/alaska/science-data/alaska-cooperative-research

| | |
|---|---|
| **8.** | **Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.** |
| | IPHC 2024c. International Pacific Halibut Commission 5-Year program of integrated research and monitoring (2022-26). Seattle, WA, U.S.A. IPHC–2023-5YPIRM, 58 pp.<br>IPHC. 2023b.International Pacific Halibut Commission Strategic Plan (2023-27). Seattle, WA, U.S.A. IPHC–2023–SP,7 pp.<br>Lomeli, M.J.M., Wakefield, W.W., Abele, M., Dykstra, C.L., Herrmann, B., Stewart, I.J., Christie, G.C. 2023. Testing of hook sizes and appendages to reduce yelloweye rockfish bycatch in a Pacific halibut longline fishery. Ocean & Coastal Management. 241: 106664.<br>Mateo,I., R.Leaf, and R.J. Allain. 2023. U.S Alaska Pacific halibut and sablefish commercial fisheries RFM Reassessment Report. Global Trust 387 pp<br>NMFS 2019. Status of U.S. Fisheries. Summary of stock status for FSSI stocks.<br>NPFMC. 2013. Trawl Sweep Modification in the Flatfish Fishery in the Central Gulf of Alaska. Environmental Assessment, Regulatory Impact Review, and Initial Regulatory Flexibility Analysis For Proposed Amendment 89 to the Fishery Management Plan for Groundfish of the Gulf of Alaska North Pacific Fishery Management Council, Anchorage, Alaska<br>NPFMC. 2021. Assessment of the demersal shelf rockfish stock complex in the Southeast Outside Subdistrict of the Gulf of Alaska. North Pacific Fishery Management Council, Anchorage, Alaska<br>NPFMC. 2024a. Fishery Management Plan for the Groundfish fisheries of the Gulf of Alaska.<br>NPFMC. 2024b. Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area<br>Sigler, M., Lunsford, C. 2008. Sperm whale depredation of sablefish longline gear in the northeast Pacific Ocean. Mar. Mammal Sci. 24: 16-27.<br>Tixier, P., Lea, M.A., Hindell, Mark, A., Welsford, D., Mazé, C., Gourguet, S., and Arnould, J.P.Y. 2021. When large marine predators feed on fisheries catches: Global patterns of the depredation conflict and directions for coexistence. Fish and Fisheries 22(1), 31-53.<br>Werner, T., Northridge, S., McClellan Press, K., and Young, N. 2015. Mitigating bycatch and depredation of marine mammals in longline fisheries. ICES Journal of Marine Science 72(5), 1576-1586.<br>Witherell D. and M. Fay. 2023. Fish Bycatch in the North Pacific Halibut, Hippoglossus stenolepis, and Groundfish Fisheries. Marine Fisheries Review. Vol 85, Issue 1-4, p31<br>Wong, N. 2015. Marine mammal depredation on IPHC standardized setline surveys: a look at killer whales and sperm whales as major depredators in Alaskan waters. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2015:418-441. |
| Statement of consistency to the RFM Fishery Standard | **The fishery continues to conform to the requirements of Fundamental Clause 8 of the RFM Fishery Standard** |

### 7.9.3.2. Fundamental Clause 9. Appropriate standards of fishers' competence

| 9. | **Fishing operations shall be carried out by fishers with appropriate standards of competence in accordance with international standards, guidelines, and regulations.** |
|---|---|
| Summary of relevant changes: | No significant changes have occurred since the reassessment.<br><br>9.1./9.2./9.3. Education and training programs<br><br>To be eligible to purchase sablefish (and halibut) IFQ shares, new participants must apply for and obtain a Transferable Eligibility Certificate issued by the North Pacific Region of NMFS. An applicant must be a U.S. citizen and show documentation of 150 days of commercial fishing experience[286] in the U.S.<br><br>Obtaining IFQ share most often will require the purchaser (aspirant halibut/sablefish 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 are a learned experience with the culmination of entrants into the fishery starting at deck hand level working their way up through proof of competence.<br><br>There are several avenues for fishermen to receive training to ensure they have appropriate standards of competence.<br><br>AMSEA provides marine safety training for commercial fishermen[287], subsistence & recreational boaters, and youth & women boaters throughout Alaska and across the United States. AMSEA's Fishing Vessel Drill Conductor Trainings are accepted by the U.S. Coast Guard and meet the training requirements for fishermen onboard commercial fishing vessels.<br><br>The State of Alaska, Department of Labor and Workforce Development (ADLWD) includes the Alaska's Institute of Technology, also called Alaska Vocational Training & Education Center (AVTEC). One of AVTEC's main divisions is the Alaska Maritime Training Center. The Alaska Maritime Training Center is a United States Coast Guard approved training facility located in Seward, Alaska, and offers USCG/STCW (STCW is the international Standards of Training, Certification, and Watchkeeping) compliant maritime training[288]. 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 world class ship simulator, state of the art computer based navigational laboratory and modern classrooms equipped with the latest instructional delivery technologies. AVTEC offers courses such as Able Seaman, Fire Fighting, Meteorology, Electronic Chart display and Information Systems, Seafood Processor Orientation and Safety Course, among many others.<br><br>The Marine Advisory Program (MAP) is a university-based statewide program designed to help Alaskans with the practical use and conservation of the state's marine and freshwater resources MAP is based at the University of Alaska Fairbanks (UAF) College of Fisheries and Ocean Sciences[289]. Through classes, workshops, trainings and other resources, MAP offers Alaskans technical assistance, marine education, applied research and other expert advice on how residents can sustain healthy coastal economies, communities, and ecosystems. |

[286] https://www.edf.org/sites/default/files/11391_alaska-ifq.pdf
[287] https://www.amsea.org/commercial-fishermen
[288] https://avtec.edu/maritime/
[289] https://alaskaseagrant.org/marine-advisory/

| 9. | Fishing operations shall be carried out by fishers with appropriate standards of competence in accordance with international standards, guidelines, and regulations. |
|---|---|
| | Established in 2007 by the Alaska Sea Grant Marine Advisory Program, the Alaska Young Fishermen's Summit (AYFS)[290] is a three-day networking and skill-building conference for new entrants in managing modern commercial fishing businesses designed to provide training, information, and networking opportunities for commercial fishermen early in their careers. The event features prominent industry leaders as speakers and mentors.<br><br>All regulations governing the halibut and sablefish fisheries are available on the IPHC[291] NPFMC[292], NMFS[293] and ADFG[294] websites, as previously documented under fundamental clause 8. Changes to regulations are considered only after detailed processes which include open and public discussions, and the results of any changes are widely communicated. Fishermen do attend these meetings and participate in these processes where they input in and become better acquainted with fishery regulations.<br><br>Data on the number and location of Alaskan of fishers, permits issued, Current Quota Share with Holders and QS Units - by species, area, vessel category, blocks, and CDQ compensation flag etc. can be found online at the NMFS website[295]122. Data on fishing in Alaskan state-managed fisheries can be found in the State of Alaska's CFEC website[296]. |
| References: | |
| Statement of consistency to the RFM Fishery Standard | **The fishery conforms to the requirements of Fundamental Clause 9 of the RFM Fishery Standard** |

[290] https://alaskaseagrant.org/events/alaska-young-fishermens-summit/
[291] https://www.iphc.int/fisheries/fishery-regulations/
[292] https://www.npfmc.org/library/fmps-feps/
[293] https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/pacific-halibut-and-sablefish-individual-fishing-quota-ifq-program
[294] https://www.adfg.alaska.gov/static/regulations/fishregulations/pdfs/commercial/cf_groundfish_regs_2023_2024.pdf
[295] https://www.fisheries.noaa.gov/alaska/commercial-fishing/permits-and-licenses-issued-alaska#individual-fishing-quota-(ifq)-halibut/sablefish-and-cdq-halibut-ifq
[296] https://www.cfec.state.ak.us/

### 7.9.3.3. Fundamental Clause 10. Effective legal and administrative framework

| 10. | **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.** |
|---|---|
| Summary of relevant changes: | There were no significant changes in relation to conformance with Fundamental Clause 10.<br>As summarized below, the evidence viewed during surveillance confirms that the certified Alaska Pacific Halibut and Alaska Sablefish fisheries continue to operate under an effective legal and administrative framework which utilizes robust mechanisms for monitoring, control, and surveillance (MCS).<br><br>10.1 Enforcement agencies and framework<br>The legal and administrative frameworks that define how the principal management agencies are to operate and the environment in which they are to do so at the state, national and binational levels have been in place for many decades. There is recurring evidence of an ongoing and effective level of cooperation between all the agencies that collectively continue to deliver positive conservation and sustainability outcomes for the sablefish resource and the marine environment on which the species depends.<br><br>**Pacific Halibut**<br>The Monitoring, Control and Surveillance (MCS) programs operated by the federal and state enforcement agencies (NMFS, USCG; ADPS's AWT) continued to perform at a high rate of effectiveness in monitoring the diverse Pacific halibut fishing fleet that operates within state waters (0-3 nm) and Alaska's EEZ (3-200 nm) and in applying the significant number of federal and state regulations they are mandated to enforce. The IPHC does not actively enforce regulations but relies on the enforcement mechanisms of the Contracting Parties (Convention, Article IV). The Contracting Parties provide extensive annual reports to the IPHC regarding their fishery management, catch monitoring and accounting, and enforcement activities.<br><br>**Sablefish**<br>The Monitoring, Control and Surveillance programs operated by the federal and state enforcement agencies (NMFS, USCG; ADPS's AWT) continued to perform at a high level of compliance effectiveness in monitoring the small but diverse sablefish fishing fleet that operates within state waters (0-3 nm) and Alaska's EEZ (3-200 nm).<br><br>The USCG and NMFSs Office of Law Enforcement (OLE) enforce Alaska fisheries laws and regulations, especially 50 CFR 679 (on the management of fisheries off the Alaska EEZ). The AWT enforces halibut and sablefish regulations in state waters. All landings of halibut and sablefish must be reported to NMFS via its mandatory "e-landings" reporting system.<br><br>**US Coast Guard Information**<br>Information from LCDR Jedediah Raskie, Domestic Fisheries Enforcement Section Chief, U.S. Coast Guard District 17 (dre) on Federal Violations from 2022 and 2023.<br><br>**2022: 140 boardings, 13 violations**<br>• Aleutian Islands Subarea: 2 boardings, 1 violation for not retaining rockfish as required.<br>• Bering Sea Subarea: 8 boardings, 1 violation for no IFQ Permit onboard.<br>• Gulf of Alaska Subarea: 54 boardings, 5 violations (1 violation for no IFQ Permit onboard, 1 violation for not logging bycatch, 1 violation for improper buoy markings, 1 violation for |

| 10. | 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. |
|---|---|

improperly retained and mutilated sport-caught/personal use halibut of 100 lbs/117 packages, 1 violation for improperly retained and mutilated sport-caught/personal use halibut of 6 packages).

- Southeast Alaska Subarea: 76 boardings, 6 violations (1 violation for not logging bycatch, 2 violations for no logbook onboard as required, 1 violation for no Hired Master Permit onboard, 1 violation for no IFQ Permit onboard, 1 violation for no active Federal Fisheries Permit).

**2023: 78 boardings, 10 violations**

- Aleutian Islands Subarea: 3 boardings, 3 violations (1 violation for not retaining rockfish as required, 1 violation for seven biodegradable pot panels being less than 18" as required, 1 violation for improper logbook entries).
- Bering Sea Subarea: 10 boardings, 2 violations (1 violation for improper logbook entries, 1 violation for not retaining rockfish as required).
- Gulf of Alaska Subarea: 29 boardings, 5 violations (2 violations for not retaining rockfish as required, 1 violation for not logging bycatch as required, 1 violation for improper logbook entries, 1 violation for biodegradable pot panels being less than 18" as required).
- Southeast Alaska Subarea: 36 boardings, no violations.

According to LCDR Jedediah Raskie, "the Alaska Halibut and Sablefish commercial fisheries can be categorized as fisheries with MEDIUM compliance. The violation rate is approximately double the overall fisheries compliance rate across all federal fisheries and all sectors (Commercial, Recreational, and Charter) that we enforce in Alaska"(Personal communication May 13, 2024).

**Alaska Wildlife Troopers**

Information from Captain Derek DeGraaf, Southern Detachment Commander, Alaska Wildlife Troopers received in May,20,2024

"In regard to the smaller amount of "state designated" Sablefish, here is what I could determine from our records for Jan 1, 2022 through Dec 31, 2023".

Violations Detected: 2

Types of Violations: Overlimit (13%, 8%)

Compliance: Very good

Gear Loss: Very little.

10.2./10.3./10.4. Fishing permit requirements

All vessels harvesting halibut and sablefish must be authorized and permitted to fish, in accordance with federal regulations, 50 CFR 679. Data on the number and location of Alaskan fishers, permits issued, current Quota Share with holders and QS Units - by species, area, vessel category, blocks, and CDQ compensation flag etc. can be found online at the NMFS website. Similarly, vessels targeting sablefish fisheries that are state-managed must also be permitted by the Commercial Fisheries Entry Commission.

References:

| Statement of consistency to the RFM Fishery Standard | **The fishery conforms to the requirements of Fundamental Clause 10 of the RFM Fishery Standard** |
|---|---|

### 7.9.3.4. Fundamental Clause 11. Framework for sanctions

| 11. | **There shall be a framework for sanctions for violations and illegal activities of adequate severity to support compliance and discourage violations.** |
|---|---|
| Summary of relevant changes: | There were no significant changes in relation to conformance with Fundamental Clause 11.<br>As summarized below, the evidence viewed during surveillance confirms that the certified Alaska Pacific Halibut and Alaska Sablefish fisheries are in conformance with RFM Fundamental Clause 11. A framework for sanctions remains in place and is an effective means to support compliance and discourage violations.<br><br>11.1./11.2./11.3. Enforcement policies and regulations, state and federal.<br>For federally managed fisheries, law enforcement agents and prosecutors rely upon NOAA's Office of General Counsel, Enforcement Section's Penalty Policy (2019) for guidance in assessing civil administrative penalties and permit sanctions under the statutes and regulations enforced by NOAA and the USCG[297].<br><br>The purpose of this Policy is to continue 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.<br><br>According to US Coast Guard LCDR Jedediah Raskie, for years 2022 and 2023, "the compliance for the Alaska Halibut and Sablefish commercial fisheries can be categorized as fisheries as a MEDIUM compliance. The violation rate is approximately double the overall fisheries compliance rate across all federal fisheries and all sectors (Commercial, Recreational, and Charter) that we enforce in Alaska" (Personal communication May 13, 2024). This suggest that the federal sanctions and penalties framework is effective in achieving compliance and discouraging repeat offenders.<br><br>For state managed fisheries in Alaska, misdemeanor commercial fishing penalties are described in the Alaska Statutes, Title 16 (Fish and Game), Chapter 5 (Fish and Game Code), Section 723[298]. Strict liability commercial fishing penalties are covered in Section 722[299].<br><br>According to Captain Derek DeGraaf, Southern Detachment Commander, Alaska Wildlife Troopers, the number of commercial sablefish violations in state-managed waters was relatively low (2) in 2023.<br><br>Federal and state law enforcement agencies have a long history of collaborating on planning and operations through Joint Enforcement Agreements[300]. The state receives federal cash to work with federal agents to gradually enforce federally regulated fisheries. The state must meet certain operational objectives outlined in the funding agreement. |
| References: | |

[297] https://www.noaa.gov/sites/default/files/2023-06/Penalty-Policy-FINAL-June24-2019.pdf
[298] https://law.justia.com/codes/alaska/title-16/chapter-05/article-4/section-16-05-723/
[299] https://codes.findlaw.com/ak/title-16-fish-and-game/ak-st-sect-16-05-722/
[300] https://www.fisheries.noaa.gov/topic/enforcement/cooperative-enforcement

| 11. | There shall be a framework for sanctions for violations and illegal activities of adequate severity to support compliance and discourage violations. |
|---|---|
| Statement of consistency to the RFM Fishery Standard | **The fishery conforms to the requirements of Fundamental Clause 11 of the RFM Fishery Standard** |

### 7.9.4. Section D: Serious Impacts of the Fishery on the Ecosystem

#### 7.9.4.1. Fundamental Clause 12. Impacts of the fishery on the ecosystem

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |
| Summary of relevant changes: | Evidence viewed during this surveillance confirms the certified AK Pacific halibut and AK sablefish fisheries are in conformance with RFM Fundamental Clause 12.<br><br>There is in place a robust fisheries management system that appropriately and adequately considers fishery interactions and effects on the ecosystem (NPFMC, 2024a, b[301,302]). The AK Pacific halibut and AK sablefish fisheries management system is based on the best available science while allowing for inputs from fishery participants and other stakeholders including the provision of local and/or traditional knowledge. The management system also incorporates risk-based approaches for determining most probable adverse impacts of the fishery so that potentially adverse impacts of the fishery on the ecosystem are appropriately assessed and effectively addressed[303,304].<br><br>Habitat protection areas, prohibited species catch (PSC) limits, and groundfish bycatch limits, are in place to protect important benthic habitat for halibut, sablefish, and other resources and to reduce halibut sablefish bycatch in the trawl and fixed gear groundfish fisheries. If PSC limits are reached in bottom trawl fisheries executed in specific areas, those fisheries are closed.<br><br>12.1. Assessment of environmental effects on target stocks and ecosystem.<br>The impacts of environmental factors on AK Pacific halibut and AK sablefish and other fish or non-fish species associated or dependent upon them continue to be assessed appropriately by the IPHC NMFS/NPFMC and ADFG agencies.<br><br>**Halibut**<br>Since its establishment, the IPHC has an extensive history of research focused on elucidating the biology of the Pacific halibut (*Hippoglossus stenolepis*)[305]. The primary objectives of the Biological and Ecosystem Science Research Program at IPHC are to 1) identify and evaluate significant knowledge deficiencies regarding the biology of the Pacific halibut; 2) comprehend the impact of environmental conditions on the biology of the Pacific halibut and its fishery; and 3) utilize the acquired knowledge to mitigate uncertainty in existing stock assessment models.<br><br>The principal biological research initiatives at IPHC that align with Commission objectives are delineated in the IPHC Five-Year Program of Integrated Research and Monitoring (2022-2026) (IPHC, 2024c). The activities are encapsulated in five overarching areas of study aimed at contributing to stock assessment and management plan evaluation procedures, as outlined below:<br>• Migration and Population Dynamics. Studies are aimed at improving current knowledge of Pacific halibut migration and population dynamics throughout all life stages in order to achieve a complete understanding of stock structure and distribution across the entire distribution range of Pacific halibut in the North Pacific Ocean and the biotic and abiotic factors that influence it. |

[301] https://www.npfmc.org/wp-content/PDFdocuments/fmp/GOA/GOAfmp.pdf
[302] www.npfmc.org/wp-content/PDFdocuments/fmp/BSAI/BSAIfmp.pdf
[303] https://www.npfmc.org/wp-content/PDFdocuments/fmp/BSAI/BSAIfmpAppendix.pdf
[304] https://www.npfmc.org/wp-content/PDFdocuments/fmp/GOA/GOAfmpAppendix.pdf
[305] https://www.iphc.int/research/biological-and-ecosystem-science-research/

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

- Reproduction. Studies are aimed at providing information on the sex ratio of the commercial catch and to improve current estimates of maturity and fecundity.
- Growth. Studies are aimed at describing the role of factors responsible for the observed changes in size-at-age and at evaluating growth and physiological condition in Pacific halibut.
- Mortality and Survival Assessment. Studies are aimed at providing updated estimates of discard mortality rates in the guided recreational fisheries and at evaluating methods for reducing mortality of Pacific halibut.
- Fishing Technology. Studies are aimed at developing methods that involve modifications of fishing gear with the purpose of reducing Pacific halibut mortality due to depredation and bycatch.

Monitoring of Environmental Conditions

The IPHC does an annual fishery-independent setline survey (FISS) on a 10x10 nautical mile grid, generally extending from Oregon to the Gulf of Alaska, along the Aleutian Islands, and into the Bering Sea at depths of 30 to 500 meters[306]. The geographic distribution of the FISS is occasionally extended southward into California, northward onto the Bering Sea flats, or into shallower and deeper depths, contingent upon the objectives for that year. Commencing in 2000, the IPHC initiated a pilot project to assess the feasibility of gathering oceanographic profile data in conjunction with fishing data at longline survey sites.

The project was executed along the shore beginning in 2009. Water column profiles were obtained at each station just before retrieving the longline gear, ensuring that oceanographic data collection coincided with the haul. A profile was conducted at all stations within the designated depth range, irrespective of their classification as standard or temporary expansion stations. The obtained data comprised surface to near-bottom profiles of pressure (depth), temperature, conductivity (salinity), dissolved oxygen, pH, and chlorophyll a concentration.

The geographic extent of the FISS enables the IPHC to capture an oceanographic "snapshot" each summer of conditions along the continental shelf in the North Pacific Ocean and portions of the Bering Sea, which is beneficial to researchers globally as the time series accumulates. Moreover, gathering these data together with longline survey fishing allows stock assessment scientists to investigate the influence of oceanographic conditions on the distributions of commercially harvested groundfish.

Effects of environmental factors and somatic growth

In the past century, the size-at-age (SAA) of Pacific halibut has seen significant changes, exhibiting consistent rises from the 1940s to historical peaks in the 1990s, followed by a gradual reduction in more recent years[307]. The recent decline in SAA, coupled with insufficient recruitment of cohorts originating from the original SAA decrease in the 1990s, has led to a reduction in usable Pacific halibut biomass. Over the past 40 years, the average weight of a 12-year-old female Pacific halibut has diminished by around 20 pounds. Although the significance of the reduction in exploitable biomass

[306] https://www.iphc.int/data/water-column-profiler-data/
[307] https://www.iphc.int/research/growth/

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

for fisheries management is acknowledged, our comprehension of the various factors contributing to the historical alteration in SAA remains limited.

Alterations in SAA in Pacific halibut are believed to stem from multiple factors, including fisheries-dependent impacts via size-selective harvesting, shifts in the population dynamics of the Pacific halibut stock due to density effects, or modifications in somatic growth influenced by environmental and ecological factors. Among other environmental factors, temperature is considered to be a primary influence on somatic growth in the Pacific halibut. Consequently, research endeavors at the IPHC in this domain aim to elucidate the potential impacts of environmental circumstances on somatic growth by assessing the influence of temperature, among other factors, on regional, temporal, and age-specific growth patterns in Pacific halibut. An essential element of these activities is the creation and utilization of tools, namely physiological markers, to track somatic developmental patterns in natural environments.

Pacific Decadal Oscillation (PDO) and Pacific Halibut Recruitment[308]
Previous studies established a significant association between the environmental conditions in the northeast Pacific Ocean, particularly the Pacific Decadal Oscillation (PDO; Mantua *et al.,* 1997), and the recruitment of Pacific halibut to the commercial fishery throughout the 1900s. The positive phase of the PDO, encompassing the years up to and including 1947, 1977-2006, and 2014-19, seems to coincide with average recruitment for Pacific halibut (Clark and Hare, 2002; Clark *et al.,* 1999). The latest PDO observations are the sole data concerning Pacific halibut abundance preceding each cohort's initial survey and fishery observation, often a delay of 6 to 8 years. From 2006 to 2013, PDO levels were negative, marking the longest duration of negative annual values recorded since the late 1970s. Positive values were recorded from 2014 to 2019, whereas negative values were recorded from 2020 to 2023. Historically, it typically requires several years to ascertain if a change signifies a new phase or merely annual variability. The correlation between the PDO and average recruitment strength is re-estimated in each year's stock assessment[309]

The average recruitment of Pacific halibut is projected to be greater (53% and 50% for the coastwide and AAF models, respectively) during favorable Pacific Decadal Oscillation (PDO) phases, a commonly utilized measure of productivity in the North Pacific (Stewart and Hicks, 2024). Historically, these regimes saw favorable conditions before 1947, adverse conditions from 1947 to 1977, favorable conditions from 1978 to 2006, and adverse conditions from 2007 to 2013. Annual averages from 2014 to 2019 were positive, however those from 2020 to 2023 had negative average conditions (data were accessible only until October 2023). Despite a good correlation with historical recruitments, it is uncertain whether the impacts of climate change and other recent abnormal conditions in the Bering Sea and Gulf of Alaska are analogous to those recorded in previous decades.

Assessment of the impact of environmental factors and fishing operations on Pacific halibut on stock dynamics[310].
MSE simulations were carried out to evaluate the effects of the environment (i.e., Pacific Decadal Oscillation) on coastwide and regional stock dynamics and the relative effect of fishing.

[308] https://www.iphc.int/uploads/2024/01/IPHC-2024-SA-02.pdf
[309] https://www.iphc.int/uploads/2024/01/IPHC-2024-SA-01.pdf
[310] https://www.iphc.int/uploads/2024/01/IPHC-2024-MSE-01_MSE2023.pdf

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

Variable productivity has been observed for Pacific halibut, including periods of high and low weight-at-age, average recruitment, movement rates-at-age, and changes in the distribution of age-0 recruits. Some of these processes have been linked to the Pacific Decadal Oscillation (PDO).

Previous investigations indicated that, for Pacific halibut, biomass-based reference points, including MSY and B0, are influenced by shifts in environmental regimes, whereas relative reference points, such as relative spawning biomass (RSB) and SPRMSY, remain consistent across different regimes. This suggests that a stable SPR-based management system is probably effective across many environmental conditions.

To test how robust this harvest strategy is to potential environmental change, and contrast it with alternative management procedures, an MSE framework for Pacific halibut has been developed.

The MSE framework for Pacific halibut integrated multiple operating models with both parameter and structural uncertainty and allows for testing projections with alternative PDO regimes. Results are evaluated against coastwide and spatial conservation and fishery objectives.

Results of MSE simulations, based on a continuous low or high PDO, indicated that fishing and environmental factors influence the spawning biomass proportions in each Biological Region variably. The median relative spawning biomass (RSB) at an SPR of 43% was comparable for both high and low PDO situations. Despite the median being almost 38%, the likelihood of the RSB being below 36% was greater in the low PDO scenario. The long-term median Total Catch Equivalent Yield (TCEY) was 22% lower for the low Pacific Decadal Oscillation (PDO) scenario and 26% higher for the high PDO scenario, relative to the median TCEY of the baseline simulations that modeled cyclical PDO regime transitions. The median TCEY for a sustained high PDO was 1.6 times bigger than that for a sustained low PDO. The inter-annual variability in the TCEY was consistent for both chronic low and high PDO scenarios, although it was lower than the AAV when PDO regime shifts were modeled, since the fluctuating PDO introduces additional variability.

The spawning biomass percentage in each Biological Region is influenced by fishing according to an SPR-based management strategy. The allocation of spawning biomass among the Biological Regions is influenced by the PDO regime, as movement, recruitment distribution, and average recruitment are contingent upon it. Region 2 exhibits a decline in the proportion of spawning biomass due to fishing, with the low PDO scenario yielding a greater percentage than the consistently high PDO scenario. Region 3 has a comparable percentage of spawning biomass with fishing and an elevated percentage of spawning biomass at a high PDO. Region 4 exhibits a greater proportion of spawning biomass in the presence of fishing and is predominantly unaffected by the PDO regime. Region 4B exhibits a greater proportion of spawning biomass under fishing conditions and a higher spawning biomass in the low PDO scenario. Various fishing intensities, ranging from SPR=40% to SPR=46%, were simulated to assess the response to both low and high fishing pressures. The extent of fishing intensity exerted a significantly lesser impact than the PDO. The proportion of spawning biomass in Region 3 exhibited minimal responsiveness to fishing intensity.

The MSE analysis concluded that for Pacific halibut, environmental factors can occasionally exert a greater influence on the distribution of spawning biomass than fishing activities, particularly within

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |
| | | a range of SPR values from 40% to 46%. The results are contingent upon the comprehensive harvest plan, and varying distribution methods would certainly yield disparate consequences.<br><br>Status of ecosystems of the Eastern Bering Sea, Aleutian Islands, and Gulf of Alaska[311]<br>Recent reports indicate that the ecosystems of the Eastern Bering Sea, Aleutian Islands, and Gulf of Alaska, have undergone significant changes over the past decade, characterized by intermittent marine 'heat waves', diminished sea ice in the Bering Sea, and an increasing frequency of mortality events affecting species such as crabs, Pacific cod, and seabirds.<br><br>In 2023, Bering Sea temperatures and ice cover were significantly nearer to the long-term normal compared to prior warmer years; yet, biological distributions are still in flux, and crab stocks persist at historically low levels (Siddon, 2023). The Aleutian Islands ecosystem persists in experiencing elevated temperature conditions and demonstrates altered linkages among critical environmental indicators (Ortiz and Zador, 2023). The Gulf of Alaska maintains roughly typical conditions after the warmer years of 2014-2016 and 2019 (Ferriss, 2023).<br><br>The connections between these observations of the physical and biological ecosystem and the success of Pacific halibut are yet to be determined. The relevance of previous relationships associated with the PDO to this period is uncertain, while current data does not indicate a robust year class in 2014. It will take several further years before the Pacific halibut recruitments from 2015 and later years are distinctly recognized in the FISS and guided fisheries.<br><br>**Sablefish**<br>The 2023 sablefish SAFE report highlights some key information relating to environmental effects on target stocks and ecosystem by analyzing environmental and ecosystem related concern levels (Goethel *et al.,* 2023).<br><br>In a stock assessment "environmental and ecosystem related concern levels" refer to the degree of worry regarding how external environmental factors, like ocean temperature changes, habitat degradation, or shifts in predator-prey dynamics, might be impacting a fish stock, potentially affecting its health and population size, and warranting additional consideration beyond just fishing pressure in management decisions.<br><br>Environmental and Ecosystem Considerations for sablefish[312]<br>Environmental conditions indicate that temperatures were within, or slightly cooler than, known optimal ranges for young-of-the-year and juvenile sablefish. However, spring chlorophyll-a concentrations were the lowest in the time series in the GOA and second lowest in the Bering Sea with peak spring bloom timing occurring late in the GOA, which may have negative implications for the prey base of larval sablefish.<br><br>Conversely, the foraging opportunities for juvenile and pre-recruit sablefish were likely sufficient, given an adequate zooplankton and forage fish prey base, though levels were reduced from 2022. Similarly, above average condition factors for large female sablefish indicate that food supply was |

[311] https://www.fisheries.noaa.gov/alaska/ecosystems/ecosystem-status-reports-gulf-alaska-bering-sea-and-aleutian-islands
[312] https://apps-afsc.fisheries.noaa.gov/Plan_Team/2023/sablefish.pdf

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |
| | | adequate in recent years. Predation by other groundfish likely remains low, whereas competition for zooplankton prey may have increased in 2023 (i.e., due to high returns of pink salmon in the GOA and a continued increase in other groundfish populations across the GOA and BSAI). Based on the ecosystem information related to Alaskan sablefish provided in the 2023 EBS and GOA Ecosystem Status Reports (ESRs) along with the sablefish Ecosystem and Socioeconomic Profile (ESP; Appendix 3C), the environmental and ecosystem related concern is a 'level 1 – no concern'.<br><br>Ecosystem Status Reports<br>Ecosystem Status Reports (ESRs) include assessments based on ecosystem indicators that reflect the current status and trends of ecosystem components, which range from physical oceanography to biology and human dimensions. The ecosystem information in this report is integrated into the annual harvest recommendations through inclusion in stock assessment-specific risk tables (Dorn and Zador, 2020).<br><br>Ecosystem Status Report Bering Sea[313]<br>The eastern Bering Sea has experienced multi-year periods of warm or cold conditions of varying durations since 2000. The recent warm stanza (2014–2021) was unprecedented in magnitude and duration with the near-absence of sea ice for two winters (2017/18 and 2018/19). The following summers (2018 and 2019) had dramatically reduced cold pool extent (areas of cold bottom waters.<br><br>Groundfish and crab stocks shifted their distribution in response to changes in sea ice and cold pool extent. Some stocks experienced increased recruitment during the warm stanza: sablefish, Togiak herring, and Bristol Bay sockeye salmon. Conversely, some stocks experienced declines: snow crab and Bristol Bay red king crab, and multiple Western Alaska salmon runs.<br><br>Since 2021 conditions have cooled. Ocean temperatures and cold pool extent were near historical average in 2023, though the cold pool was significantly smaller than the large extents that were common prior to 2010. More broadly, the North Pacific is also undergoing a transition from three consecutive years of La Niña conditions to predict El Niño conditions by early 2024. Marine life, like zooplankton and fish, have lagged in their expected response to these cooler conditions. Ecologically, the eastern Bering Sea remained in a transitional state in 2023.<br><br>Southeastern Bering Sea<br>Southeastern Bering Sea Winter 2022/2023 was on the warmer side while summer 2023 was cooler. Sea-ice advance in the winter was delayed due to warmer conditions, but spring ice melt-out occurred near the historical date. Sea ice did eventually reach as far south as St. Paul Island in 2023, providing a source of freshwater as ice melted at the ice edge, reversing a trend of increasing salinity during the recent warm stanza.<br><br>Chlorophyll-a, the base of the food chain, has generally been decreasing and 2023 was among the lowest levels across the shelf. Meanwhile, coccolithophore blooms (generally not considered a positive sign of ecosystem productivity) have been more prominent since 2017 with 2023 being the largest bloom. In spring 2023, a moderate amount of small copepods were available, but large |

[313] https://apps-afsc.fisheries.noaa.gov/REFM/docs/2023/EBSecosys.pdf

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

copepods and euphausiids were scarce. In fall, the moderate abundance of small copepods continued, and the abundance of large copepods and euphausiids remained low but increased from south to north. The abundance of jellyfish - potential competitors for zooplankton prey - was average in 2023, representing no significant change in competitive pressure.

The effects of water temperature and prey availability are evident in the indicators of pelagic fish condition, which were mixed in 2023. Age-0 pollock, the numerically dominant forage fish, as well as juvenile and adult pollock showed continued declines in fish condition in 2023. Togiak herring and Bristol Bay sockeye salmon biomass remained high. was mixed with birds on St. George Island having higher success than birds on St. Paul Island. The benthic habitat showed mixed responses following the recent warm stanza. There were continued declines in habitat disturbance by fishing gear. The biomass of some epifauna (e.g., anemones and sea whips) increased in 2022 and 2023 yet sponges have shown a steady decline since 2015. Sea stars and brittle stars continued to have high abundance and biomass while several crab stocks showed declines in 2023. Flatfish, like yellowfin sole and flathead sole, that feed on benthic infauna have continued to decrease in abundance, suggesting potential prey limitations. In fact, fish condition declined from 2022 to 2023 for several flatfish species: arrowtooth flounder, northern rock sole, yellowfin sole, flathead sole, and Alaska plaice.

Northern Bering Sea

Northern Bering Sea Ecosystem-wide impacts of the loss of sea ice have been observed in the northern Bering Sea (NBS). Northward shifts in the distribution of groundfish species and concerns about the food web dynamics and carrying capacity have existed since 2018. However, since 2021, the NBS ecosystem has also been transitioning to more average conditions. Sea surface temperatures have cooled. Marine life has experienced lower metabolic stress.

Chlorophyll-a has been decreasing over the northern shelf, and 2023 was among the lowest levels. In fall, small copepods were present and increased in abundance from south to north. Hot spots of large copepods and euphausiids were observed around St. Lawrence Island. The abundance of jellyfish increased over the NBS shelf.

Integrated indicators of the pelagic environment were mixed for the NBS in 2023. Adult pollock condition was the highest observed during the bottom trawl survey since 2017, yet juvenile pollock condition has decreased since 2021. Observations from St. Lawrence Island indicated that seabirds, like crested auklets, did well in 2023. Western Alaska salmon runs have experienced precipitous declines in recent years. This is largely attributed to ecosystem conditions experienced in both the freshwater and marine residency phases. However, slight increases were observed in juvenile Chinook and chum salmon indices in 2023. Fewer metrics of benthic habitat condition are currently available for the NBS. Those available for 2023 were mixed, but largely showed declines. Trends in anemones show low biomass in 2023. Sponges are more variable, and biomass was moderate in 2023. Indirect measures of benthic productivity show continued low biomass of eelpouts in 2023 and continued declining trend in poachers since 2017. The condition of yellowfin sole decreased to its lowest level and Alaska plaice condition remained just below the time series average in 2023.

The prevalence of harmful algal blooms (HABs) in marine food webs of the NBS are important indicators of ecosystem health and of potential threats to wildlife and human health. Recent

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |
| | | oceanographic changes have made conditions more favorable for HAB species. Dedicated research has documented HABs in the Bering Strait and this trend will continue to be monitored.<br><br>Management uses<br>Ecosystem and stock assessment scientists worked together to account for the influence of environmental conditions on commercially important fish stocks. They considered ecosystem information in seven full assessments for the Bering Sea and Aleutian Islands stocks plus the Alaska-wide sablefish stock in 2023. Two of these assessments classified ecosystem dynamics at risk level 2 (out of 3 levels) in the Bering Sea, noting concerns based on multiple indicators that showed consistent adverse signals for the walleye pollock and yellowfin sole stocks. The Aleutian Islands Pacific cod assessment also classified ecosystem dynamics at a risk level 2 (see AI In Brief for details).<br><br>The Scientific and Statistical Committee (SSC) set the maximum acceptable biological catch (max ABC) for EBS pollock following Tier 1a of the Fishery Management Plan. However, due to multiple indicators of primary and secondary productivity showing adverse signals borne out in continued declining trends in juvenile and adult fish condition, the max ABC was reduced by 18% for 2024, corresponding to the Tier 3 estimate (as has been done in past years).<br><br>Several additional BSAI stocks that did not have full assessments in 2023 had recommended reductions from max ABC for 2024 based on concerns noted in 2022. Northern rocksole, black-spotted/rougheye rockfish, and sharks were reduced from max ABC, but concerns were not related to ecosystem dynamics.<br><br>For the remaining four stocks managed in the eastern Bering Sea, including eastern Bering Sea Pacific cod and yellowfin sole, no ecosystem-related reductions from max ABC were recommended for 2024, as precautionary measures already incorporated into setting catch levels were considered sufficient to address uncertainty about ecosystem dynamics.<br><br>Ecosystem Status Report Aleutian Islands[314]<br>Current Conditions<br>• Relatively stormy during the winter of 2022-23 and summer of 2023.<br>• Warmest winter sea surface temperatures since 1900.<br>• Cooler (but still above average) spring-summer conditions.<br>• The upper mixed layer extended deeper than during 2022, which potentially impacted the vertical distribution and availability of prey throughout the water column.<br>• Wind patterns and low eddy kinetic energy suggest that there was lower transport of heat and nutrients through the passes.<br>• Seabird reproductive success in the eastern Aleutian Islands was at or above average, indicating wide availability of zooplankton and fish prey. Seabird reproductive success was mixed in the western Aleutian Islands.<br>• Eastern Kamchatka pink salmon abundance was the third highest on record.<br>• Paralytic shellfish toxins in blue mussels sampled in June were 47 times above the legal limit. |

[314] https://www.fisheries.noaa.gov/resource/data/ecosystem-status-report-2023-aleutian-islands

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |
| | | Multi-year Patterns observed across the Aleutian Islands continued.<br>Persistent warm conditions since 2013 14. Water column temperatures have been above-average for the last decade, consistent with warmer mean annual sea surface temperatures across the North Pacific as a whole. These warm conditions suggest that there has been lower productivity across the ecosystem. Spring phytoplankton abundance was below the 1998-2022 average in 2023, which appears to fit a declining trend in abundance over time. In many cases, warmer temperatures lead to increased fish metabolism, faster growth rates for zooplankton and larvae, and shorter incubation periods for fish eggs.<br><br>Increased abundance of Eastern Kamchatka pink salmon in odd numbered years. Their abundance during even-numbered years has also increased, although numbers remain much lower compared to the odd-numbered years. Several other ecosystem indicators show a biennial pattern. For example, satellite chl-a is lower in even years, and tufted puffin chick hatching dates are earlier in odd years, although tufted puffin reproductive success does not vary by year the same way.<br><br>Rockfish continue to be the most abundant pelagic foragers. Stock assessment estimates show that rockfish, which include Pacific Ocean perch and northern rockfish, are the dominant groundfish pelagic foragers. This is a change from the early 1990s, when Atka mackerel and pollock were dominant. Longer-lived species such as rockfish help to increase the stability of the food web because their numbers don't vary with environmental conditions as much as shorter-lived species. However, this also means there is a lower availability of Atka mackerel and pollock which are common prey for predators in the region. Rockfish in the Aleutians are not a common prey in the region. Analysis of Pacific cod diets in this region reflects these trends. See Noteworthy for Pacific cod diets.<br><br>The western Aleutians were under a moderate heat wave throughout winter before cooling in spring and summer. Heatwave conditions have largely persisted since August. Eddy kinetic energy was below average, suggesting that there was lower transport of heat and nutrients through the passes. There was lower phytoplankton biomass across the chain.<br><br>The reproductive success of least, whiskered, and crested auklets, planktivorous seabirds at Buldir Island was average, but was below average for parakeet auklets. This suggests that overall zooplankton availability was sufficient to support seabird reproductive success in 2023 and potentially other plankton eating commercial groundfish species. However, conditions were not as good as in 2022 when reproductive success was average to above the long-term average for all seabirds.<br><br>Reproductive success of fish-eating seabirds was mixed for both divers and surface-foragers. Tufted and horned puffins had above average and average reproductive success respectively in 2023, signaling potentially favorable conditions for fish foragers. They fed chicks mostly squid (63% by weight) and Pacific saury (18%), while horned puffins fed chicks mostly Atka mackerel (43%) and squid (30%). In contrast, the reproductive success of fork-tailed storm-petrels, kittiwakes, and thick-billed murres was below average.<br><br>The central Aleutians were also under a moderate marine heat wave throughout winter. These conditions resumed in fall. Eddy kinetic energy during 2023 was generally below the 19932022 |

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

averages. This indicates a potentially below-average flux of nutrients and heat across the passes from the Pacific Ocean to the Bering Sea. Phytoplankton biomass, as represented by chl-a concentration, was also generally below the long-term average.

In the eastern Aleutians as in past years, sea surface temperatures during 2023 were not as high during winter as in the western and central Aleutians. Winds suppressing northward flow and eddy kinetic energy was below average, suggesting that there was lower transport of heat and nutrients through Unimak Pass. Fish-eating seabirds, such as murres, puffins and gulls, had above average reproductive success. Capelin comprised 86% (by weight) of the forage fish in tufted puffin check meals. Storm-petrels, which feed on a mix of invertebrates and zooplankton, had average to above-average reproductive success. The continued overall seabird reproductive success suggests that there was enough fish and invertebrate prey to support seabird chick-rearing, which may indicate that there were favorable foraging conditions for some species of groundfish.

Management Uses

Management Uses Ecosystem information was formally considered in seven full assessments for Bering Sea/Aleutian Islands stocks plus the Alaska-wide sablefish stock in 2023. In the Aleutian Islands, ecosystem dynamics remained at a risk level 2 (out of 3 levels) for Pacific cod, noting concerns based on multiple indicators that showed consistent adverse signals for the stock such as a less fish in their diets, lower overall quality of prey, and warm winter temperatures? coinciding with their spawning season. The stock assessment authors had recommended an 8% reduction from the maximum acceptable biological catch (max ABC). However, due to concerning environmental conditions, the SSC recommended a reduction of 10% from the max ABC.

In the Bering Sea, ecosystem dynamics for both walleye pollock and yellowfin sole were also categorized at level 2, (see EBS In Brief for details). Several additional BSAI stocks that did not have full assessments in 2023 had recommended reductions from max ABC for 2024 based on concerns noted in 2022. Northern rocksole, black-spotted/rougheye rockfish, and sharks were reduced from max ABC, but concerns were not related to ecosystem dynamics.

For the remaining four stocks, no ecosystem-related reductions from max ABC were recommended for 2024. Precautionary measures already incorporated into setting catch levels were considered sufficient to address uncertainty about ecosystem impacts on stocks.

Ecosystem Status Report Gulf of Alaska[315]

Overview

- The Gulf of Alaska shelf marine ecosystem had an average year of productivity in 2023, continuing a multi-year trend that is expected to change in 2024.
- Zooplankton were less available in 2023 (prey for adult walleye pollock, Pacific Ocean perch, dusky rockfish, northern rockfish and juvenile groundfish) but nutritious large copepods were more abundant across the GOA.
- Forage fish (prey for Pacific cod, sablefish, arrowtooth flounder, yelloweye rockfish) varied across the GOA, and included increased capelin.

[315] https://www.fisheries.noaa.gov/resource/data/ecosystem-status-report-2023-gulf-alaska

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

- The predominant GOA groundfish species, by biomass, continue to be characterized by increased sablefish and Pacific Ocean perch populations and reduced populations of Pacific cod, Pacific halibut, and arrowtooth flounder

Multi-Year Trends

Given our current El Niño status and the associated warming surface waters predicted in winter/spring of 2024, the reduction in zooplankton availability and quality may persist into the coming year. Vulnerable groundfish in 2024 (due to warm surface waters and reduced zooplankton quality) poten9ally include the larval and age-0 juveniles of Pacific cod, walleye pollock, and northern rock sole. Warm surface waters can be favorable for larval rockfish and sablefish. Zooplankton-eating adult groundfish may have reduced prey availability (walleye pollock, Pacific Ocean perch, dusky & northern rockfish) but the deeper adult habitat is not predicted to warm unless El Niño-related warming continues long enough to be mixed to depth.

Ocean temperatures were approximately average to cooler than average in the winter and spring (surface and depth) and above average in the late summer, ranging from 5.8°C (WGOA Bottom Trawl Survey) to 10.5°C (Icy Strait, southeast Alaska). The cool early spring surface temperatures were favorable for walleye pollock, Pacific cod, northern rock sole egg and larval survival. The warm late spring/early summer surface temperatures may have been favorable for rockfish larval feeding and survival.

The spring chlorophyll-a concentration (an indicator of primary production) continued a multiyear below average trend, and peak bloom timing was considerably late (western GOA) to average (eastern GOA) across the regions. While late peak spring blooms can be driven by colder springs, this event may also be explained by a deeper mixed layer in the winter/spring. Weaker stratification of the water column and a deeper mixed layer depth can reduce the opportunity for wind mixing to bring plankton and nutrients to the surface to promote spring blooms.

Prey availability for zooplankton-eating adult groundfish (e.g., walleye pollock, Pacific Ocean perch, dusky and northern rockfish), and larval/juvenile groundfish, was below average to average across the GOA shelf. Total zooplankton biomass progressed from below average in the spring to improved conditions in the summer, although higher biomass of large copepods and euphausiid biomass were higher in many areas. Biomass of larval walleye pollock and Pacific cod in spring and summer surveys were low, suggesting less productive feeding conditions in the nearshore for both those larvae and the predators that feed upon them. Signs of a restricted zooplankton prey base include a decline from above average to average reproductive success for zooplankton eating seabirds, skinnier adult pollock, below average energy density of juvenile salmon, and juvenile pink salmon diet dominated by jellyfish, tunicates, and other gelatinous prey (less nutritious zooplankton). Predictions for 2024 returns of pink salmon are less favorable based on juvenile CPUE, length, and energy density in 2023

Prey availability for fish-eating groundfish (e.g., Pacific cod, sablefish, arrowtooth flounder, yelloweye rockfish) was approximately average with signs of reduced abundance. Capelin populations are rebounding for the first year since their decline during the 2014-2016 marine heatwave. Herring population biomass remains elevated but is decreasing due to a declining 2016 strong year class (as assessed in eastern GOA but assumed GOA-wide trends). Age-0 pollock, a

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

common prey in western GOA, had very low abundance. Fish-eating diving seabirds (common murres and tufted puffins), had fewer to average number of chicks across the GOA, indicating less than sufficient to adequate prey to meet their needs. In particular, black legged kittiwakes experience reproductive failure on Chowiet Isl. (Alaska Peninsula), potentially due to lack of age-0 pollock and Pacific sandlance in that area.

Management uses

Ecosystem information was formally considered in eight full groundfish stock assessments for Gulf of Alaska (GOA), and one statewide stock (sablefish) in 2023. The overall moderately-productive conditions in the GOA, there were no ecosystem-related reductions from the assessment catch (ABC) for GOA groundfish stocks (similar to 2022). The ABC for GOA walleye pollock was reduced from the assessment author's recommendation by 33%, still an increase relative to last year's ABC, to account for variable recruitment.

For the remaining seven stocks managed in the Gulf of Alaska, precautionary measures already incorporated into setting catch levels were considered sufficient to address ecological uncertainty. During deliberations, the North Pacific Fisheries Management Council noted that population dynamics and ecosystem conditions would support the persistence of adult Pacific cod through the warming conditions predicted for 2024. As such, they considered that further reductions from author-recommended ABC were unnecessary. The total allowable catch (TAC) for 2024 across GOA groundfish stocks (including sablefish) amounts to 520,020 metric tons, which is below the optimal yield cap of 800,000 metric tons.

ACLIM[316]

ACLIM is an interdisciplinary partnership aimed at projecting and assessing climate impacts on marine fisheries in the Bering Sea, Alaska. This research links downscaled global climate and socioeconomic projections to regional circulation, climate-enhanced biological models, and socio-economic and harvest scenarios to guide the management of climate change risks on fish and fisheries, as well as to assess the efficacy of various adaptation strategies. This partnership involves over 50 scientists, including physical oceanographers, ecological modelers, socioeconomic analysts, and fishery management specialists from NOAA AFSC, NOAA PMEL, and the University of Washington.

ACLIM employs outcomes from various models to assess climate-induced alterations and prospective management strategies. This encompasses a collection of 11 prospective climate scenarios dynamically downscaled to the Bering Sea via a coupled ocean circulation and lower trophic level model referred to as the "Bering10K" model. The downscaled Bering10K model scenarios are employed to inform five categories of ecosystem models, which exhibit differing degrees of food-web complexity. These include climate-enhanced single-species and multispecies assessment models, a size-spectrum model, an Ecopath with Ecosim model, and a fully coupled spatially explicit end-to-end model (FEAST). The ACLIM biological models are interconnected with socioeconomic models via over five fishing scenarios to evaluate the efficacy of various management strategies.

[316] https://www.fisheries.noaa.gov/alaska/ecosystems/alaska-climate-integrated-modeling-project

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

The ACLIM modeling framework aims to provide the NPFMC with insights into the efficacy of existing and alternative management strategies in the context of a changing climate. The scenarios will assist in identifying and evaluating climate-resilient management alternatives (Holsman *et al.*, 2019).

ACLIM 2.0: Building Pathways to Resilience Through Evaluation of Climate Impacts, Risk, & Adaptation Responses of Marine Ecosystems, Fisheries, & Eastern Bering Sea Coastal Communities.

ACLIM phase 2 is presently underway and builds on ACLIM phase 1 pilot efforts. ACLIM 2.0 next directions include:

- Eastern Bering Sea Social- ecological system climate risk analysis
- Expanded management scenarios
- Social network modeling & Co-production of knowledge
- Spatial distribution models & Northern Bering Sea
- Expanded protected species analyses (marine mammals)
- Expanded Ocean Acidification and O2 modeling
- Expanded lower trophic and Young of the Year (YOY) fish modeling
- Coordination with our sister project in the Gulf of Alaska Integrated Modeling Project (GOA-CLIM)

Gulf of Alaska Integrated Modeling Project (GOA-CLIM)[317]
The GOA-CLIM project is an interdisciplinary modeling initiative that utilizes a regional perspective on global climate models. Researchers are integrating regional socio-economic and oceanographic data with biological models, including single-species, multispecies, and ecosystem models, to create a regional multi-model (an ensemble model) that offers quantitative guidance for resource management in light of climate variability and long-term changes.

Researchers are commencing efforts to predict the effects of climate change on the Gulf of Alaska marine ecosystem and its organisms. Through the provision of short-term and long-term forecasts, scientists aim to assist resource managers and local people.
Project Focus
Research Pathway 1:

- Develop and apply the Atlantis model as an element of a multi-model ensemble to evaluate fisheries management strategies in a changing climate.
- Combine oceanographic modeling driven by climate projections of earth system models (ESM) with biological models including single species, multi-species, and ecosystem models. This includes the Atlantis end-to-end ecosystem model, food web models for the Gulf of Alaska (Ecopath and Ecosim) and a Gulf of Alaska multi-species (CEATTLE).
- Explore recent climate change impacts on the Gulf of Alaska social-ecological system (e.g., use the 2013-2016 marine heat wave, PDO variation, and climate projections as natural experiments to explore ecosystem-level and species-specific responses to physical forcing).
- Apply the coupled climate-biological-social multi-model ensemble to explore the implications of long-term changes in physical forcing on various management questions (e.g., current OY range

[317] https://www.fisheries.noaa.gov/alaska/ecosystems/gulf-alaska-climate-integrated-modeling-project

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

in the Gulf of Alaska; implementation of catch share programs, etc.), taking into account model uncertainty.
- Evaluate performance of management strategies under climate change (e.g., estimate system-level OY for Gulf of Alaska using the multi-model ensemble)

Research Pathway 2:
- Evaluate and predict the impacts of major environmental anomalies to an endangered population of Steller sea lions using the 2013-2016 marine heatwave as a natural experiment.

Research Pathway 3:
- Model fleet dynamics and fishery landings responses to ecosystem and management change

Gulf of Alaska Climate Integrated Modeling Socioeconomics—from Climate to Communities
This project will examine how individuals, families, and communities may adapt to climate variability and associated changes in fisheries and marine ecosystems. It will also identify the factors underlying adaptation choices, and tradeoffs associated with those adaptations. Predicted fleet responses and adaptations will be coupled with regional economic models to understand potential economic impacts on fishing communities. In turn, fleet behavior will feed into biological models to understand changes in harvest patterns and species composition of catch.

Fishery Ecosystem Plans
The NPFMC use Fisheries Ecosystem Plans (FEPs) to augment the Council's management programs by integrating advanced ecosystem science, comprehensive ecosystem considerations, and management policies that synchronize Council management across all Fishery Management Plans within an ecosystem[318].

The Council aimed to create FEPs that:
- Enhance existing Council documents, processes, and decision-making.
- Offer focused, adaptive ecosystem assessments without inundating the audience with excessive ecosystem data.
- Yield quantifiable advancements in fishery management, while refraining from directly sanctioning management actions (action-informing rather than action-forcing).

The Council has created a comprehensive, continuous framework to inform policy options and related opportunities, risks, and trade-offs impacting FMP species and the wider Bering Sea ecosystem, following the establishment of the Aleutian Islands FEP and the subsequent Bering Sea FEP, which incorporated lessons learned.

The FEPs aim to[319]:
1. Establish a transparent public process for the Council to determine ecosystem objectives and management strategies.
2. Function as a communication instrument for ecosystem science and Council policy.

[318] https://www.npfmc.org/about-the-council/plan-teams/bering-sea-fishery-ecosystem-plan-team
[319] https://www.npfmc.org/fisheries-issues/issues/ebfm/

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |
| | | 3. Offer a framework for strategic planning to direct and prioritize research, modeling, and survey requirements related to fisheries, habitats, and ecosystems.<br>4. Identify interconnected components of the Bering Sea and Aleutian Island ecosystems and their significance for specific management inquiries.<br>5. Evaluate Council management in relation to EBFM best practices, pinpointing areas of achievement and opportunities for enhancement on a regular basis.<br>6. Establish a framework for evaluating policy alternatives and their associated opportunities, risks, and trade-offs impacting FMP species and the wider Bering Sea and Aleutian Island ecosystem (e.g., assessment of management trade-offs among FMPs, fisheries, or other activities); and<br>7. Enhance resilience in Council management strategies, incorporating options for adapting to evolving circumstances (e.g., climate change-induced alterations in fish distribution and abundance, shifts in shipping patterns, etc.).<br><br>The Bering Sea FEP serves as a foundational document that delineates existing procedures and optimal practices for Ecosystem-Based Fisheries Management (EBFM), offers concise and adaptive descriptions of the interrelated physical, biological, and human/institutional components of the Bering Sea ecosystem, establishes ecosystem thresholds and targets, and instructs on the application of this information to inform fishery management decisions[320].<br><br>Furthermore, an "action module" approach enables the Council to focus staff efforts on urgent matters and convene an advisory taskforce of specialists. Two action modules have been commenced to date[321]. The Climate Change Action Module aims to assess the vulnerability of critical species and fisheries to climate change and to enhance resilience in regional fisheries management. The Action Module encompasses three objectives. The initial deliverable is a preliminary Climate Resilience Synthesis; forthcoming outcomes will also guide the implementation of “climate-ready” tactical and strategic management strategies, aimed at sustaining a productive Bering Sea marine ecosystem and robust fisheries for the foreseeable future.<br><br>In 2022 The Climate Change Taskforce (CCTF) has produced a climate readiness synthesis[322] to serve as a foundational resource for the North Pacific Fishery Management Council (Council) in evaluating the overall climate preparedness of the current management system and to aid in enhancing existing management for greater climate resilience. This synthesis seeks to evaluate the present status of "climate readiness," which refers to the extent to which management tools, assessments, and information pathways are structured to tackle and account for long-term climate change and the extraordinary conditions and distinct challenges it poses, as opposed to merely addressing natural climate variability.<br><br>This synthesis is structured into three distinct components. Section 1 presents a managerial overview of the existing system, emphasizing management strategies related to the Bering Sea system and their effectiveness in addressing climate change. Section 2 presents an analysis of information, encompassing climate-related data, presently incorporated in the stock assessment and fishery evaluation (SAFE) reports. These reports delineate the historical, current, and imminent status (1-4 |

[320] https://www.npfmc.org/about-the-council/plan-teams/bering-sea-fishery-ecosystem-plan-team/
[321] https://www.npfmc.org/wp-content/PDFdocuments/membership/CCTF/ClimateChangeActionModFinalWorkplan_2021.pdf
[322] https://www.npfmc.org/wp-content/PDFdocuments/Publications/Misc/ClimateReadinessSynthesis2022.pdf

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

years) of Bering Sea fishery resources on an individual stock basis, alongside the function of the target species within the wider social-ecological framework. Section 3 examines the diverse knowledge bases that underpin climate preparedness and adaptation strategies.

Harvest specification procedure

The Council annually reviews an ecosystem-based Ecosystem Status Report during the harvest specifications agenda item to enhance connections between indicators monitoring Alaska's ecosystem status and pertinent issues, as well as the determination of specifications for individual species[323]. An annual four-page report, titled "in-brief," is produced to encapsulate current conditions, pertinent issues, and the application of ecosystem knowledge in establishing harvest requirements.

Furthermore, each groundfish stock assessment include a risk table, which delineates the possibility of the permitted biological catch (ABC) surpassing the genuine, yet unknown, overfishing limit (OFL) (Goethel *et al.,* 2023). The risk tables are designed to guide the adjustment of the ABC from the maximum allowable when necessary. Each stock is evaluated on a scale from level 1 (normal) to level 4 (severe concern) concerning evaluation, population dynamics, environmental/ecosystem concerns, and external fishery performance risk factors (Dorn and Zadori, 2020).

Moreover, a growing number of evaluations also incorporate an Ecological and Socioeconomic Profile, which consolidates a summary of stock-specific ecological and socioeconomic data for integration with the primary stock assessment (Shotwell *et al.,* 2023a).

Aside from the NMFS ecosystem-based research, there are a number of other programs, initiatives and plans initiatives devoted to understanding the ecosystem dynamics as they relate to fisheries.

The North Pacific Research Board (NPRB) established the Integrated Ecosystem Research Program (IERP) to facilitate interdisciplinary research aimed at comprehending the many mechanistic processes that affect the structure and function of marine ecosystems[324]. IERP investigations encompass studies of processes that impact productivity, structure biological communities, determine species relationships, and affect ecosystem services for communities and industries. The IERP research aims to discover and define significant ecosystem features and processes to enhance our capacity to predict and respond to environmental changes.

The program fosters interdisciplinary collaboration (e.g., oceanography, fisheries, social sciences) and integration among ecosystem components (e.g., physics, chemistry, plankton, invertebrates, fish, marine birds and mammals, people). It also promotes collaboration and exchange among the several entities and institutions tasked with conducting research and management in the North Pacific.

Since 2002, NPRB has supported three IERPs in the Bering Sea, Gulf of Alaska, and Arctic marine ecosystems. NPRB is currently planning a fourth IERP that will be centered in, but not limited to, the Northern Bering Sea.

[323] https://apps-afsc.fisheries.noaa.gov/refm/reem/ecoweb/index.php
[324] https://nprb.org/integrated-ecosystem-research/

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |
| | This North Pacific Research Board's (NPRB) Northern Bering Sea IERP will focus on the northern Bering Sea and will include consideration of upstream and downstream ecosystems in the southeastern Bering Sea, western Bering Sea, and Chukchi Sea, respectively[325].<br><br>The research will be focus on 1) how environmental conditions and processes influence species of commercial, ecological, and subsistence importance and 2) the implications for state and federal fisheries management and communities that depend on these resources.<br><br>12.2.1-12.2.3 Main and minor species: protection from adverse impacts.<br>Processes for the detection of possibly harmful effects to nontarget catch/associated species taken in BSAI and GOA groundfish fisheries have been established by the Council, NMFS, and NOAA (NPFMC,2024a,2024b). Fishery management organizations have taken into account the associated species' most likely negative effects of BSAI and GOA groundfish fisheries (NMFS, 2004). Through the NOAA observer program, fishery impacts on associated species are continuously observed, and possible repercussions are taken into account during annual stock assessment procedures[326].<br><br>Additionally, monitoring procedures are in place to make sure that groundfish fisheries do not have any potential negative effects on nontarget species. For BSAI and GOA groundfish fisheries, NOAA implements an observer program (NOAA, 2024)[327]. NOAA maintains an observer database that contains information on non-target captures, including discards of target stocks. The authors of stock assessments get observer data on a regular basis, and they include this data in their annual stock evaluations.<br><br>Main Associated Species<br>• Non-target species are designated "main associated species" for those taxa contributing to the top 80% of total bycatch in the Bycatch Species Profile (BSP).<br>• Observer data summaries were provided by NOAA Regional Office covering the 3 most recent years 2019-2021 for which data were available (Mateo *et al.*, 2023).<br>• The main associated species. in the Sablefish and halibut targeted Hook and Line (HAL) fishery consisted of members of shark and skate complex. As for the species composition in Sablefish and halibut targeted Pot fishery there were no main associated species.<br><br>MAIN SPECIES on Hook and Line fishery targeting Halibut and Sablefish<br>Shark complex (spiny dogfish, Pacific sleeper, salmon shark, other/unidentified sharks).<br>The spiny dogfish, Pacific sleeper shark, and salmon shark are the most common shark species that interact with the longline fishery in the BSAI and GOA[328].<br><br>Sharks belonging to the order Squaliformes, encompassing the families Lamnidae and Squalidae, are classified as higher sharks characterized by five gill slits and two dorsal fins. Spiny dogfish are extensively dispersed over the North Pacific Ocean and serve as the representative species for the Gulf of Alaska shark complex. In the North Pacific, spiny dogfish are predominantly found in the Gulf |

[325] https://nprb-public-website.s3.us-west-2.amazonaws.com/integrated-ecosystem-research/NorthernBeringSeaFactSheet.pdf
[326] https://www.fisheries.noaa.gov/alaska/fisheries-observers/north-pacific-observer-program
[327] https://repository.library.noaa.gov/view/noaa/66036
[328] https://www.npfmc.org/wp-content/PDFdocuments/fmp/GOA/GOAfmpAppendix.pdf

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |
| | | of Alaska, with southeast Alaska as their primary center of abundance; they are also present in the Bering Sea. Spiny dogfish are pelagic species at depths up to 700 m, predominantly around 200 m or shallower on the shelf and neritic zone; they are frequently observed in aggregations.<br><br>Spiny dogfish have aplacental viviparity. Litter size correlates with the female's size, ranging from 2 to 23 pups, with an average of 10. Gestation can last between 22 and 24 months. At birth, individuals measure 24 to 30 cm, experiencing rapid growth initially, followed by a significant deceleration. The greatest adult size is around 1.6 meters and 10 kilograms; the maximum lifespan exceeds 80 years. Fifty percent of females reach maturity at 97 cm and 36 years of age; fifty percent of males attain maturity at 74 cm and 21 years of age. Females deliver offspring in shallow coastal waters, often from September to January. Tagging investigations reveal the presence of local indigenous populations in certain regions and extensively moving groups in others. They may migrate inshore during summer and offshore during winter.<br><br>Salmon sharks are sizable (up to 3 m in length), aplacental, viviparous (producing small litters of one to four pups, with embryos sustained by yolk sac and oophagy), extensively migratory sharks, possessing homeothermic capacities and functioning as extremely active predators (of salmon and white sharks). Salmon sharks are epipelagically scattered over the continental shelf, inhabiting shallow waters from California through the Gulf of Alaska to the northern Bering Sea and off the coast of Japan. In the GOA groundfish fishery and survey data, salmon sharks are found from the coastal regions to the outer shelf, especially near Kodiak Island.<br><br>The Pacific sleeper shark is found from California along the Pacific Rim to Japan and in the Bering Sea, primarily on the outer shelf and upper slope. They frequently appear in nearshore and shallow seas in the Gulf of Alaska. Data tagging indicates that they allocate considerable time traversing vertically into the water column. Adult Pacific sleeper sharks have been documented to reach lengths of up to 7 meters; however, the size at which they attain adulthood and their reproductive mechanism remain unidentified. Other members of the Squalidae exhibit aplacental viviparity, and it is reasonable to assume that Pacific sleeping sharks do as well. Pacific sleeper sharks are located in the GOA groundfish fishery and survey data from the coast to the outer shelf, especially around Kodiak Island in Shelikof Strait, within Southeast Alaska's seas, and in Prince William Sound.<br><br><u>Status of Shark complex in BSAI</u>[329]<br>The last full/operational stock assessment was conducted in 2022. We are presenting the results of the 2022 stock assessment.<br><br><u>Spawning biomass and stock trends</u><br>The primary shark species captured in the BSAI fisheries, predominantly targeting pollock and Pacific cod, are Pacific sleeper sharks and salmon sharks. Commencing circa 2000, the catch rates of sleeper sharks in both the IPHC longline survey and bycatch fisheries experienced a significant reduction over several years, raising potential concerns regarding depletion. All sleeping sharks captured in the survey and fishery are presumably juveniles, rendering it impossible to ascertain the impact of those |

[329] https://apps-afsc.fisheries.noaa.gov/Plan_Team/2022/BSAIshark.pdf

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |
| | | harvests on spawning stock biomass. The bycatch of salmon sharks has typically risen since 2010. Recent catch levels have significantly fallen short of the Acceptable Biological Catch (ABC).<br><br>Discussion on tier determination and plan team resulting in ABCs and OFLs<br>The SSC has categorized sharks in Tier 6, where the Overfishing Limit (OFL) and Acceptable Biological Catch (ABC) are generally determined by historical catch data. The Optimal Fishing Level (OFL) is established at the maximum capture from 2003 to 2015 (689 tons), while the Acceptable Biological capture (ABC) is set at 75% of the OFL, totaling 517 tons. The author and PT advised a decrease from the maximum ABC due to apprehensions about the Pacific sleeper shark stock, as indicated in the danger table. The advised ABC is 450 tons.<br><br>Assessment of status<br>The shark population is not experiencing overfishing. The status of this species complex regarding overfishing or proximity to overfished conditions cannot be ascertained due to its management under Tier 6.<br><br>Status of Shark complex in GOA[330]<br>The last full/operational stock assessment was conducted in 2022. We are presenting the results of the 2022 stock assessment.<br><br>Spawning biomass and stock trends<br>There was a 25% increase in estimated spiny dogfish exploitable biomass from the 2020 assessment value; this increase was due to a substantial increase in estimated biomass in the Eastern GOA (9,917 t to 18,494 t). Although the ORCS methodology is not recommended at this time for setting harvest specifications, the analysis of available information for Pacific sleeper shark did raise substantial concerns for this stock related to recruitment overfishing and likely low productivity of the species.<br><br>Tier determination/Plan Team discussion and resulting ABC and OFL recommendations.<br>For ABC/OFL estimates, spiny dogfish are managed as Tier 5, while the other components remain in Tier 6. The total OFL for the GOA shark complex is the sum of the Tier 5 and Tier 6 recommendations for each species. The recommended ABC for 2023/2024 represents a 23% increase from the 2022 ABC (see table above for details). This increase is entirely from the large contribution of spiny dogfish. The Team's recommended ABC and OFL using the status quo methods are reflected in the table above.<br><br>Tier determination/Plan Team discussion and resulting ABC and OFL recommendations For ABC/OFL estimates, spiny dogfish are managed as Tier 5, while the other components remain in Tier 6. The total OFL for the GOA shark complex is the sum of the Tier 5 and Tier 6 recommendations for each species. The recommended ABC for 2023/2024 represents a 23% increase from the 2022 ABC.<br><br>Status determination<br>Sharks are not targeted in any federal or state managed waters of the GOA. However, sharks are caught incidentally in other target fisheries. A vast majority of this incidental catch is discarded with |

[330] https://apps-afsc.fisheries.noaa.gov/Plan_Team/2022/GOAintro.pdf

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

discard mortality estimated at 100%. There were insufficient data to determine if the shark complex is in an overfished condition, but the complex is not currently being subjected to overfishing. There is no evidence to suggest that overfishing is occurring for any shark species in the GOA because the OFL has not been exceeded.

Skates[331]

Skates (Rajidae) found in the Bering Sea and Aleutian Islands (BSAI) and Gulf of Alaska (GOA) are classified into two genera: *Bathyraja* sp., characterized by soft-nosed species (with narrow rostral cartilage and a soft, flexible snout), and *Raja* sp., comprising hard-nosed species (with thick rostral cartilage that renders the snout stiff). In the Gulf of Alaska, the skate stock complex is administered as three units, with big skate and longnose skate each possessing distinct harvest specifications, while all other skates are categorized as "other skates" group (Ormseth, 2019). Skates are oviparous; fertilization occurs inside, and eggs (ranging from one to five or more) are laid in protective horny casings during incubation. Big skates (*Raja binoculata*) and longnose skates (*Raja rhina*) are the predominant species of skates in the Gulf of Alaska. The majority of the biomass for these two species is situated in the Central Gulf of Alaska (NMFS statistical regions 620 and 630). Survey depth distributions indicate that huge skates predominantly inhabit depths ranging from 0 to 100 m, while longnose skates are primarily located at depths between 100 and 200 m, although they can be found at all depths shallower than 300 m. *Bathyraja* sp. skaters predominate below 200 meters in depth. There is limited knowledge regarding their habitat needs for growth or reproduction, as well as any seasonal migrations. The biomass estimates of BSAI skate more than doubled from 1982 to 1996 based on bottom trawl surveys; it may have declined in the GOA while being stable in the Aleutian Islands during the 1980s.

Spawning biomass and stock trends[332]

Numerous potential indicators of skate abundance exist in the Gulf of Alaska, including longline and trawl surveys. This evaluation utilizes solely the AFSC bottom trawl surveys from 1984 to 2023 for establishing harvest guidelines and biomass estimations, as it provides the most extensive spatial coverage among the available surveys (Tribuzio *et al.,* 2023).

**For** all three assessment groups, the projected biomass for 2024 across the GOA was lower than that projected for 2023 in last year's assessment. The decline for Big and Longnose skates was minimal, with Big skate decreasing from 38,220 t to 37,804 t, representing a 1.09% reduction, and Longnose skate decreasing from 36,162 t to 33,804 t, indicating a 6.52% reduction. The decrease in Other skates was the most significant, dropping from 13,114 tons to 8,869 tons, representing a 32.37% reduction. Other skates experienced a significant decline from 2013 to 2019 and have maintained low levels thereafter. The current status of Other skates biomass remains uncertain; however, the 2023 estimate of 8,869 t represents the lowest level recorded since 1995.

Tier determination/Plan Team discussion and resulting ABCs and OFLs

The skate complex is a Tier 5 assessment with three groups: big skate, longnose skate, and 'other' skates that require an estimated biomass time series. A random effects (RE) model within the REMA

[331] https://www.npfmc.org/wp-content/PDFdocuments/fmp/GOA/GOAfmpAppendix.pdf
[332] https://apps-afsc.fisheries.noaa.gov/Plan_Team/2023/GOAskate.pdf

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

model R package (Sullivan *et al*., 2022) was used to produce biomass estimates suitable for harvest recommendations.

Big skate

The REMA model biomass estimate of Big skate for 2024 is 37,804 t, therefore the OFL = 3,780 t and ABCmax = 2,835 t. The regional biomass estimates are 9,934 t (26.3%) for the WGOA; 23,326 t (61.7%) for the CGOA; and 4,545 t (12%) for the EGOA. The resulting region-specific ABCs are 745 t for the WGOA; 1,749 t for the CGOA; and 341 t for the EGOA.

Longnose skate

The REMA model biomass estimate of Longnose skate for 2024 is 33,804 t, therefore the OFL = 3,380 t and ABCmax = 2,536 t. The regional biomass estimates are 1,384 t (4.1%) for the WGOA; 25,249 t (74.7%) for the CGOA; and 7,172 t (21.2%) for the EGOA. The resulting region-specific ABCs are 104 t for the WGOA; 1,894 t for the CGOA; and 538 t for the EGOA.

Other skates

The REMA model estimate of Other skate biomass for 2024 is 8,869 t, therefore the OFL = 887 t and ABCmax = 665 t. The Other skate ABC is not apportioned among regions.

Status determination

The skate complex is not being subjected to overfishing. Information is insufficient to determine stock status relative to overfished criteria as estimates of spawning biomass are unavailable.

BSAI Skate Complex[333]

Trends in spawning biomass and stock

Biomass estimates for skates (Tier 5 component) in the EBS shelf have been increasing since 2013 and are projected to reach a historic high in 2024, primarily due to Big skates (Tribuzio *et al.,* 2023). Since at least 2010, biomass in the AI has seen a downward trend. Concerns exist over the population of Leopard skates in the AI, as this uncommon, unique species seems to be declining. Biomass estimates in the EBS slope are steady; nonetheless, they are imprecise due to the absence of a recent slope survey.

The spawning biomass of Alaska skates (Tier 3 component) consistently rose from 198,418 tons in 2006 to 284,268 tons in 2020, reaching a peak for the post-1976 environmental regime in that year. The approved model (14.2d) demonstrates a shift to a declining trend since 2021, however projections remain far above the long-term average. Due to diminished recruitment in recent years, as shown in the evaluation, spawning biomass is anticipated to decline in the future. There are indications that a new cohort may be starting to recruit into the population.

Discussion on tier determination and plan team resulting in ABCs and OFLs

The biomass estimations for the Tier 5 "other skates" stock component are predicated on a natural death rate of 0.10 and are generated using the random effects model. The Team deliberated on the potential to ascertain varying values of M for the different species within this stock component in the future, although endorsed the Tier 5 harvest standards as supplied, acknowledging this as a

[333] https://apps-afsc.fisheries.noaa.gov/Plan_Team/2023/BSAIskate.pdf

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

subject for future exploration. The resultant ABCs for this segment of the stock are 9,858 t for both 2024 and 2025, whereas the resultant OFLs for this segment of the stock are 13,145 t for both 2024 and 2025.

The predicted spawning biomass for Alaska skates in 2024 is 106,549 tons, above B40% at 69,152 tons; therefore, Alaska skates are regulated under sub-tier "a" of Tier 3. The Alaska skate allocations for the 2024 and 2025 ABCs are 27,950 t and 26,767 t, respectively, along with the Alaska skate sections of the 2024 and 2025 OFLs are 32,429 t and 31,058 t. Other reference points for Alaska skates are maxFABC = F40% = 0.080 and FOFL = F35% = 0.093.

In aggregate, the harvest recommendations for the BSAI skate stock complex are ABCs of 37,808 t and 36,625 t for 2024 and 2025, and OFLs of 45,574 t and 44,203 t for 2024 and 2025 respectively.

Status determination
Alaska skate, which may be viewed as an indicator stock for the complex, is not overfished and is not approaching an overfished condition. The skate complex is not being subjected to overfishing.

MAIN SPECIES on POT fishery targeting Halibut and Sablefish
There were no main species in the Pot fishery targeting Halibut and Sablefish.

Minor associated species for Sablefish/Halibut targeted longline fishery include the following taxa/categories

- Pacific Cod
- Longnose skate
- Big Skate
- Shortraker Rockfish
- Thornyhead Rockfish
- Other Rockfish

**Pacific cod**
Pacific cod: *Gadus macrocephalus*, is generally found on the continental shelf and upper slope and is distributed at depths from shoreline to 500 m. Pacific cod has a wide distribution over the BSAI and GOA areas (NPFMC, 2024a,b). Management of Pacific cod is under two Fishery Management Plans: one for the Bering Sea/Aleutian Islands region and the other for the Gulf of Alaska region. Stock status of Pacific cod species information is collected through both fishery dependent and fishery independent mechanisms, including the fishery independent surveys, catch accounting system, and observer program. The species is managed as a Tier 5 species.

Status of Pacific cod in BSAI[334]
Eastern Pacific cod

[334] https://www.fisheries.noaa.gov/s3/2024-02/BSAIintro.pdf

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

Trends in spawning biomass and stock

Recruitment is projected to have been subpar for the 2014-2017 and 2019-2021 cohorts, while exceeding average levels for the years 2013 and 2018. The anticipated spawning biomass from Model 23.1.0.d rose from 2010 to 2017, reaching 335,350 t, but has since declined, with an estimated low of 213,565 t in 2023, representing B38%. The spawning biomass is anticipated to rise marginally to 223,107 tons, representing a 39% increase in 2024.

Tier assessment/Plan Team deliberation and consequent ABCs and OFLs

This stock is categorized as Tier 3b for the assessment of 2024 and 2025 ABCs and OFLs. The maximum allowable biological catch (maxABC) for 2024, as determined by Model 23.1.0.d, is 167,952 tons, whereas the estimated maxABC for 2025 is 150,879 tons. The 2024 OFL from Model 23.1.0.d is 200,995 metric tons. The anticipated OFL for 2025 is 180,798 tons. The risk table ratings indicated level 1 (no concerns), and the authors and team did not advocate for a reduction in the ABC.

Assessment of status

EBS Pacific cod is not experiencing overfishing nor classified as overfished, nor is it nearing an overfished state.

Aleutian Islands (AI) Pacific cod

Trends in spawning biomass and stock

Following a decline exceeding 50% from 1991 to 2002, survey biomass has since remained within the range of 50 to 90 kilotons. The biomass estimate from the 2018 Aleutians survey was 81,272 tons, reflecting a decrease of nearly 4% from the 2016 estimate of 84,409 tons. No Aleutian Island survey was completed in 2020, and the last survey for Pacific cod in 2022 recorded 51,539 tons, which is 37% lower than the 2018 estimate.

Determination of tiers, discussion among the Plan Team, and the resultant ABCs and OFLs

The Team opposed the author's proposal to reclassify AI Pacific cod to Tier 3. The Team acknowledged the time and effort the authors invested in creating the models featured in this stock rating. Model 23.2 demonstrates significant enhancement in numerous aspects. Due to the author's apprehension regarding the retrospective patterns in the initial two alternative models (Models 23.0 and 23.1) and the significant divergence of the recommended model (Model 23.2) from those presented in September 2023, the Team concluded that Model 23.2 necessitated further examination prior to its acceptance for management. The Team was unprepared to make a final decision and establish a precedent regarding the most suitable projection method, as they were only given the projection choices and the subsequent changes in specifications from the document during the author's presentation, without sufficient documentation on the subject. Consequently, the Team advised the Tier 5 model with a decrease from the maximum ABC, owing to the Level 2 - Major Concern shown in the risk table for the population dynamics and ecosystem concerns sections. The indicators from both the trawl and longline surveys, as well as the fishery catch per unit effort (CPUE), are at their lowest levels in the historical data set, and elevated temperatures persist at both the surface and bottom in the Aleutian Islands (AI). The decrement from the Tier 5 maximum ABC is established to correspond with the ABC aligned to the 2024 OFL, as forecasted by the author-recommended model utilizing the mean M and growth values from 2004 to 2023. This reduction aimed to decrease the likelihood that the ABC surpasses the true but indeterminate OFL, as per SSC

| 12. | Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed. |
|---|---|

recommendation. The rationale for this decision parallels that utilized in 2022 when the ABC was diminished from the maximum for BSAI northern rock sole, as the Team encountered a persuasive yet insufficiently evaluated new model and signals from the risk table indicating probable issues. The Team additionally advised utilizing the projected OFL from the model in 2024 for both 2024-2025, owing to unsolved issues with the contradictory tendencies of the rising OFL relative to the static predicted ABC from the model in 2025.

Assessment of status
This stock is not experiencing overfishing. It is indeterminate if this stock is overfished or nearing an overfished state due to its management under Tier 5.

GOA Pacific cod[335]
Trends in spawning biomass and stock
Total biomass and spawning biomass had significant reductions from 2013 to 2018, followed by an increase thereafter. The expected spawning biomass for 2024 is B29.7% (nearly 30% of the unfished value and below B40%), representing an increase over the estimated B25.5% for the 2023 spawning biomass based on the 2022 assessment. The augmented biomass is corroborated by a 53% rise in the 2023 projections of total biomass from the AFSC trawl survey and a 32% increase in the AFSC longline survey's relative population number compared to prior estimates.

Discussion on tier determination and plan team resulting in ABCs and OFLs
The GOA Pacific cod stock is classified as Tier 3b. The Team concurred with the author's recommendations for ABC and OFLs. The Team acknowledged the author's discourse on concerns regarding the hazards and environmental conditions impacting Pacific cod and concurred with the author's justification for the proposed OFL and maximum allowable ABC.

Assessment of status
The stock is not experiencing overfishing, is not presently overfished, nor is it nearing a state of being overfished.

**Shortraker Rockfish[336]**
Shortraker: *Sebaster borealis*, is a groundfish belonging to the family Scorpanenidae. This species is distributed along the continental slope in the north Pacific from Point Conception in southern California to Japan. Characteristics of rockfishes including fidelity to localized habitats, slow growth, late maturation, and remarkably long-life spans. The shortraker stock is classified as a Tier 5 stock.

Status of shortraker rockfish in BSAI
The most recent comprehensive stock evaluation was performed in 2022[337]. We are delivering the findings of the 2022 stock assessment. A comprehensive stock assessment will be performed in 2024. Until that time, the values derived from the preceding stock evaluation (below) will be utilized for the 2024-2025 specifications.

[335] https://www.fisheries.noaa.gov/s3/2024-02/GOAintro.pdf
[336] https://apps-afsc.fisheries.noaa.gov/Plan_Team/2023/BSAIshortraker.pdf
[337] https://apps-afsc.fisheries.noaa.gov/Plan_Team/2022/BSAIshortraker.pdf

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |
| | | Trends in spawning biomass and stock<br>The estimated biomass of shortraker rockfish in the BSAI gradually declined from 1998 to 2010 and stayed reasonably steady until 2022. Biomass estimates from the survey diminished in the western and eastern Arctic Islands and augmented in the central Arctic Islands in 2022 relative to 2018. Relative population weights in the EBS slope segment of the longline survey have fluctuated over time, with an increase in 2019 and a subsequent fall in 2021. Exploitation rates have typically remained much below the ABC levels, approaching ABC between 2013 and 2021.<br><br>Discussion on tier determination, plan team outcomes, and resultant ABCs and OFLs.<br>The SSC has previously concluded that only valid estimates of biomass and natural mortality are available for shortraker rockfish, hence categorizing the species for management under Tier 5. The Team advises that the biomass estimate should be derived from the random effects model. The Team advised establishing FABC at the highest allowable level under Tier 5, which is 75 percent of M. The acceptable value of M for shortraker rockfish is 0.03, yielding a maximum FABC value of 0.0225. The ABC is 530 tons for 2023 and 2024, whereas the OFL is 706 tons for the same years.<br><br>Assessment of status<br>Shortraker rockfish is not experiencing overfishing. It is impossible to ascertain whether this stock is overfished.<br><br>Status of shortraker rockfish in GOA[338]<br>Trends in spawning biomass and stock<br>The application of the random effects (REMA) model to trawl survey data from 1990 to 2023 and the longline survey estimated relative population weight (RPW) indices yielded an approximate 8% reduction in the 2024 biomass estimate for shortraker rockfish, compared to the 2023 estimate.<br><br>Discussion on tier determination and plan team resulting in ABCs and OFLs<br>Shortraker rockfish are classified as a Tier 5 species for management purposes.<br>For the 2024 fishery, the authors recommended the maximum allowable ABC of 647 t for shortraker rockfish. This ABC is an 8.3% decrease from the 2023 ABC of 705 t. The OFL is 863 t<br><br>Assessment of status<br>The available data are inadequate to assess stock status concerning overfished criteria. This stock was not experiencing overfishing in 2023.<br><br>**Thornyhead Rockfish**<br>Groundfish called thornyheads (*Sebastolobus* spp.) are members of the Scorpanenidae family, which also includes rockfish. Thornyheads are found throughout the north Pacific in deep water environments. Due to the lack of age data required for age-structured assessment models, NOAA classifies the Thornyhead Complex as a Tier 5 stock. The complex is subject to a biennial stock assessment schedule, with full stock assessments performed in even years and no stock assessments produced in odd years. The complex of thornyhead species does not currently have a directed fishery, however they are frequently captured and kept as part of the groundfish trawl and HAL fisheries. |

[338] https://www.fisheries.noaa.gov/s3/2024-02/GOAintro.pdf

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

Despite being one of the most lucrative rockfish species, thornyheads are still regulated in the BSAI and GOA as "bycatch only," and they are not the subject of a guided fishery (Echave and Hulson, 2018).

Status of Thornyhead in BSAI[339]
The most recent comprehensive stock evaluation was performed in 2022[340]. We are delivering the findings of the 2022 stock assessment. A comprehensive stock assessment will be performed in 2024. Until that time, the values derived from the preceding stock evaluation (below) will be utilized for the 2024-2025 specifications.

Trends in spawning biomass and stock
This is a Tier 5 complex; hence, trends in spawning biomass remain indeterminate. The random effects survey biomass estimates for shortspine thornyhead (SST) on the Aleutian Islands and the Eastern Bering Sea slope have exhibited variability. The non-SST component of the complex exhibits significant variability among surveys. Biomass estimates for the non-SST segment of the complex in both the eastern Bering Sea slope and shelf surveys are often negligible or minimal.

Discussion on tier determination and plan team resulting in ABCs and OFLs
The Team concurs with the author's recommendation to establish FABC at the maximum permissible level under Tier 5 (FABC = 0.75M). The accepted values of M for species within this complex are 0.03 for SST and 0.09 for all other species. Multiplying these rates by the optimal biomass estimates of shortspine thornyhead and the non-SST segment of the complex results in 2023 and 2024 ABCs of 880 t in the eastern Bering Sea and 380 t in the Aleutian Islands. The Team advises that the Overfishing Limit (OFL) be established for the entire Bering Sea and Aleutian Islands (BSAI) region, which, under Tier 5, is determined by multiplying the optimal biomass estimates for the area by the distinct natural mortality rates and summing the outcomes, resulting in an OFL of 1,680 metric tons for 2023 and 2024.

Assessment of status
The "other rockfish" complex is not experiencing overfishing. It is indeterminate if this complex is overfished or nearing an overfished state due to its management under Tier 5.

Status of Thornyhead in GOA[341]
Trends in spawning biomass and stock
This is a Tier 5 complex; hence, trends in spawning biomass remain indeterminate. The random effects survey biomass estimates for shortspine thornyhead (SST) on the Aleutian Islands and the Eastern Bering Sea slope have exhibited variability. The non-SST segment of the complex exhibits significant variability across surveys. Biomass estimates for the non-SST segment of the complex in both the eastern Bering Sea slope and shelf surveys are often negligible or minimal.

[339] https://www.fisheries.noaa.gov/s3/2024-02/BSAIintro.pdf
[340] https://apps-afsc.fisheries.noaa.gov/Plan_Team/2022/BSAIorock.pdf
[341] https://www.fisheries.noaa.gov/s3/2024-02/GOAintro.pdf

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

Tier classification/Plan Team deliberation and subsequent ABCs and OFLs

The Team concurs with the author's recommendation to establish FABC at the maximum permissible level under Tier 5 (FABC = 0.75M). The accepted values of M for species within this complex are 0.03 for SST and 0.09 for all other species. Multiplying these rates by the optimal biomass estimates of shortspine thornyhead and the non-SST segment of the complex results in 2023 and 2024 ABCs of 880 t in the eastern Bering Sea and 380 t in the Aleutian Islands. The Team advises that the Overfishing Limit (OFL) be established for the entire Bering Sea and Aleutian Islands (BSAI) region, which, under Tier 5, is determined by multiplying the optimal biomass estimates for the area by the distinct natural mortality rates and summing the outcomes, resulting in an OFL of 1,680 metric tons for 2023 and 2024.

Assessment of status

The "other rockfish" complex is not experiencing overfishing. Determining whether this complex is overfished or nearing an overfished state is unfeasible due to its management under Tier 5.

**Arrowtooth flounder**[342]

Arrowtooth flounder is a relatively large flatfish and one of the most abundant fish in the Gulf of Alaska. It plays an important role in Alaska's complex marine food chain. It feeds extensively on the commercially important walleye pollock. In turn, they are food for Alaska Steller sea lions, making up almost 35% of their diet. Though the population can be found as far south as central California, it is known to spawn in Alaskan waters and the eastern Bering Sea from December through February.

BSAI Arrowtooth Flounder[343]

The most recent full assessment was conducted in 2022[344] (Shotwell *et. al,* 2022). A full stock assessment document with updated assessment and projection model results is scheduled for November 2026.

Trends in spawning biomass and stock

The anticipated age 1+ total biomass for 2023 is 929,274 t, reflecting a minor decline from the 914,915 t estimated for 2023 in the previous year's assessment. The anticipated female spawning biomass for 2023 is 514,577 tons, representing a little decline from the previous year's projection of 528,725 tons. This stock experienced consistent growth from 1985 to 2009, declined marginally until 2017, and thereafter rose to levels comparable to the peak observed in 2009.

Discussion on tier determination and plan team, resulting in ABCs and OFLs.

The SSC has concluded that dependable estimates for B40%, F40%, and F35% are available for this stock. The Arrowtooth flounder is thus eligible for management under Tier 3. The point estimates for B40% and F40% from this year's evaluation are 224,487 tons and 0.146, respectively. The anticipated spawning biomass for 2023 significantly exceeds B40%, so the ABC and OFL recommendations for 2023 were determined within sub-tier "a" of Tier 3. The authors advise establishing FABC at the F40% threshold, the highest allowable level under Tier 3a, yielding ABCs of 83,852 t and 87,511 t for 2023

[342] https://www.fisheries.noaa.gov/species/arrowtooth-flounder/science.
[343] https://www.fisheries.noaa.gov/s3/2024-02/BSAIintro.pdf
[344] https://apps-afsc.fisheries.noaa.gov/Plan_Team/2022/BSAIatf.pdf

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |
| | | and 2024, respectively. The anticipated harvest at F35% (0.174) results in 2023 and 2024 OFLs of 98,787 t and 103,070 t, respectively.<br><br>Assessment of status<br>The Arrowtooth flounder is a minimally exploited stock in the Bering Sea and Aleutian Islands. Arrowtooth flounder is neither experiencing overfishing nor classified as overfished, and it is not nearing an overfished state.<br><br>GOA Arrowtooth Flounder[345]<br>The arrowtooth flounder population is evaluated every four years. A comprehensive stock assessment was performed in 2021. A harvest forecast was presented this year. The projection model was executed utilizing revised catch data.<br><br>Trends in spawning biomass and stock<br>The Alaska Fisheries Science Center (AFSC) GOA bottom trawl survey was conducted in 2023. The GOA arrowtooth flounder biomass estimate was 1,192,608 (t) for 2023, which was 5% higher than the 2021 survey, but still below the long-term average for the time series. Geostatistical model (vector autoregressive spatio-temporal or VAST with lognormal observation error) estimates were also provided for arrowtooth flounder from the GOA bottom trawl survey. These estimates were very similar in trend to the design-based estimates but had reduced error over most years.<br><br>The anticipated female spawning biomass is expected to experience a modest decline till 2025. The estimated total biomass (1+) is constant, with a little rise anticipated until 2025.<br><br>Discussion on tier determination and plan team outcomes about ABCs and OFLs<br>Arrowtooth flounder sole classified as Tier 3a.<br>The projected total biomass for 2024 is 1,295,410 t. The recommend ABC for 2024 is 119,249 t, the maximum allowable ABC under Tier 3a. This ABC is a 0.2% decrease compared to the 2023 ABC of 119,485 and a 1% increase from the projected 2024 ABC from the last year's assessment. The 2024 GOA-wide OFL for arrowtooth flounder is 142,485 t.<br>The Team agreed with the author's suggestion to utilize the maximum allowable ABC and the associated OFL from the revised harvest prediction.<br><br>Assessment of status<br>This stock is not experiencing overfishing and is neither overfished nor nearing an overfished state.<br><br>**Blackspotted/Rougheye rockfish complex[346]**<br>Rockfish called rougheye (*Sebastes aleutianus*) and blackspotted (*S. melanostictus*) live in the northeastern Pacific's upper continental slope and outer continental shelf. Their range include the Bering Sea and the North Pacific arc from Japan to Point Conception, California (Kramer and O'Connell, 1988). The two species coexist in a sympatric range, with blackspotted expanding into the western Aleutian Islands and rougheye reaching further south along the Pacific Rim (Orr and Hawkins, 2008). The two species' ranges overlap quite a bit, mostly from southeast Alaska into the |

[345] https://www.fisheries.noaa.gov/s3/2024-02/GOAintro.pdf
[346] https://www.npfmc.org/wp-content/PDFdocuments/SAFE/2023/GOArougheye.pdf

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

Alaska Peninsula (Gharrett *et al.,* 2005; Orr and Hawkins, 2008). Both species seem to be most prevalent in Alaskan waters, especially the eastern Gulf of Alaska (GOA). Adults in the GOA are restricted to a small area along the upper continental slope at depths of 300–500 m; their abundance declines sharply beyond this range (Ito, 1999). Along with shortraker rockfish (*Sebastes borealis*), these species coexist often.

Rougheye and blackspotted (RE/BS) rockfish appear to be K-selected with late maturity, sluggish development, extraordinary longevity, and low natural mortality, despite the fact that virtually little is known about their biology and life history. The RE/BS rockfish are ovoviviparous, like other Sebastes species, which means that the embryos receive at least some maternal nutrition during internal egg fertilization and incubation. Studies on the RE/BS fecundity in Alaska are lacking.

According to one study on the reproductive biology of rougheye, parturition (larval release) may occur between the months of December and April (McDermott, 1994). It is unknown whether or when males inseminate females or if spawning/breeding migrations take place. The larval stage is pelagic, but studies on larvae are hampered since, as of right now, the only reliable method for positively identifying larvae is through labor-intensive genetic analysis. Additionally, it appears that the post-larvae and early young-of-the-year stages are pelagic (Matarese *et al.,* 1989; Gharrett *et al.,* 2002). The only evidence of habitat preference for this life stage comes from the recent application of genetic tools to identify post-larval RE/BS rockfish from opportunistically collected samples in epipelagic waters far offshore in the Gulf of Alaska.

BSAI Rougheye/Blackspotted Rockfish[347]
The last full assessment was conducted for the BSAI blackspotted and rougheye rockfish complex in 2022[348]. A full stock assessment document with updated assessment and projection model results is scheduled for November 2024.

Trends in spawning biomass and stock
From 2014 to 2023, spawning biomass rose from 2,656 t to 3,471 t, while total biomass climbed from 2002 to 23,883 t in 2023. A significant portion of this rise in total biomass can be ascribed to relatively recent year classes, particularly the substantial 2010-year class that is already commencing maturation. The spawning biomass for AI blackspotted/rougheye rockfish is anticipated to have a modest increase in 2024, reaching 3,642 tons.

Discussion on tier determination and plan team outcomes about ABCs and OFLs
The stock assessment is divided into AI and EBS. This stock is categorized under Tier 3 for management by the AI, as estimates for B40%, F40%, and F35% are accessible. It qualifies as Tier 3b but is anticipated to surpass B40% in 2023, therefore placing it in Tier 3a. The EBS stock is classified under Tier 5, with an anticipated biomass of 1,544 tons for both 2023 and 2024.

The authors and Team propose a total 2023 ABC of 525 t and a 2023 OFL of 703 t. The allocation of the 2021 ABC to subareas is 166 tons for the Western and Central Aleutian Islands and 359 tons for the Eastern Aleutian Islands and Eastern Bering Sea.

[347] https://www.fisheries.noaa.gov/s3/2024-02/BSAIintro.pdf
[348] https://apps-afsc.fisheries.noaa.gov/Plan_Team/2022/BSAIrougheye.pdf

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

Assessment of status
The BSAI blackspotted and rougheye stock complex is not experiencing overfishing. In the AI region, the blackspotted and rougheye rockfish complex is neither overfished nor nearing an overfished status. The status of the complex in the EBS region regarding overfishing or nearing overfished conditions cannot be assessed due to its management under Tier 5.

GOA Rougheye/Blackspotted Rockfish[349]
Trends in spawning biomass and stock
The projected female spawning biomass for 2024 and 2025 is a significant increase compared to 2023. This is ascribed to a modification in population scale projected by the author's suggested model 23.1b. This alteration in scale aligns with historical stock estimates but contradicts recent decreases in both abundance indexes. The anticipated female spawning biomass significantly exceeds B40% and is expected to remain stable.

Discussion on tier determination and plan team outcomes about ABCs and OFLs
The rougheye/blackspotted combination is classified as Tier 3a. The Team assessed and deliberated on model performance, concurring with the author with the inadequate fits and model uncertainty. Consequently, it was agreed to recommend model 23.1b, which estimates a reduced number of parameters. The Team concurred with the rationale for the reductions from the model-estimated maximum allowable ABC.

Assessment of status
The stock is not experiencing overfishing nor is it currently overfished, nor is it nearing a state of being overfished.

Minor associated species for Sablefish/Halibut targeted pot fishery
There were no minor associated species on the Sablefish/Halibut pot fishery.

In Alaska, there is a strategy in place to manage most bycatch fish species (main species, groundfish, seabirds) which consists of (1) extensive catch accounting system (2) observer program to estimate discarded catch (3) fishery independent surveys conducted by NOAA- Fisheries (4) statistical stock assessments for all of the main bycatch species (5) a tiered system of assessments that provides for more precautionary annual catch limits when assessments use less precise methods. The tiered, precautionary procedure for setting annual catch limits provides a high likelihood that stocks will be maintained at levels above their reference points and, and clear procedures exist for restricting catch limits if stock rebuilding is necessary.

Management actions are in place in respect to increasing knowledge on the bycatch dynamics of the directed halibut and sablefish fishery (i.e., methods for the estimation of non-target species catch in the unobserved sablefish IFQ fleet and the restructuring the observer program for inclusion of the halibut and sablefish fleet). Longline and Pot gear is not considered to have serious nor irreversible impacts on marine habitats. Bycatch of seabirds has been addressed by specific regulations put in

[349] https://www.fisheries.noaa.gov/s3/2024-02/GOAintro.pdf

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |
| | | 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. None have been taken since 2013. These measures now include the use of tory lines, night setting, lineshooters and lining tubes, and have been shown to significantly reduce seabird interactions. Bycatch data is collected annually indicating that the majority of the bycatch is made up by rockfish, sharks, and skates. These species are managed by the NPFMC under tier 3 and 5 respectively, using OFL and ABC recommendations and catch limits[350].<br><br>Evidence of outcome indicator(s) consistent with achieving management objectives for non-target species (i.e., avoiding overfishing and other impacts that are likely to be irreversible or very slowly reversible) have been achieved is shown on the stock status of sharks, skates, and rockfish, where it had been shown, that for all of these species' overfishing is not occurring.<br><br>Examining the three fisheries responsible for the majority of seabird bycatch—Pacific cod, sablefish, and halibut demersal longline, the average annual seabird bycatch for 2011 through 2020 were 4,636 birds per year in the Pacific cod fishery, 639 in the sablefish fishery, and 213 in the halibut fishery (Tide and Eich, 2022). In 2021, the Pacific cod and sablefish demersal longline estimated seabird bycatch was quite reduced when compared to the 2011 through 2020 averages (2,277 and 273 birds, respectively). The halibut demersal longline estimated seabird bycatch was higher when compared to the 2011 through 2020 average.<br><br>12.2.4-12.2.5 ETP species: protection from adverse impacts.<br>Several federal policies and associated laws establish management guidelines and legal protections for endangered species that might be affected by the Alaskan commercial halibut and sablefish fishery. These policies include the Magnuson-Stevens Act, the Marine Mammal Protection Act and the U.S. Endangered Species Act. ADF&G provides additional protections for species and stocks of concern.<br><br>The purpose of the ESA is to conserve threatened and endangered species and their ecosystems. There are more than 1,900 species listed under the ESA. A species is considered endangered if it is in danger of extinction throughout all or a significant portion of its range. A species is considered threatened if it is likely to become endangered in the future. The U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) share responsibility for implementing the ESA. NMFS is responsible for 94 marine species, from whales to sea turtles and salmon to Johnson's seagrass[351].<br><br>The listing of a species as endangered makes it illegal to "take" (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to do these things) that species. Similar prohibitions usually extend to threatened species. Federal agencies may be allowed limited take of species through interagency consultations with NMFS or USFWS. Non-federal individuals, agencies, or organizations may have limited take through special permits with conservation plans. Effects to the listed species must be minimized and in some cases conservation efforts are required to offset the |

[350] https://www.fisheries.noaa.gov/alaska/population-assessments/2023-north-pacific-groundfish-stock-assessments
[351] https://www.boem.gov/sites/default/files/oil-and-gas-energy-program/GOMR/NMFS-ESA-Fact-Sheet.pdf

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |

take. NMFS' Office of Law Enforcement works with the U.S. Coast Guard and other partners to enforce and prosecute ESA violations.

The NOAA Protected Resources program conserves and recovers marine resources by doing the following:

- Listing species under the ESA and designating critical habitat (section 4).
- Developing and implementing recovery plans for listed species (section 4).
- Developing cooperative agreements with and providing grants to States for species conservation (section 6).
- Consulting on any Federal actions that may affect a listed species to minimize the effects of the action (section 7).
- Partnering with other nations to ensure that international trade does not threaten species (section 8).
- Investigating violations of the ESA (section 9).
- Cooperating with non-federal partners to develop conservation plans for the long-term conservation of species (section 10).
- Authorizing research to learn more about protected species (section 10).

U.S. fisheries management, including that of Alaskan groundfish fisheries, must be consistent with the Magnuson-Stevens Act, the Marine Mammal Protection Act, and the U.S. Endangered Species Act. Each of these establishes management guidelines, objectives, and legal protections for threatened and endangered species.

Interactions between Alaskan commercial halibut and sablefish fisheries with marine mammals and birds have been documented through NMFS' Alaska Marine Mammal Observer Program, which reports on these interactions, including incidental take of endangered species[352]. Under the Marine Mammal Protection Act (MMPA)[353], all Category I and II fisheries must be registered in the Marine Mammal Avoidance Program and report any injuries or mortalities of marine mammals to NMFS within 48 hours. All MMPA category fisheries are liable for incidental take of any ESA-listed species.

Onboard Observer Program

In addition to the foregoing, the NOAA Alaska Onboard Observer Program[354] provides further evidence that there is adequate assessment of the most probable adverse impact of the halibut/sablefish fisheries on ETP species. Groundfish observers conduct species composition sampling of retained catch and bycatch, and record data on retained catch, fishing effort, and location, and observers also document specific seabird and mammal observations.

There are established outcome indicators that are consistent with guaranteeing that ETP species are safeguarded from negative effects resulting from interactions with Halibut/Sablefish fisheries (including recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible), including recruitment overfishing or other impacts. Constant monitoring procedures,

[352] https://www.fisheries.noaa.gov/alaska/fisheries-observers/alaska-marine-mammal-observer-program
[353] https://www.fisheries.noaa.gov/topic/marine-mammal-protection
[354] https://www.fisheries.noaa.gov/contact/north-pacific-observer-program

| 12. | Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed. |
|---|---|

such as the AK NOAA Onboard Observer Program, ensure that negative effects on ETP species are avoided.

Under the Marine Mammal Protection Act (MMPA), stock assessment reports for stocks that have been classified as strategic must be evaluated annually, annually for stocks for which there is materially new information, and at least once every three years for all other stocks. When available, each stock assessment includes a description of the stock's geographical range, a minimum population estimate, current trends in population, current and maximum net productivity rates, optimal sustainable population levels, allowable removal levels, and estimates of annual human-caused mortality and serious injury due to interactions with commercial fisheries and subsistence hunters (see Young *et al*. (2023) for the most recent Marine Mammal stock assessment for the Alaska region).

Additional outcome indicators that are consistent with monitoring for negative impacts on endangered species are detailed in the annual Ecosystems Status Reports for the Aleutian Islands (Ortiz and Zador, 2023) and Eastern Bering Sea (Siddon, 2023). The assessments of stock abundance and/or related parameters for Stellar sea lions, northern fur seals, harbor seals, arctic ice seals (bearded seal, ribbon seal, ringed seal, and spotted seal), and bowhead whales are included as ecological indicators for marine mammals. In order to provide a summary of environmental impacts on seabirds and what that may indicate for ecosystem productivity as it relates to fisheries management, the EBS Ecosystem Status Report also includes an Integrated Seabird Information section. This section integrates seabird data to provide information about seabirds. Sources of seabird data include agency/university researchers, citizen science groups, coastal community members, and long-term monitoring projects like the Alaska Maritime National Wildlife Refuge (e.g., 2023 Seabird Report Card).

The likelihood that halibut/sablefish fishing will negatively affect marine animals or endangered species is quite low. As previously mentioned, the USFWS has identified three ESA-listed seabird species in Alaska: The Short-tailed albatross, *Phoebastria albatrus*; the Spectacled eider, *Somateria fischeri*; and the Steller's eider, *Polysticta stelleri* (threatened) (endangered). According to results from continuous seabird monitoring (Tide and Eich, 2022), there is little to no bycatch of these species in fisheries for halibut and sablefish.

<u>Seabirds</u>
NOAA's NMFS annually updates its estimates of seabirds caught as bycatch in commercial groundfish fisheries operating in Federal waters off Alaska (Tide and Eich, 2022). There is no indication of adverse interactions between Halibut/Sablefish and ESA-listed birds. USFWS does not identify Halibut/sablefish fishery interactions as a threat to short-tailed albatross[355], Stellar's eider[356], spectacled eider[357], or Eskimo curlew[358]. No fishery interactions with Eskimo curlew have been reported in the literature and would seem unlikely given that Halibut/Sablefish fisheries are prosecuted well offshore.

[355] https://ecos.fws.gov/docs/five_year_review/doc6487.pdf
[356] https://www.fws.gov/species/stellers-eider-polysticta-stelleri
[357] https://www.fws.gov/species/spectacled-eider-somateria-fischeri
[358] https://www.fws.gov/species/eskimo-curlew-numenius-borealis

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |
| | | Marine Mammals<br>As identified in annual marine mammal stock assessment reports, there is ongoing monitoring of human-caused mortality, serious injury, and non-serious injury of marine mammals[359]. AK Bering Sea, Aleutian Islands, halibut and sablefish longline fisheries and AK Gulf of Alaska halibut longline fisheries are listed in the Federal Register as Category III: Annual mortality and serious injury of a stock in a given fishery is less than or equal to 1% of the Potential Biological Removal (PBR) level (i.e., a remote likelihood of or no known incidental mortality and serious injury of marine mammals)[360]. However, The AK Gulf of Alaska sablefish longline fishery is classified as Category II based on interactions with North Pacific sperm whales. Given the current mean estimated annual mortality and serious injury (M/SI) of sperm whales in this fishery, NOAA Fisheries cannot conclude the plain language definition for Category III, "a remote likelihood of or no known incidental mortality or serious injury of marine mammals" is appropriate at this time. Instead, the Category II definition, "occasional incidental mortality and serious injury of marine mammals" is more appropriate for this fishery.<br><br>12.2.6-12.2.8 Habitats: knowledge of essential habitats and protection from adverse impacts.<br>The MSA requires fishery management plans to describe and identify EFH, minimize to the extent practicable adverse effects of fishing on EFH, and identify other actions to conserve and enhance EFH (16 U.S.C. 1853(a)(7))[361]. Alaska has more than 50% of the U.S. coastline and leads the United States in fish habitat area and value of fish harvested[362]. Major research programs aim to identify habitats that contribute to the survival, growth, and productivity of sablefish, and to determine how to best manage and protect these habitats. For example, the Marine Ecology and Stock Assessment group from the AK ASFC Auke bay lab have been working on life history of sablefish and identification of essential fish habitat[363].<br><br>EFH research support is based on priorities from the EFH Research Implementation Plan for Alaska (Pirtle et al.,2024). Around $450,000 is spent on EFH research projects each year[364]. Project results are described in annual reports and peer-reviewed literature. Study results contribute to existing Essential Fish Habitat data sets. All federal agencies must consult with NMFS regarding any action they authorize, fund, or undertake that may adversely affect EFH, and NMFS must provide conservation recommendations to federal and state agencies regarding any action that would adversely affect EFH[365]. All significant permits and actions are subject to the Environmental Impact Statement (EIS) process, which not only requires thorough review by scientists and agencies, but also mandates thorough and comprehensive public information and transparency.<br><br>The FMP for Groundfish Fisheries in the EEZ off Alaska contains detailed descriptions of EFH that occur in the state's marine waters, and habitat areas of particular concern. The FMP relates that, "The EFH regulations at 50 CFR 600.815(a)(8) provide guidance on identifying habitat areas of |

[359] https://repository.library.noaa.gov/view/noaa/52074
[360] https://www.federalregister.gov/documents/2023/09/13/2023-19721/list-of-fisheries-for-2024
[361] https://www.ecfr.gov/current/title-50/chapter-VI/part-600/subpart-J
[362] https://www.fisheries.noaa.gov/alaska/habitat-conservation/essential-fish-habitat-research-plan-alaska#:~:text=The%20new%20approach%20is%20focused,reproductive%2C%20or%20survival%20rates).
[363] https://www.fisheries.noaa.gov/about/auke-bay-laboratories
[364] https://apps-afsc.fisheries.noaa.gov/Quarterly/ond2008/tocHEPR.htm
[365] https://www.fisheries.noaa.gov/alaska/habitat-conservation/essential-fish-habitat-efh-alaska

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |
| | | particular concern (HAPCs)[366]. HAPCs are meant to provide greater focus to conservation and management efforts and may require additional protection from adverse effects. Fishery management plans should identify specific types or areas of habitat within EFH as HAPCs based on one or more of the following considerations:<br>1. The importance of the ecological function provided by the habitat.<br>2. The extent to which the habitat is sensitive to human-induced environmental degradation.<br>3. Whether, and to what extent, development activities are, or will be, stressing the habitat type; or<br>4. The rarity of the habitat type.<br><br>Achieving management goals for avoiding, reducing, or mitigating habitat impacts of sablefish/halibut fishing to EFH and HAPCs is supported by outcome indicators.<br><br>In the February 2023 meeting, the Council received a presentation summarizing the 2023 EFH 5-year review process, and subsequently initiated an analysis to incorporate the advancements in description of EFH from the 2023 EFH 5-year review (motion) into the respective FMPs[367]. The 2023 EFH 5-year summary report highlighted 7 components in which new information and emerging research were developed: 1) EFH descriptions and identification (maps), 2) impacts of fishing activities on EFH, 3) impacts of non-fishing activities on EFH, 4) EFH conservation and enhancement recommendations, 5) prey species list and habitat locations, 6) HAPC identification, and 7) research and informational needs.<br><br>In the December meeting 2023 the Council reviewed the Fishery Management Plans (FMP) omnibus amendment initial/final analysis, and proposed FMP amendment text based on the 2023 EFH 5-year Review. The Council took final action (motion) and selected Alternative 2, as amended, as the preferred alternative[368].<br><br>The preferred alternative (Alternative 2) updates the EFH information in the BSAI Groundfish, GOA Groundfish, BSAI crab, and Arctic FMPs, as a result of the comprehensive analysis in the 2023 EFH 5-year review presented to the Council in February. These updates include updated EFH maps and text descriptions, results of the fishing effects on habitat (FE) analysis, updates to prey species tables, updates to the non-fishing effects report and updated research and information needs. Updating EFH information into the FMPs allows the Council to incorporate the best available science into the applicable FMPs.<br><br>EFH component 1 (descriptions and identification) (Harrington et al.,2023)[369]. A<br>The focus for EFH component 1, EFH maps and text descriptions, in the 2023 EFH 5-year Review was to modernize the 2017 single species distribution model (SDM) EFH mapping approach to an SDM ensemble approach as a new foundation to map EFH for the summer distribution of groundfishes and crabs using AFSC RACE-GAP summer bottom trawl survey data. In addition to defining EFH for |

[366] https://www.npfmc.org/wp-content/uploads/hapc_process092010.pdf
[367] https://www.npfmc.org/february-2023-newsletter/
[368] https://www.npfmc.org/december-2023-newsletter/
[369] https://meetings.npfmc.org/CommentReview/DownloadFile?p=511c0ff7-9884-4f3f-8f14-380c51df9c84.pdf&fileName=2023%20EFH%20Review%20Summary%20Report.pdf

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |
| | | groundfishes and crab, the 2023 5-year review was also able to map EFH for pelagic early life stages (PELS) of Pacific cod and sablefish and provide EFH maps for Arctic FMP species for the first time.<br><br>The EFH 5-year review utilized various mapping and modeling strategies to best understand EFH for federally managed species in the FMP. The SDM ensemble EFH approach for the 2023 EFH 5-year Review described and mapped 31 North Pacific groundfish species in the Bering Sea (BS), 24 in the Aleutian Islands (AI), 41 in the GOA across up to three life stages. In addition, EFH is described and mapped for four crabs in the BS, two crabs in the AI, and one octopus in all three regions. The ensembles describing and mapping EFH in this study advance EFH information levels and refine EFH area maps for North Pacific species' life stages from none to Level 1 and from none or Level 1 to Level 2. The study also applies habitat-related vital rates from other studies to the SDMs to describe and map EFH Level 3 for the first time for eight species.<br><br>Additionally, during this 5-year Review, EFH information was developed for the PELS of North Pacific groundfish species for GOA Pacific cod and sablefish. Shotwell et al. has developed a novel application of biophysical life-stage integrated IBMs to map EFH for PELS at Level 2 and Level 3, through case studies of Pacific cod and sablefish in the GOA Management Area, informed by spawning locations and a settled early juvenile stage SDM. This study has ultimately provided survival rate EFH maps for the PELS of these two species to demonstrate that IBM output can be used within the context of EFH. Once established, this new methodology may be explicitly applied to other groundfish and crab species in Alaska where IBMs have been developed (e.g., walleye pollock, POP, red king crab, snow crab), including as a starting reference for other co-occurring species with similar early life history strategies<br><br>EFH component 2 (fishing effects) (NMFS,2024)[370].<br>Updates on the Fishing Effects Evaluation Model<br>Modifications to the FE model were implemented in 2022 and presented at the SSC meeting in February 2022. Updates comprised: correction of the FE model, the introduction of a new habitat feature to accommodate extended recuperation durations, and a comparison of VMS data from observed trips vs all trips. The third item did not lead to modifications in the model; rather, it generated curiosity in a possible change and was deliberated by the SSC during the February 2022 meeting. The whole finite element model description is available in the 2022 Evaluation of Fishing Effects on Essential Fish Habitat (Zaleski *et al*., 2024).<br><br>Stock assessment authors were asked to examine the results generated by the FE model for their specific species to evaluate the effects of fishing. The upper 50$^{th}$ percentile core Essential Fish Habitat (EFH) area from the summer distribution Species Distribution Model (SDM) ensemble EFH maps for adults or combined life stages, indicating EFH Level 2 information regarding habitat-related abundance at the population level, was superimposed on the 2022 Fisheries Ecosystem model results to assess species-specific habitat disturbance. Authors of stock assessments performed supplementary analyses under three scenarios: when their stock fell below the minimum stock size threshold (MSST), when the estimated habitat impacted by fishing in the CEA was ≥ 10%, and/or when they opted for a qualitative evaluation of the effects of fishing on their species' habitat instead |

[370] https://www.fisheries.noaa.gov/s3//2024-07/Final-EFH-EA-Omnibus-Amendment-2024.pdf

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |
| | | of a quantitative assessment. The third alternative was initiated by the SSC during the February 2022 meeting to address the concerns of stock assessment authors regarding species with data deficiencies.<br><br>Bering Sea Sablefish (Zaleski *et al.,* 2024)[371]<br>BSAI sablefish exceeded ≥ 10% in 2022(12.8% of habitat disturbance) but not in 2017 due to an increase in fishing effort within the CEAs because neither the SDM EFH map nor the FE model would not have led to exceeding ≥10% CEA disturbed in 2017.<br><br>The EBS shelf is likely a nursery area for juvenile sablefish when large year classes are present. As noted in the FE time series, the 10% threshold has only been exceeded in a few recent years and once in the late 2000s, all of which are associated with large year classes. Fishery effects tend to increase when large numbers of juveniles are present and interact with trawl gears in the EBS. These events include increased disturbance in the late 2000s following moderately strong late 1990s-year classes and over the last ~5 years following a series of unprecedented 2014-, 2016-, and 2018-year classes. Analysis as part of the 2020 and 2021 sablefish SAFEs indicated that the impact of BS fisheries on the sablefish population were generally limited to juvenile fish and unlikely to exceed the impact of natural mortality in the region. Thus, it is unlikely that fishery effects have a large impact on either the juvenile sablefish in the BS or the entire Alaska wide population (see Appendix 3D of the sablefish SAFE, Goethel *et al*., 2020). Moreover, given the high mobility of sablefish and movement among management areas, it is likely that EFH should be viewed from a population-wide instead of localized outlook (i.e., because sablefish frequently move long distances, it is unlikely that disturbance in one localized area will broadly impact the population).<br><br>When considered in combination with EFH disturbance in the AI and GOA, it is unlikely that there is a strong impact on sablefish (i.e., population-wide CEA disturbance is likely <10%).<br><br>Aleutian Islands Sablefish<br>The effects of fishing on the AI CEA are generally very low (<4.8% habitat reduction. Habitat impacts on AI sablefish growth-to-maturity, spawning success, breeding success, and feeding success are not detectable. No changes to management are recommended at this time.<br><br>Gulf of Alaska Sablefish<br>The effects of fishing on the AI CEA are generally very low (<1.8% habitat reduction. Habitat impacts on AI sablefish growth-to-maturity, spawning success, breeding success, and feeding success are not detectable. No changes to management are recommended at this time.<br><br>AK Pacific Halibut<br>Information was insufficient to conduct the three-tiered approach for Pacific Halibut (Mateo *et al*., 2023). However, based on the analysis in the 2005 EFH EIS, fishing activities are considered to have overall minimal and temporary effects on the EFH for Halibut. Professional judgement from NMFS and IPHC Stock assessment scientists indicates that fisheries do not adversely affect the EFH of |

[371] https://repository.library.noaa.gov/view/noaa/66042

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |
| | | Halibut. Halibut, FE model results does not provide sufficient evidence to meet Habitat Assessment Element 1. Specifically, available information does not enable the assessment team to:<br>• Identify the spatial footprint (i.e., total area in $Km^2$ or $nm^2$) of the fishery on marine habitats (e.g., based on maps of fishing fleet distribution or other data).<br>• Identify the general range of habitat type/substrate (e.g., sand, muddy, gravel and pebble, rocky reefs, kelp, other biogenic habitats) affected and unaffected by the spatial footprint of the fishery.<br>• Assess the percentage area of overlap of the fishery with known sensitive habitats using available data. Sensitive habitats include HAPCs, other areas of known distribution rich in structural epifauna, areas of particular importance for ETP species, and closed areas which may be set up for habitat, species conservation, or both.<br>Based on the above, the team considered that the information presented to the assessment team was not sufficient to confirm that the effects of the AK Pacific Halibut fishery on sensitive habitats is reduced to a minimum percentage of the total area. Because of this a potential nonconformance was raised. A notification of the nonconformance was sent to the client and they had 28 days to respond.<br><br>On April 7, 2023, AFDF provided a response to the nonconformance raised by the team AFDF has prepared maps showing the spatial footprint of the halibut fishery across the Gulf of Alaska and into the Bering Sea and Aleutian Islands. Fishing intensity was quantified by cumulative landed weight from 2010—2021 and binned by ADF&G groundfish statistical areas. AFDF compared fishing activity to sensitive habitat areas in maps provided by the National Marine Fisheries Service (NMFS) showing coral and sponge habitat and Habitat Areas of Particular Concern (HAPCs). Their results showed the following.<br>• The areas of greatest fishing activity for halibut in Alaska occur within Prince William Sound, around Kodiak Island, inside waters of Southeast Alaska, and outside of Unalaska in the Aleutian Islands.<br>• Prince William Sound contains relatively little coral and sponge habitat. Southeast Alaska does contain coral gardens, but these are predominantly in outside waters where less fishing activity occurs.<br>• At Cape Ommaney and the Fairweather grounds in Southeast, five HAPCs have been designated, banning all bottom contact gear in an area of 14 $nm^2$. HAPCs have also been designated around coral-rich seamounts in the Gulf of Alaska and Bower's Ridge in the Aleutian Islands, restricting a combined 10,639 $nm^2$ from all bottom-contact gear.<br>• In the Bering Sea, the Pribilof Habitat Conservation Area restricts an additional 7,000 nm2 from hook and line gear. Outside of these closed waters, overlap of the halibut longline fishery and coral habitat occurs in Beaver Inlet outside Unalaska, the North end of St. Matthew's Island, areas around Kodiak, and outside of Kachemak Bay.<br>• Collectively these areas make up 1,647 $nm^2$ of a total of the 177,155 $nm^2$ of statistical areas with halibut fishing activity, or 0.9%. Given this small fraction and the extensive habitat conservation areas where no fishing occurs, AFDF believe that the benthic footprint of the Alaskan halibut fishery is minimal.<br>Based on the above a potential non-conformance (NC) issue was removed |

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |
| | | **Number of Actions by NPFMC to protect habitat in Bering Sea and Aleutian Islands[372]**<br>**Amendment 9, implemented December 1, 1985:**<br>• Incorporated habitat protection policy.<br>**Amendment 21a, implemented January 20, 1995:**<br>• Established a Pribilof Islands Habitat Conservation Area.<br>**Amendment 37, implemented January 1, 1997**<br>• Established a non-pelagic trawl closure area called the Red King Crab Savings Area, a trawl closure area called the Nearshore Bristol Bay Trawl Closure and revised the red king crab PSC limits.<br>**Amendment 55, implemented April 26, 1999:**<br>• Implemented the Essential Fish Habitat (EFH) provisions contained in the Magnuson-Stevens Fishery Conservation and Management Act and 50 CFR 600.815. Amendment 55 describes and identifies EFH fish habitat for BSAI groundfish and describes and identifies fishing and non-fishing threats to BSAI groundfish EFH, research needs, habitat areas of particular concern, and EFH conservation and enhancement recommendations.<br>**Amendment 57, implemented June 15, 2000, revised Amendment 37 and Amendment 40:**<br>• Prohibited the use of nonpelagic trawl gear in the directed pollock fishery.<br>**Amendment 78, implemented July 28, 2006, supersedes Amendment 55:**<br>• Refined and updated the description and identification of EFH for managed species.<br>• Revised approach for identifying Habitat Areas of Particular Concern within EFH, by adopting a site-based approach.<br>• Established a new area (Aleutian Islands Habitat Conservation Area) in which non-pelagic trawling is prohibited, to protect sensitive habitats from potential adverse effects of fishing.<br>**Amendment 89 implemented on May 19, 2008:**<br>• Established new habitat conservation areas (HCA) (Bering Sea HCA; St. Matthew Island HCA; St. Lawrence Island HCA; and Nunivak Island, Etolin Strait, and Kuskokwim Bay HCA) in which nonpelagic trawling is prohibited, to protect bottom habitat from potential adverse effects of fishing.<br>• Established the Northern Bering Sea Research Area in which nonpelagic trawling is prohibited except under an exempted fishing permit that is consistent with a research plan approved by the Council to study the effects of nonpelagic trawling on the management of crab species, marine mammals, ESA-listed species, and subsistence needs for Western Alaska communities.<br>**Amendment 94, implemented September 17, 2010, partly revises Amendment 89:**<br>• Required use of modified nonpelagic trawl gear in the Bering Sea flatfish nonpelagic trawl fishery to reduce the potential impact of nonpelagic trawl gear on bottom habitat.<br>• Created the Modified Gear Trawl Zone, in which anyone fishing with nonpelagic trawl gear must use modified nonpelagic trawl gear.<br>• Revised the northern and southern boundaries of the Northern Bering Sea Research Area, and the eastern boundary of the St Matthew Island Habitat Conservation Area.<br>• Removed reference to the Crab and Halibut Protection Zone which was superseded by the Nearshore Bristol Bay Trawl Closure<br>**Amendment 98, implemented on October 31, 2013, revised Amendment 78:** |

[372] https://www.npfmc.org/wp-content/PDFdocuments/fmp/BSAI/BSAIfmpAppendix.pdf

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |
| | | • Revise EFH description and identification by species, and update life history, distribution, and habitat association information, based on the 2010 EFH 5-year review.<br>• Update description of EFH impacts from non-fishing activities, and EFH conservation recommendations for non-fishing activities.<br>• Revise the timeline associated with the HAPC process to a 5-year timeline.<br>• Update EFH research priority objectives.<br>**Amendment 103, implemented December 2, 2014:**<br>• Revise the Pribilof Islands Habitat Conservation Zone to close to fishing for Pacific cod with pot gear (in addition to the closure to all trawling).<br>**Amendment 104, implemented on January 9, 2015:**<br>• Establishes Six Areas of Skate Egg Concentration as HAPCs.<br>**Amendment 115, implemented on July 5, 2018, revised Amendment 98:**<br>• Revises EFH descriptions and identification by species, and update life history, distribution, and habitat association information, based on the 2016 EFH 5-year review.<br>• Updates the model used to determine fishing effects on EFH, and description of EFH impacts from fishing activities.<br>• Updates descriptions of EFH impacts from non-fishing activities, and EFH conservation recommendations for non-fishing activities.<br>**Amendment 127, implemented on July 15, 2024, revised Amendment 126:**<br>• Revise EFH description and maps by species, and update life history, distribution, and habitat association information (EFH component 1), based on the 2023 EFH 5-year Review.<br>• Update the model used to determine fishing effects on species' core EFH areas, and the evaluation of EFH impacts from fishing activities (EFH component 2).<br>• Update description of EFH impacts from non-fishing activities, and EFH conservation recommendations for non-fishing activities (EFH component 4).<br><br>**Number of Actions to protect habitat in Gulf of Alaska** [373]<br>**Amendment 14, implemented November 18, 1985:**<br>• Implemented NMFS Habitat Policy<br>**Amendment 15, implemented April 8, 1987:**<br>• Established time and area restrictions on non-pelagic trawling around Kodiak to protect king crab for three years, until December 31, 1989.<br>**Amendment 18, implemented November 1, 1989:**<br>• Continued the Type I and II trawl closure zones and added a Type III trawl closure zone around Kodiak Island to protect king and Tanner crab. This measure sunsets December 31, 1992<br>**Amendment 55, implemented April 26, 1999:**<br>• Implemented the Essential Fish Habitat (EFH) provisions contained in the Magnuson-Stevens Fishery Conservation and Management Act and 50 CFR 600.815. Amendment 55 describes and identifies EFH fish habitat for GOA groundfish and describes and identifies fishing and non-fishing threats to GOA groundfish EFH, research needs, habitat areas of particular concern, and EFH conservation and enhancement recommendations. |

[373] https://www.npfmc.org/wp-content/PDFdocuments/fmp/GOA/GOAfmpAppendix.pdf

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |
| | | **Amendment 59, implemented December 11, 2000**:<br>• Prohibited vessels holding a Federal fisheries permit from fishing for groundfish or anchoring in the Sitka Pinnacles Marine Reserve.<br>**Amendment 60, implemented December 27, 2002.**<br>• Prohibited bottom trawling in Cook Inlet<br>**Amendment 65, implemented July 28, 2006:**<br>• Identified specific sites as HAPCs for the GOA groundfish fisheries and established management measures to reduce potential adverse effects of fishing on HAPCs. Specifically, Amendment 65 establishes the following HAPCs: the Alaska Seamount Habitat Protection Areas (fourteen sites in the GOA management area) and three sites of GOA coral HAPCs (two on the Fairweather Grounds and one off Cape Ommaney) within which five smaller areas comprise the GOA Coral Habitat Protection Areas.<br>**Amendment 73, implemented July 28, 2006, revised Amendment 55:**<br>• Refined and updated the description and identification of EFH for managed species.<br>• Revised approach for identifying Habitat Areas of Particular Concern within EFH, by adopting a site-based approach.<br>• Established a new area (Aleutian Islands Habitat Conservation Area) in which non-pelagic trawling is prohibited, to protect sensitive habitats from potential adverse effects of fishing.<br>**Amendment 87, implemented on November 5, 2010:**<br>• Places target species in the fishery which requires annual catch limits, accountability measures, and the description of essential fish habitat (EFH) and 5-year review of EFH information for listed species and species groups.<br>**Amendment 89, implemented July 17, 2013:**<br>• Established the Marmot Bay Tanner Crab Protection Area nonpelagic trawl gear closure area to protect Tanner crab. This closure applies to all trawl gear, except pelagic trawl gear used to directed fish for pollock.<br>• Required the use of modified nonpelagic trawl gear by vessels directed fishing for flatfish in the Central GOA regulatory area.<br>**Amendment 90, implemented on October 31, 2012, revised Amendment 73:**<br>• Revise EFH description and identification by species, and update life history, distribution, and habitat association information, based on the 2010 EFH 5-year review.<br>• Update description of EFH impacts from non-fishing activities, and EFH conservation recommendations for non-fishing activities.<br>• Revise the timeline associated with the HAPC process to a 5-year timeline.<br>• Update EFH research priority objectives.<br>**Amendment 105, implemented on July 5, 2018, revised Amendment 90:**<br>• Revise EFH description and identification by species, and update life history, distribution, and habitat association information, based on the 2016 EFH 5-year review.<br>• Update the model used to determine fishing effects on EFH, and description of EFH impacts from fishing activities.<br>• Update description of EFH impacts from non-fishing activities, and EFH conservation recommendations for non-fishing activities.<br>**Amendment 115, implemented on July 19, 2024, revised Amendment 114:** |

| 12. | Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed. |
|---|---|

- Revise EFH description and maps by species, and update life history, distribution, and habitat association information (EFH component 1), based on the 2023 EFH 5-year Review.
- 2. Update the model used to determine fishing effects on species' core EFH areas, and the evaluation of EFH impacts from fishing activities (EFH component 2).
- 3. Update description of EFH impacts from non-fishing activities and EFH conservation recommendations for non-fishing activities (EFH component 4).
- 4. Update the research and information needs (EFH component 9Update the research and information needs (EFH component 9).

**Federal Monitoring Indicators**

NOAA Fisheries compiles annual Ecosystem Status Reports for the Gulf of Alaska, Bering Sea and Aleutian Islands[374]. At least four of these outcome indicators are useful for monitoring of adverse impacts to habitats.

**1) Habitat – Structural Epifauna**

Biota classified as Habitat Areas of Particular Concern (HAPC) comprise structural epifauna, including seapens, seawhips, corals, anemones, and sponges.

**Aleutian Islands**

Status and Trends (Laman, 2022)[375]

Soft corals are found in 20% of eastern AI tows. Their abundance time series is dominated by 1986 in the west and 1991 in the center (Figure 8).

Although sea anemones are common in survey catches (~20-40% of tows), their abundance trends remain unclear in most regions. Sea anemone abundance and frequency in the southern Bering Sea are decreasing (western, central, and eastern Aleutians) or stabilizing at low levels in 2022. Sea pens are more prevalent in the southern Bering Sea and eastern AI than in western regions. Low abundance estimates across the survey area. A single massive catch usually causes large apparent abundance increases, such in the eastern AI in 1997. Sea pens increased little in the eastern AI and southern Bering Sea in 2022.

[374] https://www.fisheries.noaa.gov/alaska/ecosystems/ecosystem-status-reports-gulf-alaska-bering-sea-and-aleutian-islands
[375] https://www.fisheries.noaa.gov/resource/data/ecosystem-status-report-2022-aleutian-islands

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

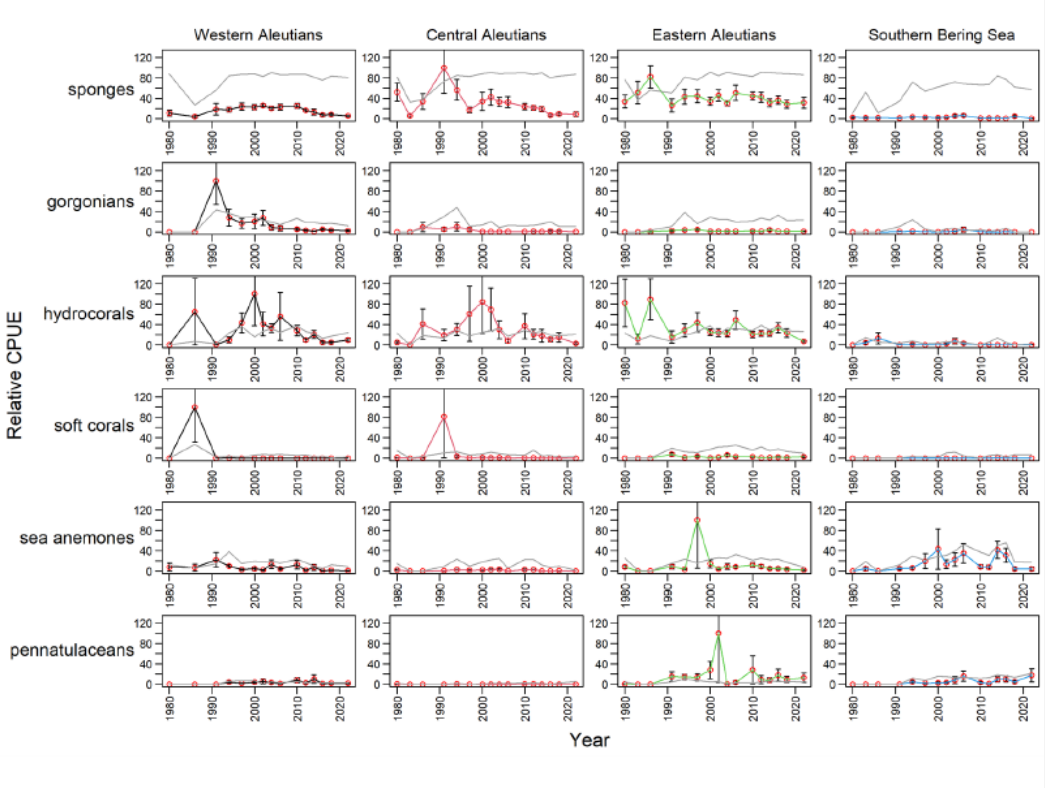



**Figure 8.** Mean CPUE of structural epifauna from Habitat Areas of Particular Concern by area from RACE Groundfish Assessment Program bottom trawl surveys in the AI from 1980 through 2022. Error bars represent standard errors; gray lines the percentage of non-zero catches (Source: Laman, 2022).

Factors influencing observed trends

The effects of fishing and the effects of climate change have been highlighted as the two main threats to populations of benthic invertebrates in the Aleutian Islands. The Aleutian Islands are home to both processes. Since 2006, a large portion of the benthic habitat in the Aleutians (about 50% of the shelf and slope to depths of 500 m) has been shielded from mobile fishing gear; however, no research has been done to establish whether the closures may have caused population growth or recovery.

Implications

The RACE GAP AI bottom trawl study inadequately represents abundance trends for several categories of HAPC species. Nonetheless, bottom trawl surveys are proficient in detecting trends of presence or absence, as demonstrated by recent validation tests of distribution models for the species groups. The recent reductions in sponges, gorgonians, and hydrocorals in the western and central Aleutian Islands require ongoing monitoring.

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |
| | | **Eastern Bering Sea** (Buser, 2023)[376]<br>Status and Trends<br>The relative catch rates for sea anemones (Actiniaria) in 2022 were comparable to those recorded from 2010 to 2015, in contrast to the diminished catch rates noted from 2016 to 2021. Similarly, the 2023 estimates for sea whip (Pennatulacea) align with those recorded in 2021 and 2022, together indicating an increase from 2019 observations and a return to catch rates akin to those noted between 1999–2005 and 2013–2016.<br><br>In 2023, the catch rate of sponges (Porifera) persists at the exceedingly low levels recorded since 2021, the lowest in the time series, however comparable to sporadic results noted during the initial years of the dataset, 1984–1992. These patterns must be interpreted cautiously because to the variability in their enumeration's consistency and quality throughout the time series (Stevenson and Hoff, 2009; Stevenson *et al*., 2016). Furthermore, the discernment of trends is ambiguous due to the significant range in relative CPUE (Figure 9). |

[376] https://www.fisheries.noaa.gov/resource/data/ecosystem-status-report-2023-bering-sea

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

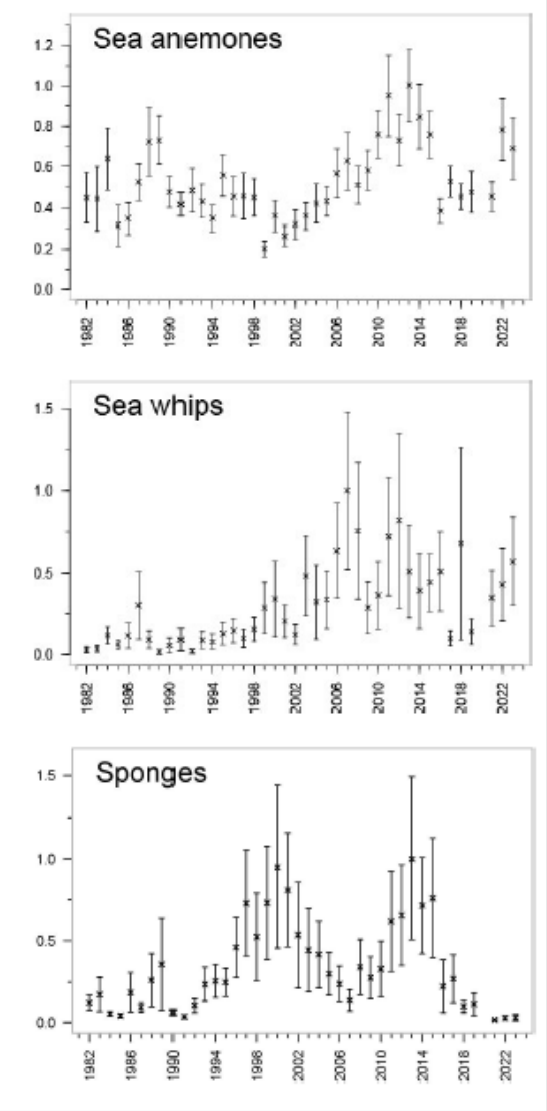



**Figure 9.** AFSC eastern Bering Sea shelf bottom trawl survey relative CPUE for three groups of benthic epifauna during the May to August time period from 1982–2023 (Source: Buser, 2023).

The catch rates of sea anemones in the Northern Bering Sea remain steady throughout the time series, with the exception of 2022, which exhibited significantly higher rates than all other years. This diverges marginally from the trend seen in the eastern Bering Sea from 2010 to 2023, which exhibited comparatively elevated catch rates from 2010 to 2013 and 2022 to 2023, with relatively diminished catch rates in the intervening period. The catch rate of sponges in the NBS exhibits significant variability across the time series, with elevated relative catch rates observed in 2010, 2017, 2022, and 2023, and diminished catch rates recorded in 2019 and 2021 (Figure 10).

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

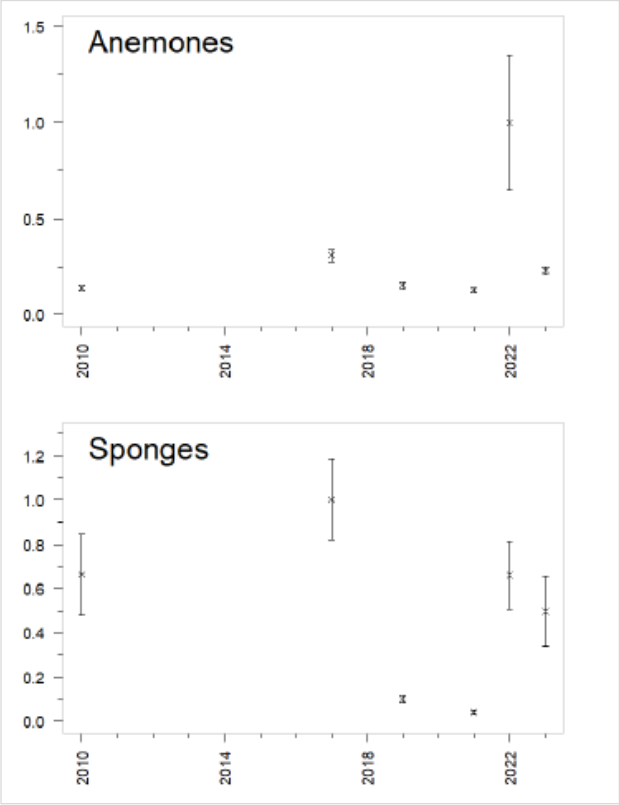



**Figure 10.** AFSC northern Bering Sea shelf bottom trawl survey relative CPUE for two groups of benthic epifauna during the July to August time period from 2010–2023 (Source: Buser, 2023).

Factors influencing observed trends

Identifying trends is challenging due to the sporadic nature of the NBS survey, which has only lately (i.e., since 2017) been done on a more consistent schedule. Additional research in various domains would enhance the understanding of structural epifauna trends, encompassing the systematics and taxonomy of Bering Sea shelf invertebrates, survey gear selectivity, and the life history traits of the epibenthic species obtained through the survey trawl.

Implications

Comprehending the trends and distribution patterns of structural epifauna is crucial for habitat modeling to formulate spatial management strategies for habitat protection, assessing fishing gear impacts, and forecasting responses to future climate change (Rooper *et al*., 2016). Further research on the eastern Bering Sea shelf is necessary to ascertain whether definitive connections exist.

**Gulf of Alaska** (Laman and Dowlin, 2023)[377]

Current Status and Trends

[377] https://www.fisheries.noaa.gov/resource/data/ecosystem-status-report-2023-gulf-alaska

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

Several general patterns are identifiable among the epifaunal groupings outlined here (Figure 11). Sponges are often found in bottom trawl survey hauls across the Gulf of Alaska (GOA), present in 40–50% of captures in all sampled districts; however, their abundance seems to be diminishing in recent years, particularly in the Shumagin and Kodiak districts.

Sea anemones seem to be more prevalent in the western Gulf of Aden, however they are rather widespread throughout the study area, appearing in 40–50% of trawl catches frequently. Gorgonian corals are predominantly found in southeast Alaska, differing from the abundance patterns of sponges and anemones, and are infrequently captured in our trawl samples, despite their increased prevalence in certain areas. Sea pens and sea whips (Pennatulacea) are infrequent and scarce in GOA trawl catches, but we have occasionally captured them in significant numbers in the Chirikof district. Hydrocorals are neither numerous nor prevalent in the Gulf of Alaska; nevertheless, they have historically been captured in greater quantities in the Shumagin district of the western Gulf.

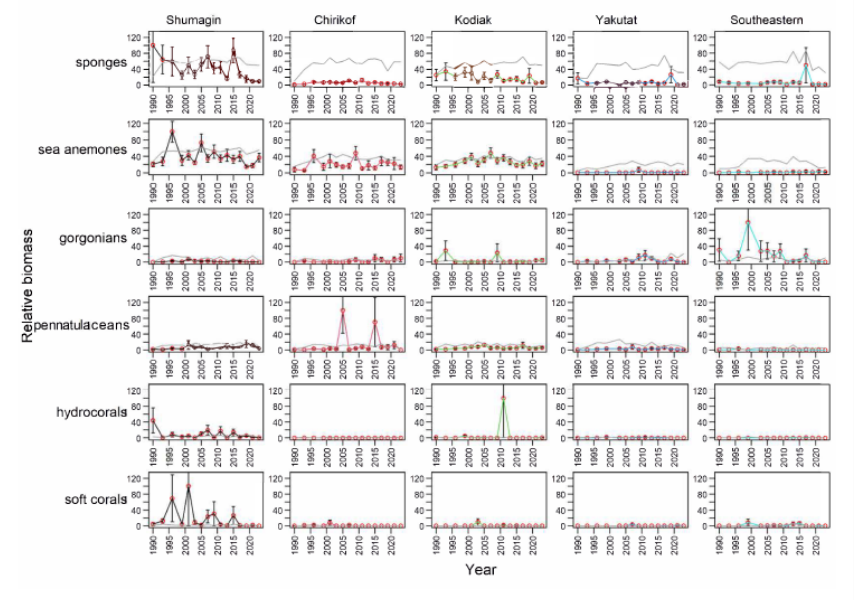



**Figure 11.** Estimated relative biomass of epifaunal species groups collected from International North Pacific Fisheries Commission (INPFC) statistical districts during fishery-independent summer bottom trawl surveys of the Gulf of Alaska (1990-2023). Error bars represent standard errors, and the gray lines the prevalence (percentage) of non-zero catches for these taxa (Source: Laman and Dowling, 2023).

Factors influencing Trends

The Gulf of Alaska Bottom Trawl Survey inadequately samples this fauna; hence, caution is advised when evaluating the changes in CPUE and abundance indices.

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

Implications Gulf of Alaska

Population patterns for these epifaunal taxa in the GOA may indicate alterations in their habitats or environment. Recent climate phenomena such as the Warm Blob (Bond *et al.,* 2015; Di Lorenzo and Mantua, 2016) have likely affected certain sessile populations. Ongoing monitoring and additional research to elucidate the mechanisms and ramifications of observed patterns are essential for a comprehensive understanding of the environment.

**2) Time Trends in Non-Target Species Catch**

In the ecosystems of the Eastern Bering Sea (EBS), Gulf of Alaska (GOA), and Aleutian Islands (AI), the catch of non-target species is monitored in groundfish fishing. Scyphozoan jellyfish, species connected to habitat areas of particular concern (HAPC), such as seapens/whips, sponges, anemones, corals, and tunicates, and various invertebrates, are the three categories of non-target species that are monitored (bivalves, brittle stars, hermit crabs, miscellaneous crabs, sea stars, marine worms, snails, sea urchins, sand dollars, sea cucumbers, and other miscellaneous invertebrates). Information is gathered from groundfish fisheries. As a result, the usefulness of this indicator in connecting habitat trends to sablefish/halibut fisheries may be restricted.

**Aleutian Islands** (Whitehouse and Gaichas, 2023)[378]

Status and trends

The capture of Scyphozoan jellies in the AI rose from 2015 to 2020, reaching peaks in 2017 and 2020, followed by a fall to its second lowest value in 2022 within this time series (Figure 12). Scyphozoan jellies are primarily caught in the pollock fishery. The capture of structural epifauna in the AI has fluctuated from 2011 to 2021, reaching a maximum in 2015 and a minimum in 2022. Sponge constitutes the predominant component of the structural epifauna catch, succeeded by corals and bryozoans. These species are predominantly harvested in the Atka mackerel and rockfish fisheries. The capture of various invertebrates in the AI has fluctuated from 2011 to 2022, reaching a zenith in 2013 and experiencing troughs in 2011, 2014, and 2020. Sea stars predominantly include the catch of various invertebrates and are mainly harvested in the Pacific cod and halibut fisheries.

[378] https://apps-afsc.fisheries.noaa.gov/REFM/docs/2023/AIecosys.pdf

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

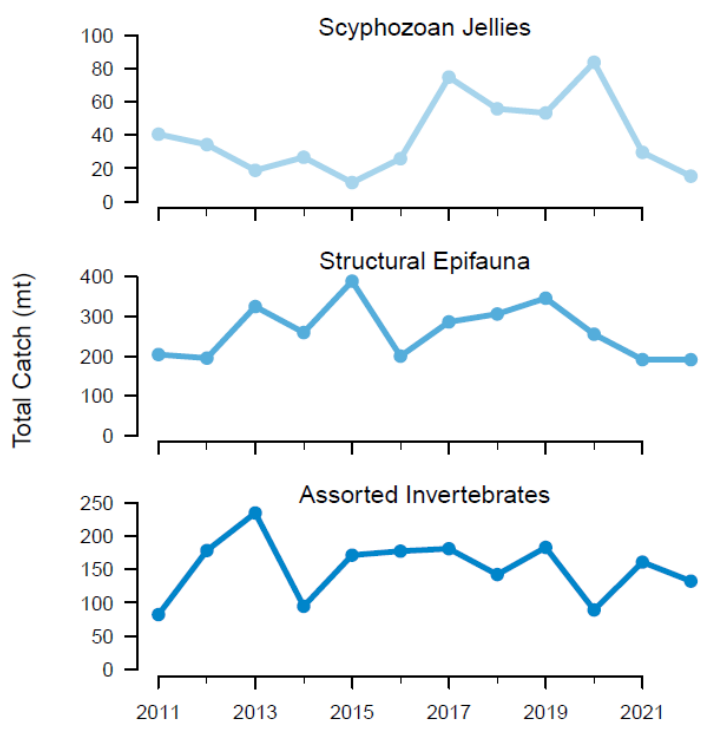



**Figure 12.** Total catch of non-target species (tons) in AI groundfish fisheries (2011–2022). Please note the different y-axis scales (Source: Whitehouse and Gaichas, 2023a).

Factors causing trends

The bycatch of non-target species may vary due to alterations in fisheries, ecosystems, or both. Due to the unregulated and inadvertent capture of non-target species, the absence of significant alterations in fishery management within a certain ecosystem may suggest that substantial fluctuations in non-target catch reflect changes in the environment. Conversely, modifications in permissible capture for target species, external market dynamics, fishing effort, or limits on fishing gear might influence the catch of non-target species. Trends in catch may be influenced by alterations in biomass, shifts in distribution (overlap with the fishery), or a combination of both factors. The population dynamics of jellyfish are affected by various biophysical parameters that influence their survival, reproduction, and growth, including temperature, wind mixing, ocean currents, and prey availability (Purcell, 2005; Brodeur *et al*., 2008).

Implications

The catches of structural epifauna species and various invertebrates are significantly lower than those of target species. The increased captures of scyphozoan jellies from 2017 to 2020 may indicate interannual fluctuations in jellyfish biomass or alterations in their overlap with fisheries. Numerous jellyfish may adversely affect fish populations by competing with planktivorous fish for prey supplies (Purcell and Sturdevant, 2001), and furthermore, jellyfish may consume the early life stages (eggs and larvae) of fish (Purcell and Arai, 2001; Robinson *et al.,* 2014).

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

**Gulf of Alaska** (Whitehouse and Gaichas, 2023)[379]

Status and Trends

The capture of Scyphozoan jellies in the GOA has exhibited variability from 2011 to 2022, with notable peaks in 2012, 2015, 2016, and 2019 (Figure 13). The jellyfish catch in 2022 was the lowest recorded in his time series. Scyphozoan jellyfish are predominantly harvested in the pollock fisheries. The capture of structural epifauna progressively rose from 2011 to 2016, thereafter declining to 2022, where it reached its second lowest level since 2011. From 2011 to 2019, sea anemones were the predominant portion of the structural epifauna capture, but from 2020 to 2022, they co-dominated alongside unidentifiable corals and bryozoans. Structural epifauna has predominantly been captured in hook-and-line and non-pelagic trawl fisheries.

The capture of various invertebrates rose from 2012, reached a zenith in 2015, subsequently declined annually to a nadir in 2021, and has persisted at a low level in 2022. Sea stars comprise almost 86% of the overall miscellaneous invertebrate capture annually. Sea stars are predominantly captured by pot and hook-and-line fisheries.

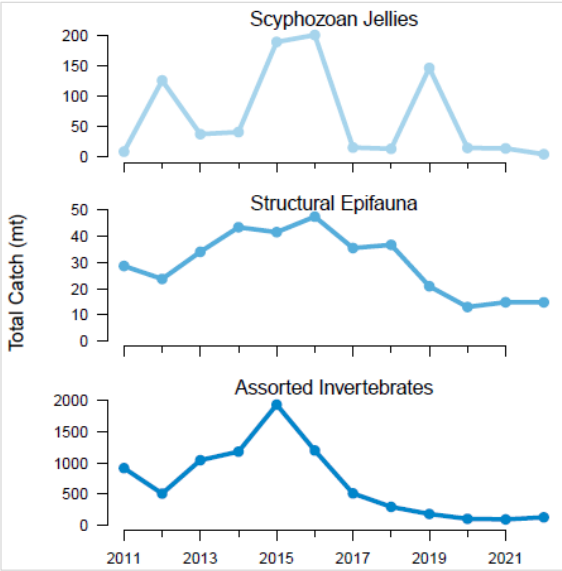



**Figure 13.** Total catch of non-target species (tons) in the GOA groundfish fisheries (2011–2022). Note the different y-axis scales between species groups (Source: Whitehouse and Gaichas, 2023b).

Factors influencing status and trends

The capture of non-target species may vary due to alterations in fisheries, ecosystems, or both. Due to the unregulated and inadvertent capture of non-target species, the absence of significant alterations in fishery management within a specific ecosystem may suggest that substantial variations in non-target catch reflect changes in the environment. Trends in catch may be influenced by alterations in biomass, shifts in distribution (overlap with the fishery), or a combination of both

[379] https://www.fisheries.noaa.gov/resource/data/ecosystem-status-report-2023-gulf-alaska

| 12. | Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed. |
|---|---|

factors. The decreases in Pacific cod Total Allowable Catch during 2018 may have led to losses in the capture of structural epifauna and various invertebrates.

The dynamics of jellyfish populations are shaped by various biophysical parameters that impact their survival, reproduction, and growth, such as temperature, wind mixing, ocean currents, and prey availability (Purcell, 2005; Brodeur *et al.*, 2008). The absence of a distinct trend in scyphozoan jellyfish harvest may indicate interannual fluctuations in jellyfish biomass or alterations in their overlap with fisheries.

Implications

The capture of structural epifauna and other invertebrates is significantly lower than those of the target species. Numerous jellyfish may adversely affect fish populations by competing with planktivorous species for food supplies (Purcell and Sturdevant, 2001), and furthermore, jellyfish may consume the early developmental stages (eggs and larvae) of fish (Purcell and Arai, 2001; Robinson *et al.,* 2014).

**Eastern Bering Sea** (Whitehouse and Gaichas,2023)[380]

Status and Trends

The jellyfish catch more than doubled from 2020 to 2021 (Figure 14,top). Notable peaks in jellyfish captures were recorded in 2011, 2014, and 2018, each of which was succeeded by a significant decline in catches the subsequent year. The jellyfish catch diminished from 2021 to 2022, albeit marginally, by approximately 7%. Jellyfish are predominantly harvested in the pollock fishery.

The capture of structural epifauna exhibited a declining trend from 2015 to 2020 and has persisted at low levels in 2021 and 2022 (Figure 14, middle). Benthic urochordates captured in non-pelagic trawls constituted the predominant element of the structural epifauna catch during 2012 and from 2015 to 2022. In 2013 and 2014, anemones comprised the predominant component of the structural epifauna catch in the Pacific cod fishery. Sponge constituted the predominant element of the structural epifauna catch in 2011 and were mainly captured using non-pelagic trawls.

Sea stars constitute about 85% of the diverse invertebrate catch across all years and are predominantly captured in flatfish fisheries (Figure 14, bottom). The capture of various invertebrates exhibited an overall increase from 2011 to 2015, followed by a decrease from 2015 to 2022.

[380] https://apps-afsc.fisheries.noaa.gov/REFM/docs/2023/EBSecosys.pdf

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

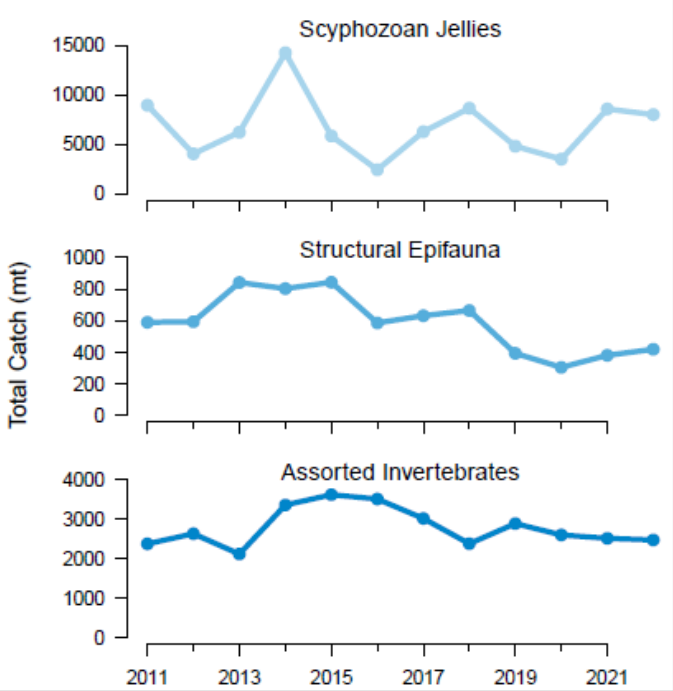



**Figure 14.** Total catch of non-target species (tons) in EBS groundfish fisheries (2011–2022) (Source: Whitehouse and Gaichas, 2023).

Factors influencing Status and Trends

The bycatch of non-target species may vary due to changes in fisheries, ecosystems, or both. Due to the unregulated and inadvertent capture of non-target species, the absence of significant alterations in fishery management within a certain ecosystem may suggest that substantial fluctuations in non-target catch reflect changes in the environment. Trends in catch may be influenced by alterations in biomass, shifts in distribution (overlap with the fishery), or a combination of both factors. The variability in jellyfish populations in the EBS is determined by various biophysical parameters that impact their survival, reproduction, and growth, including temperature, sea ice phenology, wind mixing, ocean currents, and prey availability (Brodeur *et al.,* 2008). The absence of a distinct trend in scyphozoan jellyfish catch may indicate interannual fluctuations in jellyfish biomass and/or alterations in the overlap with fisheries.

Implications

The capture of structural epifauna and other invertebrates is significantly lower than those of the target species. Numerous jellyfish may adversely affect fish populations by competing with planktivorous species for food supplies (Purcell and Sturdevant, 2001), and furthermore, jellyfish may consume the early developmental stages (eggs and larvae) of fish (Purcell and Arai, 2001; Robinson *et al.,* 2014).

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

3) **Maintaining and Restoring Fish Habitats**

**Aleutian Islands** (Olson,2022)[381]

This indicator employs output from the Fishing Effects (FE) model (Smeltz *et al.,* 2019) to assess the extent of geological and biological features disrupted in the Aleutian Islands, utilizing spatially explicit Vessel Monitoring System (VMS) data aggregated into 25 km² grid cells within fishable depths (<1000m). The time series for this indicator has been accessible since 2003, coinciding with the availability of extensive VMS data. In 2021, techniques devised by the Alaska Regional Office of NMFS were employed to integrate unobserved fishing occurrences throughout the whole time period (2003 – 2021) into FE analysis. Unrecorded fishing activities generally represent 7 - 12% of the total effort in the VMS dataset. In this research, NMFS statistical area 543 pertains to the western Aleutians, areas 542 and 541 correspond to the middle Aleutians, whereas the eastern Aleutians are linked to statistical areas associated with the Bering Sea to the north and the western Gulf of Alaska to the south.

Status and trend

The percentage of area affected by commercial fishing (including pelagic and non-pelagic trawl, longline, and pot) in the Aleutian Islands has fluctuated between 1% and 3% since 2003, with a modest upward trend across the three AI zones since 2015. This increase is presumably attributable to a boost in non-pelagic trawl effort that has exceeded the 10-year average (Figure 15, Figure 16) illustrates the locations of the areas with the greatest influence.

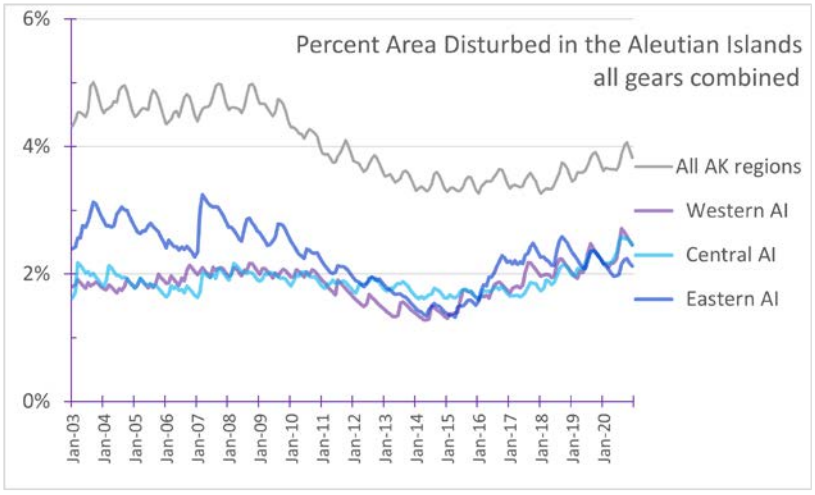



**Figure 15.** Percent habitat disturbance, all gear types combined, from 2003 through 2020 (Source: Olson, 2022).

[381] https://www.fisheries.noaa.gov/resource/data/ecosystem-status-report-2022-aleutian-islands

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

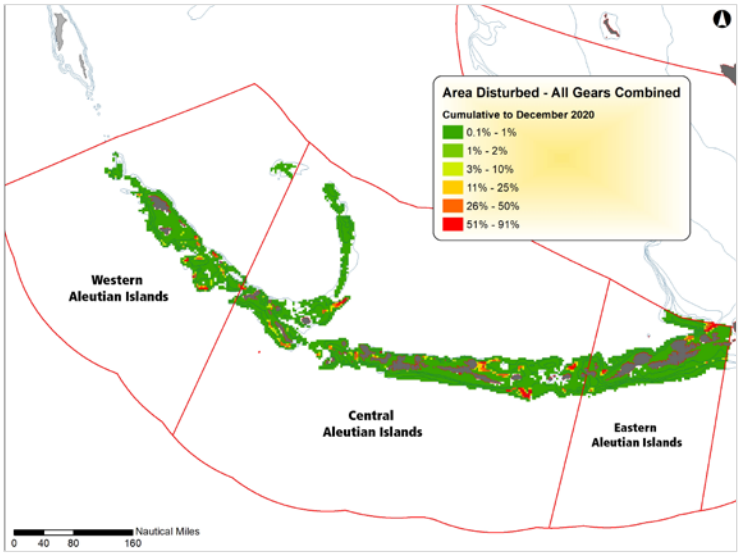



**Figure 16.** Map of percentage area disturbed per grid cell for all gear types. Effects are cumulative and consider impacts and recovery of features from 2003 to 2020 (Source: Olson, 2022).

Factors influencing observed trends

A seasonal pattern is evident, with a minor rise in the percentage of land disturbed throughout the late summer to early fall months. The overall percentage of disturbed area across all Alaskan regions is mostly influenced by the southern Bering Sea, where habitat disturbance was approximately 10% at the onset of the time series and is now approximately 8%. In 2010, improvements to trawl sweep gear were instituted on non-pelagic trawls in the Bering Sea, leading to less gear contact with the seafloor and diminished habitat effect.

Trawl sweep changes were enacted in the Gulf of Alaska in 2014. The 2007 rise in the eastern Aleutians likely reflects an increase in the annual percentage of swept area in the Bering Sea, but not in the Gulf of Alaska (Smeltz *et al.,* 2019). In 2008, Amendment 80 was enacted, designating BSAI yellowfin sole, flathead sole, rock sole, Atka mackerel, and Aleutian Islands Pacific Ocean perch to the head and gut trawl catcher processor sector, and permitting eligible vessels to establish cooperatives. The establishment of cooperatives lowered total effort within the fleet while preserving catch levels.

demand for fish products, and modifications in vessel horsepower and fishing equipment. Intensive fishing in a region can alter species diversity by attracting opportunistic fish species that prey on organisms disturbed by fishing activities or by diminishing the habitat suitability for certain species. Enhanced fishing efforts in fisheries that engage with both biotic and abiotic bottom substrates may lead to heightened habitat loss or degradation attributable to the impacts of fishing gear. The extent of habitat damage is influenced by gear characteristics (type, weight, towing speed, depth of penetration), the physical and biological attributes of the fished areas, the recovery rates of living substrates in those areas, and management or economic alterations that lead to spatial redistribution of fishing activities.

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |
| | | Implications<br>The impact of alterations in fishing effort on habitat remains largely unknown, while our capacity to measure these effects has significantly improved with the creation of a Fishing Effects model during the 2015 Essential Fish Habitat (EFH) Review.<br><br>The 2005 EFH FEIS and the 2010 EFH 5-year Review stated that commercial fisheries can exert long-term effects on habitats; nevertheless, these impacts were assessed as minor and not harmful to fish populations or their habitats. The prior EFH evaluations demonstrated the necessity for an enhanced Variations in the disturbed seafloor area can be influenced by multiple factors, including fish population dynamics and distribution, regulatory measures (e.g., designated no-fishing zones), alterations in fishery structures due to rationalization, advancements in technology (e.g., enhanced fish detection capabilities, acoustic methods for bottom fishing without physical contact), market methodology for assessing fishing consequences. The creation and execution of the FE model rectified numerous deficiencies of prior fishing effects methodologies.<br><br>Vessel Monitoring System data offer a more comprehensive analysis of fishing intensity, facilitating improved evaluations of the impacts of overlapping efforts and the distribution of effort across and within grid cells. The creation of a literature-based fishing effects database has enhanced our capacity to assess gear-specific susceptibility and recovery metrics. The distribution of habitat types, informed by enhanced sediment data availability, has improved. The amalgamation of these indicators has significantly improved our capacity to assess fishing consequences.<br><br>New methodologies and criteria were established to assess whether the impacts of fishing on Essential Fish Habitat (EFH) are significant and not ephemeral on regulated fish populations in Alaska. The Council and its advisory committees formulated and evaluated these criteria in 2016, followed by stock assessment authors in 2017. In April 2017, the Council agreed with the Plan Team's agreement that the impact of fishing on Essential Fish Habitat (EFH) does not now exceed the threshold of minimal and non-temporary effects, so no mitigation action is required at this time. While the overall effects of fishing in the area are minimal, localized effects may be occurring.<br><br>**Eastern Bering Sea** (Zaleski *et al.,*2023)[382]<br>This indicator uses output from the Fishing Effects (FE) model to estimate the area of geological and biological features disturbed over the Bering Sea domain, utilizing spatially-explicit VMS data summarized to 25km2 grid cells in fishable depths (<1000m). The time series for this indicator is available since 2003, when widespread VMS data became available, through August 2022.<br><br>Status and trends<br>The estimated disturbance in the northern Bering Sea was less than the southern Bering Sea, and the southern Bering Sea had the highest estimated disturbances over time for all Alaska regions (Figure 17). While the southern Bering Sea had the highest estimated percentage of habitat disturbance, the time series shows a decline in disturbance from 2003 which could represent gear modifications, shifts in gear types, and changes in effort. Figure 18 shows the location of the areas with the highest impact cumulatively from 2003 through August 2022. |

[382] https://www.fisheries.noaa.gov/resource/data/ecosystem-status-report-2023-bering-sea

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

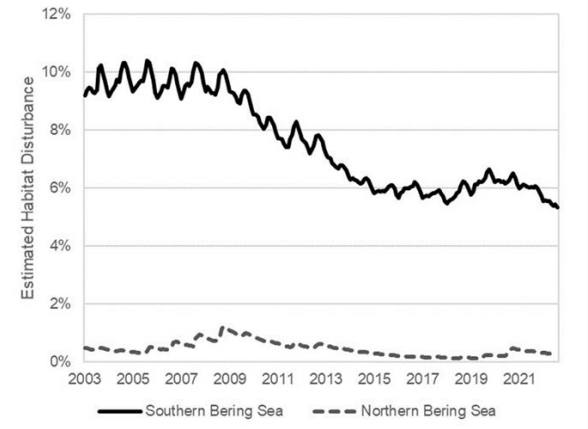



**Figure 17.** Estimated % habitat disturbance by bottom contact of commercial fishing gear in the southern (solid black line) and northern (dashed gray line) Bering Sea from 2003 through August (Source: Zaleski *et al.,* 2023).

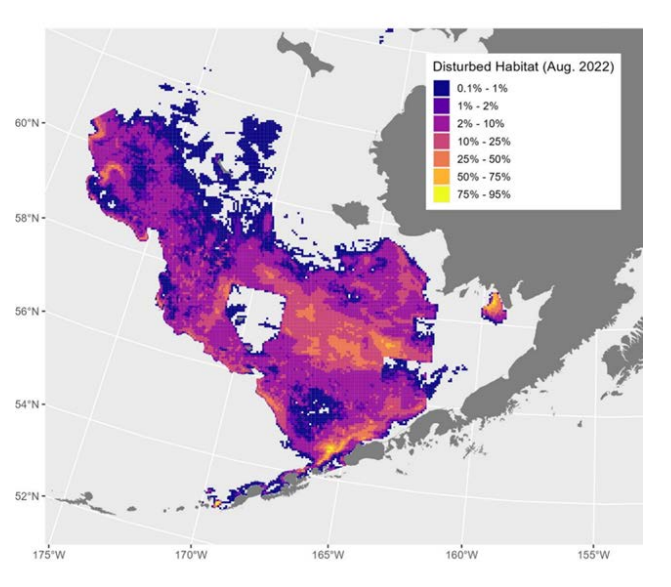



**Figure 18.** Map of cumulative percentage of habitat disturbed, all gears combined, from 2003 through August 2023. Note the delineation between the southern and northern Bering Sea at latitude 60°N (Source: Zaleski *et al.,* 2023).

Factors influencing observed trends.

Trends in disturbed seafloor area can be influenced by various factors, including fish abundance and distribution, management interventions (e.g., designated closed areas), alterations in fishery structures due to rationalization, advancements in technology (e.g., enhanced fish detection

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |

capabilities, acoustic methods for bottom fishing without physical contact), market dynamics for fish products, and modifications in vessel horsepower and fishing equipment. Intensive fishing in a region can alter species diversity by attracting opportunistic fish species that prey on organisms disturbed by fishing activities or by diminishing the habitat suitability for certain species.

Enhanced fishing efforts that engage with both biotic and abiotic bottom substrates may lead to heightened habitat loss or degradation attributable to the impacts of fishing gear. The extent of habitat damage is influenced by gear characteristics (type, weight, towing speed, depth of penetration), the physical and biological attributes of the fished areas, the recovery rates of living substrates in those areas, and management or economic alterations that lead to a spatial redistribution of fishing activities.

From 2003 to 2008, fluctuations in the disturbed area were mostly influenced by the seasonal fishing activities in the Bering Sea, a trend that persists, but to a reduced extent. In 2008, Amendment 80 was enacted, designating BSAI yellowfin sole, flathead sole, rock sole, Atka mackerel, and Aleutian Islands Pacific Ocean perch to the head and gut trawl catcher processor sector, and permitting eligible vessels to establish cooperatives. The establishment of cooperatives lowered total effort within the fleet while preserving catch levels. In 2010, improvements to trawl sweep gear were enacted on non-pelagic trawls in the Bering Sea, leading to alterations in the gear-specific contact adjustment utilized in the fishing impacts model. While the overall effects of fishing in the area are minimal, localized repercussions may be occurring. The topic of local repercussions is a subject of ongoing research.

Implications

Assessing the impacts of alterations in fishing effort on habitats is challenging; however, our capacity to quantify these effects has significantly improved with the introduction of the Fishing Effects model during the 2017 EFH 5-year Review (Simpson *et al.,* 2017) and the revised model for the 2023 EFH 5-year Review (Zaleski *et al.,* 2023b). In the 2023 EFH 5-year Review, stock authors and experts received model results up to December 2020 to assess whether the predicted disturbance negatively affected the core EFH areas of FMP species. No species in the Bering Sea were found to have effects from fishing that exceeded low and temporary levels, and no stock authors recommended species for mitigation actions regarding the consequences of fishing gear on habitat (Zaleski *et al.,* 2023b). No additional closure areas have been implemented in the Bering Sea and Aleutian Islands.

**Gulf of Alaska** (Zaleski *et al*., 2023c)[383]

This indicator uses output from the Fishing Effects (FE) model to estimate the area of geological and biological features disturbed in the Gulf of Alaska, utilizing spatially explicit VMS data summarized to 25km2 grid cells in fishable depths. The time series for this indicator is available since 2003, when widespread VMS data became available, through August 2022.

Status and trends

The time series reveals minimal variation in habitat disturbance over time, exhibiting a marginal decline from the inception of the data series in 2003 to the most recent estimate in 2022 (1.71% in

[383] https://www.fisheries.noaa.gov/resource/data/ecosystem-status-report-2023-gulf-alaska

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

January 2003 and 0.9% in August 2022,Figure 19). Figure 20 illustrates the locations of the areas having the greatest impact for August 2022.

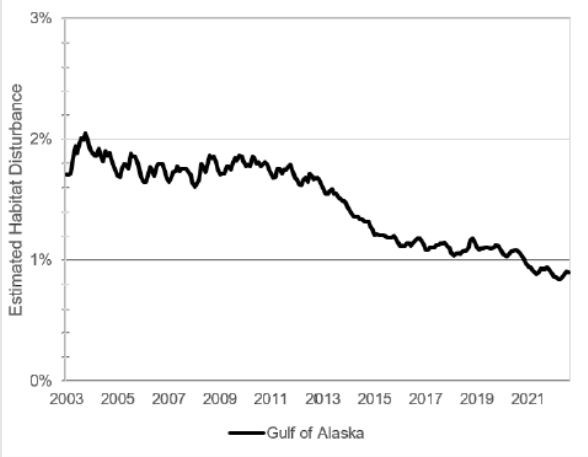



**Figure 19.** A time series of the estimated % habitat disturbance by bottom contact of commercial fishing gear in the Gulf of Alaska (2003–Aug 2022) (Source: Zaleski *et al.,* 2023c).

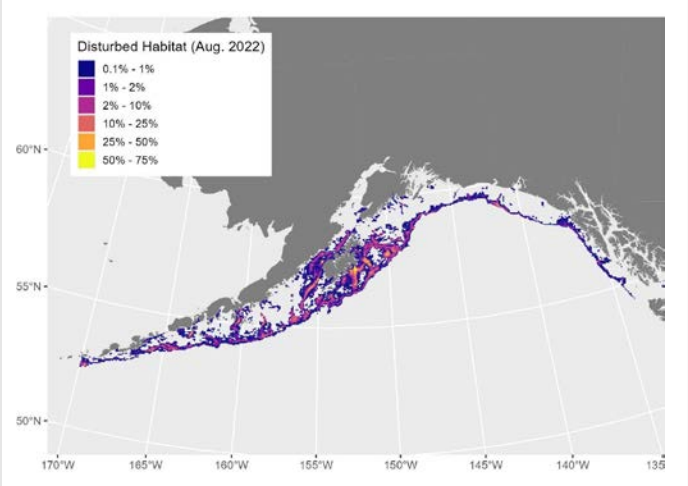



**Figure 20.** A map of the Gulf of Alaska cumulative percentage habitat disturbed; all gears combined (August 2022) (Source: Zaleski *et al.,* 2023c).

Factors influencing observed trends

Trends in disturbed seafloor area can be influenced by various factors, including fish abundance and distribution, management measures (e.g., closed areas), alterations in fishery structure due to rationalization, advancements in technology (e.g., enhanced fish detection capabilities, acoustic methods for bottom fishing without contact), market dynamics for fish products, and modifications in vessel horsepower and fishing gear. Intensive fishing in a region can alter species diversity by

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |
| | | attracting opportunistic fish species that prey on organisms disturbed by fishing activities or by diminishing the habitat suitability for certain species.<br><br>Enhanced fishing efforts that engage with both biotic and abiotic bottom substrates may lead to heightened habitat loss or degradation attributable to the impacts of fishing gear. The extent of habitat damage is influenced by gear characteristics (type, weight, towing speed, depth of penetration), the physical and biological attributes of the fished areas, the vulnerability and recovery rates of living substrates, and management or economic alterations that lead to spatial redistribution of fishing activities. Bottom trawling is prohibited in the Eastern Gulf of Alaska; hook-and-line is the primary gear type utilized in the eastern GOA.<br><br><u>Implications</u><br>Assessing the impact of alterations in fishing effort on habitat is challenging; however, our capacity to quantify these effects has significantly improved with the introduction of the Fishing Effects model during the 2017 EFH 5-year Review (Simpson *et al.,* 2017) and the revised model for the 2023 EFH 5-year Review (Zaleski *et al.,* 2023b). In the 2023 EFH 5-year Review, stock authors and experts received model results up to December 2020 to assess whether the predicted disturbance negatively affected the core EFH areas of FMP species. No species in the Gulf of Alaska were found to have effects from fishing that exceeded minimal and temporary levels, and no stock authors recommended mitigation strategies for fishing gear impacts on habitat (Zaleski *et al.,* 2023b). While the overall effects of fishing in the area are minimal, localized repercussions may be occurring.<br><br>The topic of local repercussions is a subject of ongoing investigation. No additional closure areas have been established in the Bering Sea/Aleutian Islands or Gulf of Alaska regions.<br><br>12.2.9-12.2.10 <u>Ecosystems: monitoring and protection from adverse impacts.</u><br>**North Pacific Fishery Management Council Ecosystem-based Fishery Management Approach**[384]<br>The North Pacific Council has employed an ecosystem-based approach to fisheries for numerous years. NPFC has established precautionary catch limits that account for ecological factors; protections for habitat, marine mammals, seabirds, bycatch, and forage fish are integrated into the fishery management plans; and implement comprehensive reporting and monitoring through industry-funded observers and electronic surveillance. The transition to Ecosystem-Based Fishery Management (EBFM) is a process, and as new knowledge or tools emerge, the Council enhances the fishery management program accordingly. Throughout the years, the Council has delineated an ecosystem vision statement along with detailed ecosystem-based goals and objectives for the management plans of the groundfish fishery. Annual harvest criteria incorporate ecosystem considerations, and the Council has formulated two Fishery Ecosystem Plans for the Aleutian Islands and the Bering Sea, each informed by insights gained from both regional and national experiences.<br><br><u>EBFM management policies</u><br><u>Ecosystem Vision Statement</u><br>In February 2014, the Council enacted an Ecosystem Policy to be implemented across all its activities, including long-term planning initiatives, fishery management actions, and scientific planning to |

[384] https://www.fisherycouncils.org/s/CMOD-2022-NPFMC-Resources.pdf

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

facilitate ecosystem-based fishery management. The Ecosystem Policy comprises three components: a value statement, a vision statement, and an implementation strategy.

Policy for the management of groundfish

The Council initially established its groundfish management policy in 2004. The management strategy integrates proactive conservation approaches that tackle various degrees of uncertainty to guarantee the ongoing sustainability of managed species. A total of 45 objectives are delineated to avert overfishing, foster sustainable fisheries and communities, safeguard the food web, manage incidental catch, minimize bycatch and waste, mitigate impacts on seabirds and marine mammals, lessen habitat disturbances, encourage equitable and efficient utilization of fishery resources, enhance Alaska Native consultation, and elevate data quality, monitoring, and enforcement. The Council implements the principles outlined in the groundfish policy to govern all its fisheries.

Fishery Ecosystem Management Plans

The NPFMC use Fisheries Ecosystem Plans (FEPs) to augment the Council's management programs by incorporating advanced ecosystem science, comprehensive ecosystem considerations, and management rules that synchronize Council management across all Fishery Management Plans within an ecosystem. The Council aimed to create FEPs that:

- Enhance existing Council documents, processes, and decision-making.
- Offer focused, adaptive ecosystem assessments without inundating the audience with excessive ecosystem data.
- Yield quantifiable advancements in fishery management, while refraining from directly sanctioning management actions (action-informing rather than action-forcing).

The Council has created a comprehensive, continuous framework to inform policy options and related opportunities, risks, and trade-offs impacting FMP species and the wider Bering Sea ecosystem, following the development of the Aleutian Islands FEP and the subsequent Bering Sea FEP, which incorporated lessons learned.

The FEPs aim to:

1. Establish a transparent public process for the Council to delineate ecosystem objectives and management strategies.
2. Function as a communication instrument for ecosystem science and Council policy.
3. Offer a framework for strategic planning to direct and prioritize research, modeling, and survey requirements related to fisheries, habitats, and ecosystems.
4. Identify interrelated components of the Bering Sea and Aleutian Islands ecosystems and their significance for particular management inquiries.
5. Evaluate Council management concerning EBFM best practices, identifying both successful areas and those requiring enhancement on a regular basis.
6. Establish a framework for analyzing policy alternatives and their associated opportunities, risks, and trade-offs impacting FMP species and the wider Bering Sea and Aleutian Island ecosystem (e.g., assessment of management trade-offs among FMPs, fisheries, or other activities).
7. Enhance resilience in Council management strategies, incorporating options for adapting to evolving circumstances (e.g., climate change-induced alterations in fish distribution and abundance, shifts in shipping patterns, etc.).

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |
| | | The Bering Sea FEP serves as a foundational document that delineates existing procedures and optimal practices for Ecosystem-Based Fishery Management (EBFM), offers concise and dynamic descriptions of the interrelated physical, biological, and human/institutional components of the Bering Sea ecosystem, establishes ecosystem thresholds and targets, and instructs on the application of this information to inform fishery management strategies.<br><br>Furthermore, an "action module" approach enables the Council to focus staff efforts on urgent matters and convene an advisory taskforce of specialists. To date, two action modules have been initiated.<br>• The Climate Change Action Module aims to assess the susceptibility of critical species and fisheries to climate change while enhancing resilience in regional fisheries management. The Action Module encompasses three objectives. The initial deliverable is a preliminary Climate Resilience Synthesis; further findings will also guide "climate-ready" tactical and strategic management strategies, which will contribute to sustaining a productive Bering Sea marine ecosystem and robust fisheries for decades ahead.<br>• The objective of the Local Knowledge (LK), Traditional Knowledge (TK), and Subsistence Action Module is to establish protocols for the application of LK and TK in management and to assess the effects of Council decisions on subsistence resources, users, and practices. This Action Module seeks to establish a framework for the implementation of LK and TK, potentially via Co-Production of Knowledge processes, over both short and long terms. Additionally, it aims to develop methodologies for evaluating the potential impact of specific Council actions on subsistence resources, user access to those resources, and subsistence practices.<br><br><u>Harvest specifications procedure.</u><br>The Council annually reviews an ecosystem-based Ecosystem Status Report during the harvest specifications agenda item to enhance connections between indicators monitoring Alaska's ecosystem status and pertinent issues, as well as the establishment of harvest specifications for individual species. An annual four-page summary, termed a "in-brief," is produced to encapsulate prevailing conditions, salient issues, and the application of ecosystem knowledge in determining harvest specifications. Furthermore, each groundfish stock assessment include a risk table, which delineates the possibility of the permitted biological catch (ABC) surpassing the genuine, yet unknown, overfishing limit (OFL). The risk charts are designed to guide the adjustment of the ABC from the maximum allowable when necessary. Each stock is evaluated on a scale from level 1 (normal) to level 4 (severe concern) concerning evaluation, population dynamics, environmental/ecosystem concerns, and external fishery performance risk factors. Additionally, a growing number of evaluations incorporate an Ecological and Socioeconomic Profile, which consolidates a summary of stock-specific ecological and socioeconomic variables for consideration alongside the primary stock assessment.<br><br>**BS FEP Climate Change Action Module and Climate Change Task Force**<br>The Climate Change Task Force (CCTF) was established in 2019 by the Council to formulate and implement a work plan for a Climate Change Action Module inside the Bering Sea Fishery Ecosystem Plan (FEP)[385]. The objective of the Climate Change Module is to assist the Council in advancing |

[385] https://www.npfmc.org/about-the-council/plan-teams/bering-sea-fishery-ecosystem-plan-team

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |
| | | climate-resilient fisheries management, so ensuring both immediate and enduring resilience for the interdependent natural and human communities of the Bering Sea.9 The CCTF's work plan delineates three objectives:<br>Objective 1. Collate: Organize the assessment of current and emerging climate data regarding impacts, adaptation, and residual risk.<br>Objective 2. Synthesize: Evaluate significant climate change effects, adaptation measures, and remaining risks.<br>Objective 3. Communicate: Summarize and convey potential risks and adaptive measures.<br><br>In 2022, The CCTF has recently finalized the Climate Readiness Synthesis (CRS), a crucial deliverable in furtherance of Objective 1[386]. The CRS serves as an initial framework for the Council to evaluate the climate preparedness of the management system, defining climate readiness as the extent to which management tools, assessments, and information pathways are structured to address and account for long-term climate change and the exceptional conditions and distinct challenges it poses, as opposed to merely addressing natural climate variability. The synthesis is structured into three sections assessing climate readiness: 1) the management system, 2) Stock Assessment and Fishery Evaluation (SAFE) reports and products, including Ecosystem Status Reports, and 3) knowledge bases that facilitate climate readiness and adaptation, emphasizing indigenous community, industry, and NMFS and Council knowledge bases.<br><br>In the Council meeting of October 2024[387],The Council obtained the report from the Climate Scenarios Workshop and a discussion paper on climate science and concepts from the 8th national meeting of the Scientific Coordination Subcommittee (SCS8), conducted in August 2024. The Council approved a motion endorsing two objectives established by the SSC to sustain progress towards reaching Objective 3.<br><br>It is expected that in December 2024 the Council will have the final report of the Climate Change Task Force. Staff will propose suggestions to assist the Council's April debate on programmatic alternatives and seek Council feedback regarding the approach to generating discussion materials.<br><br>**Ecosystem-based fisheries management approach to Essential Fish Habitat[388]**<br>Ecosystem-based fishery management (EBFM) is geographically specific, adaptive, incorporates ecosystem knowledge and uncertainties, considers multiple external influences, and aims to balance various societal objectives (NMFS 2016), with habitat science as a fundamental component (Peters et al. 2018). EBFM seeks to preserve ecosystems in a robust, productive, and resilient state to facilitate sustainable fishing by integrating ecosystem interactions and concerns. The NMFS AKR aims for an Ecosystem-Based Fishery Management (EBFM) approach to Essential Fish Habitat (EFH), wherein habitat science underpins consultations and information for five-year reviews; hence, developments in habitat science also fulfill additional EBFM information requirements. |

[386] https://www.npfmc.org/wp-content/PDFdocuments/Publications/Misc/ClimateReadinessSynthesis2022.pdf
[387] https://meetings.npfmc.org/CommentReview/DownloadFile?p=d3081be2-383c-42b8-bb71-9e4ccceb94cf.pdf&fileName=D1b%20Climate%20Change%20Task%20Force%20Report.pdf
[388] https://meetings.npfmc.org/CommentReview/DownloadFile?p=511c0ff7-9884-4f3f-8f14-380c51df9c84.pdf&fileName=2023%20EFH%20Review%20Summary%20Report.pdf

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

- NMFS examines the ten EFH components of FMPs within the geographical framework of Alaska's five extensive marine ecosystems, as delineated by NOAA: the Gulf of Alaska (GOA), Aleutian Islands (AI), Eastern Bering Sea (EBS), northern Bering Sea and Chukchi Sea, and Beaufort Sea, together with the associated fishery management areas, coastal communities, species, and habitats.
- The updated SDM EFH component 1 maps provide an enhanced basis for fulfilling our EFH obligations. The foundational SDMs represent a progression in habitat science that enhances EBFM by facilitating stock assessment (e.g., Ecosystem Socioeconomic Profiles; Shotwell *et al.,* 2022) and elucidating the impact of climate variability on habitat, recruitment, and spatial stock structure (e.g., Goldstein *et al.,* 2020, Rooper *et al.,* 2021, Barnes *et al.*, 2022).
- The EFH component 2 fishing effects study examines the impact of fishing gear on Essential Fish Habitat (EFH) and is utilized to provide an annual indicator for the Ecosystem Status Reports for the Gulf of Alaska (GOA), Aleutian Islands (AI), and Eastern Bering Sea (EBS). The evaluation of fishing impacts could be enhanced through further research utilizing an ecological approach.
- The EFH Component 4 non-fishing effects report, which facilitates the consultation process for actions potentially detrimental to EFH, adopts an ecosystem approach in offering conservation recommendations to the relevant action agencies. This report introduces climate informed EFH conservation recommendations for the first time, recognizing climate change as a transformation of habitat from a species perspective. Additionally, future considerations for addressing EFH components 7 (prey species habitat), 5 (cumulative impacts), and 3 (non-MSA fishing effects) present further avenues through which EFH conservation initiatives and habitat science can enhance NMFS' mission effectiveness regarding EBFM.
- Component 9 of EFH (research priorities) is guided by management information requirements for advancements in habitat science, along with an Ecosystem-Based Fisheries Management (EBFM) strategy to fulfill EFH objectives.
- The EFH component 10 entails a review process of EFH information inside the FMPs and the incorporation of new data at least every five years, conducted iteratively and publicly, with contributions from many stakeholders.

The 2023 EFH 5-year Review which was completed in February 2023, analyzed new data on EFH, identified information deficiencies and research requirements, and determined the necessity for any adjustments to EFH. According to the EFH 5-year Review, the Council concluded that new habitat and life history data necessitate the revision of numerous EFH descriptions and maps within the FMPs. The suggested modifications to the EFH provisions in the Council's FMPs would not significantly alter the effects of EFH as assessed in the 2005 EFH environmental impact assessment. The 2023 EFH 5-year Review determined that the results on the evaluation of fishing impacts on EFH remain unchanged in light of new knowledge. No FMP modifications necessitate regulatory action.

On July 19, 2024, NPFMC amended the GOA and BBSAI FMPs to include the findings of the 2023 EFH 5-year Review. The modifications were as follows:

1. Revise EFH description and maps by species, and update life history, distribution, and habitat association information (EFH component 1), based on the 2023 EFH 5-year Review.

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

2. Update the model used to determine fishing effects on species' core EFH areas, and the evaluation of EFH impacts from fishing activities (EFH component 2).
3. Update description of EFH impacts from non-fishing activities and EFH conservation recommendations for non-fishing activities (EFH component 4).
4. Update the research and information needs (EFH component 9).

12.3-4 Key prey species and dependent predators

**Halibut**

The feeding behaviors of Pacific halibut evolve during the course of its lifespan. They are not typically categorized as a key prey species for any single marine predator, partly because they are quite high up in the food chain and has a trophic level of around 4[389].

Larval Pacific halibut consume zooplankton. Individuals aged 1-3 years typically measure less than 12 inches (30 cm) in length and consume small, shrimp-like creatures, crabs, and small fish[390]. As Pacific halibut get larger and have enhanced swimming capabilities, fish constitute a more significant component of their diet. Commonly found in the stomachs of huge Pacific halibut are species such as cod, sablefish, pollock, rockfish, sculpins, turbot, and various flatfish. Pacific halibut frequently ascend from the seabed to prey on pelagic species like sand lance and herring. Octopuses, crabs, clams, and occasionally tiny Pacific halibut also comprise their diet[391]. Pacific halibut have been discovered to have crabs with a carapace diameter of up to seven inches in their stomachs, although adult halibut do not seem to be the principal predators of crabs.

Larval and juvenile Pacific halibut are little and exceedingly susceptible to predation by other fish species[392]. The dimensions, active behavior, and benthic tendencies render larger Pacific halibut less susceptible to predation compared to other species. Adult Pacific halibut are infrequently consumed by marine animals and sharks, but seldom serve as prey for other fish[393]. This is understandable, because adult halibut are large, active animals that would be difficult to capture in open water. Also, their bottom dwelling habits, generally in offshore areas, make them less accessible to predation than schooling, pelagic species[394].

**Sablefish**

Larval sablefish consume several small zooplankton, including copepod nauplii and diminutive amphipods (Grover and Olla, 1990). The epipelagic juveniles predominantly consume microzooplankton and micronekton, namely euphausiids.

Gao *et al*. (2004) investigated stable isotopes in the otoliths of juvenile sablefish from Oregon and Washington, revealing that as the fish grew, they transitioned from midwater prey to predominantly benthic prey. In nearshore southeast Alaska, the diets of juvenile sablefish (200-450 mm) comprised

[389] https://www.fishbase.se/Ecology/FishEcologySummary.php?StockCode=530&GenusName=Hippoglossus&SpeciesName=stenolepis
[390] https://www.iphc.int/research/pacific-halibut-stock-status-biology
[391] https://www.adfg.alaska.gov/index.cfm?adfg=halibut
[392] https://www.iphc.int/research/larval-distribution/
[393] https://www.fisheries.noaa.gov/species/pacific-halibut
[394] https://iphc.int/uploads/pdf/tr/IPHC-1986-TR021.pdf

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |
| | | fish species such Pacific herring and smelts, as well as invertebrates including krill, amphipods, and polychaeta worms (Coutré *et al.,* 2015). During late summer, juvenile sablefish exhibited opportunistic scavenging by consuming substantial quantities of post-spawning Pacific salmon corpse fragments (Coutré *et al.,* 2015). Juvenile sablefish are frequently located in the stomachs of salmon captured in the Southeast Alaska troll fishery during late summer. Nearshore habitats in their second year offer the option to consume salmon fry and smolts during the summer season.<br><br>During their demersal phase, young sablefish under 600 mm predominantly consume euphausiids, shrimp, and cephalopods (Yang and Nelson 2000, Yang et al. 2006), but sablefish beyond 600 mm largely feed on fish. Juvenile and adult sablefish are classified as opportunistic feeders. The sablefish diet primarily consists of fish such as pollock, eulachon, capelin, Pacific herring, Pacific cod, Pacific sand lance, and some flatfish, with pollock being the most prevalent, comprising 10 to 26 percent of prey weight, contingent on the year. Squid, euphausiids, pandalid shrimp, Tanner crabs, and jellyfish were identified, with squid being the most significant among the invertebrates (Yang and Nelson, 2000; Yang *et al.,* 2006). Research in Oregon and California revealed that fish constituted 76 percent of the adult sablefish diet (Laidig *et al.,* 1997). Euphausiids were the predominant prey off the southwest coast of Vancouver Island (Tanasichuk, 1997). The diet of sablefish in the Gulf of Alaska predominantly overlaps with that of giant flatfish, arrowtooth flounder, and Pacific halibut (Yang and Nelson, 2000). Nearshore residence in their second year allows for the consumption of salmon fry and smolts during the summer season.<br><br>Adult coho and chinook salmon are the primary predators of juvenile sablefish, targeting the young-of-the-year sablefish during their pelagic phase[395]. Despite juvenile sablefish being an infrequent prey item due to their limited and irregular abundance relative to other prey, they coexist on the continental shelf with potential predators, including arrowtooth flounder, halibut, Pacific cod, bigmouth sculpin, big skate, and Bering skate, which are the primary piscivorous groundfishes in the Gulf of Alaska. Sperm whales are probable primary predators of adult sablefish. Juvenile sablefish (less than 60 cm fork length) share dietary overlap with small arrowtooth flounder and potentially with sleeper sharks.<br><br>Alaska sablefish trophic level is considered to be between 3.8[396], and they are not considered a key prey species as such there does not appear to be a need for management objectives and measures in place to avoid severe adverse impacts on dependent predators.<br><br>Finally, the ecological roles of the sablefish and halibut stocks are sufficiently understood, and neither is considered a significant prey species. According to multiple comprehensive studies of food webs in various regions of the northern Pacific Ocean, sablefish and halibut are not considered to be extensively devoured by any predator. Marine organisms seldom prey on Alaskan halibut and sablefish, unless when the fish are entangled in fishing gear. This appears reasonable considering that adult sablefish and halibut are both sizable, dynamic species that would pose difficulties in capturing inside open water. Moreover, their bottom-dwelling behavior renders them less susceptible to predators compared to schooling pelagic species, which are generally located in offshore environments. Consequently, the Council does not categorize sablefish/halibut stocks as |

[395] https://apps-afsc.fisheries.noaa.gov/REFM/Docs/2014/GOAsablefish.pdf
[396] https://fishbase.se/summary/SpeciesSummary.php?ID=512&AT=sablefish

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |
| | | forage species for groundfish (e.g., BSAI and GOA Groundfish FMP; NPFMC, 2024a.NPFMC,2024b), and no predators are recognized to possess an obligatory or dependent relationship (Pikitch *et al.*, 2012) with sablefish/halibut stocks. Thus, the current information indicates that the sablefish and halibut stocks under consideration are not significant prey species and removing them would not adversely impact dependent predators.<br><br>Nevertheless, the Council process includes measures to create outcome indicators aimed at preventing severe adverse impacts on dependent predators. The BSAI and GOA Groundfish FMPs both consider potential impacts on dependent predators by employing outcome indicators. Ongoing efforts are being made to monitor outcome indicators to avert negative effects on dependent predators.<br><br>12.5 Pollution – MARPOL<br>MARPOL 73/78 (the "International Convention for the Prevention of Pollution From Ships") is one of the most important treaties regulating pollution from ships[397]. 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)[398]. The requirements apply to vessels operating in U.S. waters as well as ships operating within 200 nautical miles of the coast of North America, also known as the North American Emission Control Area (ECA).<br><br>On June 27, 2011, the EPA and USCG entered into a Memorandum of Understanding (MOU) to enforce Annex VI MARPOL[399]. The Annex VI MOU160 provides that EPA and USCG will jointly and cooperatively enforce the provisions of Annex VI and APPS. Efforts to be conducted by USCG and EPA include inspections, investigations, and enforcement actions if a violation is detected. The efforts to ensure compliance with Annex VI and APPS include oversight of marine fueling facilities, on board compliance inspections, and record reviews. On January 16, 2015, EPA released a penalty policy for violations of the sulfur in fuel standard and related provisions for ships[400].<br><br>12.6 Research on gear impacts<br>**Halibut and Sablefish**<br>In general, during the management of groundfish resources process NPFMC, NMFS AKFSC and NOAA Alaska regional office have encountered controversial issues on marine resources conservation and different social and economic goals for sustainable fishery management, including protection of the long-term health of the resource and the optimization of yield. On their FMPs there are sections describing the economic and socioeconomic characteristics of the fisheries and communities in Alaska[401],[402](NPFMC 2024a; NPFMC 2024b). Catch levels for each groundfish species or species group that are set by NPFMC and IPHC are based on the best biological, ecological, and socioeconomic information available. Socio-economic data collection and economic analyses are often included |

[397] https://www.imo.org/en/about/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-(MARPOL).aspx
[398] https://coast.noaa.gov/data/Documents/OceanLawSearch/ActtoPreventPollutionfromShipsandMARPOL7378.pdf
[399] https://www.epa.gov/enforcement/marpol-annex-vi-and-act-prevent-pollution-ships-apps
[400] https://www.epa.gov/sites/default/files/2015-03/documents/marinepenaltypolicy.pdf
[401] https://www.npfmc.org/wp-content/PDFdocuments/fmp/BSAI/BSAIfmp.pdf
[402] https://www.npfmc.org/wp-content/PDFdocuments/fmp/GOA/GOAfmp.pdf

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

under the Regulatory Flexibility Act (RFA), the MSA, the NEPA, the Endangered Species Act, and other applicable laws. AFSC's Economic and Social Sciences Research Program produces an annual Economic Status Report of the Groundfish fisheries in Alaska (Fissel *et al.,* 2023). The primary mission of the Economic and Social Sciences Research Program[403] is to provide economic and sociocultural information that will assist NMFS in meeting its stewardship responsibilities. Activities in support of this mission include:

- Collecting economic and sociocultural data relevant for the conservation and management of living marine resources.
- Developing models to use that data both to monitor changes in economic and sociocultural indicators and to estimate the economic and sociocultural impacts of alternative management measures.
- Preparing reports and publications.
- Participating on NPFMC, NMFS, and inter-agency working groups.
- Preparing and reviewing research proposals and programs.
- Preparing analyses of proposed management measures.
- Assisting Alaska Regional Office and NPFMC staff in preparing regulatory analyses.
- Providing data summaries.

Many of these are cooperative activities conducted with other scientists at the Center, other NMFS sites, the NPFMC, other natural resource agencies, and universities. Currently, the research topics being addressed cooperatively by program staff and scientists at the University of Washington, the University of Alaska, and the University of California, Davis include regional economic impact models, behavioral models of fishing operations, indicators of economic performance, and the non-market valuation of living marine resources.

**Halibut[404]**

The IPHC Secretariat is undertaking research to devise techniques for modifying fishing gear to mitigate Pacific halibut depredation and bycatch. The specific objectives in this domain are: 1) to explore novel techniques for whale avoidance and/or deterrence to mitigate Pacific halibut depredation by whales (e.g., catch protection strategies), and 2) to examine the behavioral and physiological responses of Pacific halibut to fishing gear to decrease bycatch. The significant management implications of our findings involve enhancing mortality calculations of Pacific halibut in the directed commercial fisheries, which will result in more accurate assessments of stock productivity. Based on the projected extent of whale depredation, this may be incorporated as an additional explicit source of mortality in the stock assessment and mortality limit determination procedure.

**Whale predation**

Research on the advancement of gear-based strategies for catch protection to reduce whale depredation in the Pacific halibut longline fishery.

**Gear modification for bycatch mitigation**

Research on gear improvements to mitigate bycatch of Pacific halibut in trawl fisheries and non-Pacific halibut bycatch in the Pacific halibut longline fishery**.**

[403] https://www.fisheries.noaa.gov/alaska/socioeconomics/alaska-economic-and-social-sciences-research
[404] https://www.iphc.int/research/fishing-technology/

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |
| | **Sablefish**<br>NOAA Auke Bay lab have been doing continuing research in collaboration with University of Alaska and ADFG on determining effects of fishing gear on benthic habitats[405]<br>Theses research individual projects fall into three major categories:<br>1) Effects of specific gear on specific habitat,<br>2) Linkage of fishing induced disturbance to population dynamics of commercial and non-commercial species,<br>3) Mitigation-related studies.<br><br>12.7 Marine Protected Areas (MPAs)<br>In Alaska, MPAs have been widely employed as management tools by state and federal management organizations as well as NPFMC. Brock (2015) reports that 95 MPAs have been established in Alaska, totaling 2,737,588 km2 over 4 significant ecoregions. It is not unexpected that different MPAs have different specific conservation aims given the sheer number of MPAs. However, the majority of Alaska's MPAs were created with the intention of safeguarding fish stocks and fisheries and/or protecting marine biodiversity and sensitive or important habitats. To safeguard benthic invertebrates and lessen the possibility of damaging effects on sensitive habitat, the NPFMC, for instance, notes that large sections of the North Pacific have been permanently prohibited to groundfish trawling and scallop dredging. These marine protected zones operate in many ways as marine reserves and make up a sizable percentage of the continental shelf. Additionally, fisheries restrictions enforced in nearshore areas to lessen encounters with Steller sea lions have an additional benefit of lessening habitat damage as well[406].<br><br>NOAA and the Department of the Interior have partnered to create the National Marine Protected Areas Center[407]. On its website, the Center offers an interactive MPA Inventory that lists all MPAs in US waters, their locations, and their functions. This extensive geographic database combines information from state and federal MPA programs with data that is publicly available. A map of MPAs in Alaska is shown in (Figure 21). |

[405] https://www.fisheries.noaa.gov/about/auke-bay-laboratories
[406] https://www.npfmc.org/fisheries-issues/issues/habitat-protections/#:~:text=Structural%20habitat%20includes%20boulders%2C%20corals,Image%20from%202009
[407] https://marineprotectedareas.noaa.gov/

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

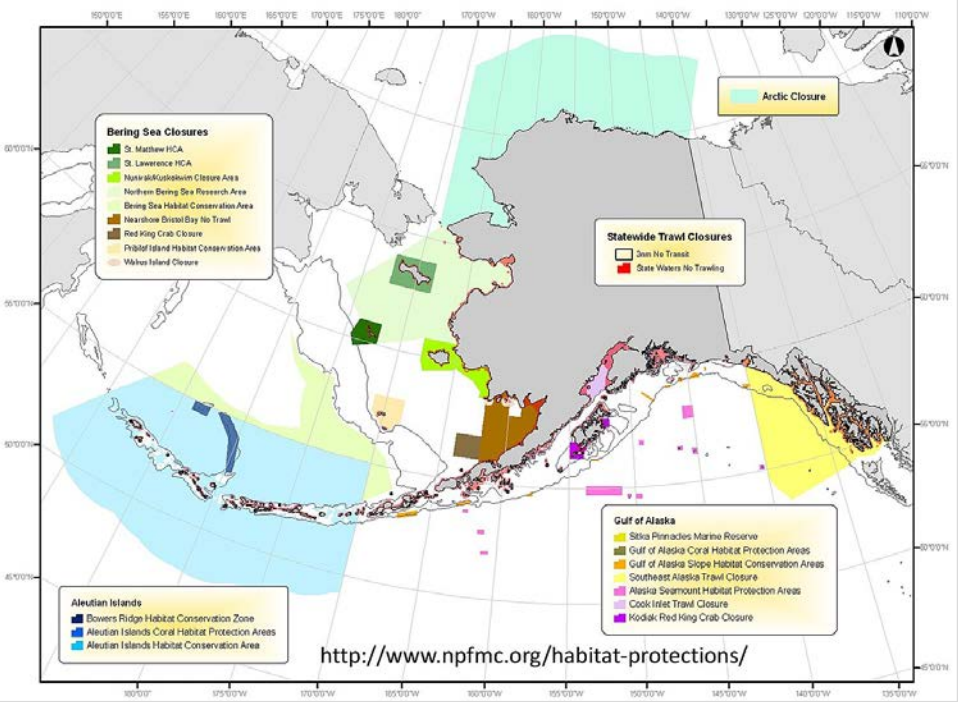



**Figure 21.** Marine Protected Areas in Alaska (Source: NOAA).

The North Pacific Council's jurisdiction spans from three to 200 miles offshore of Alaska. The North Pacific Council oversees over 140 species across 47 stocks and stock complexes, encompassing pollock, cod, rockfish, crab, scallops, halibut, and state-managed salmon fisheries via six fishery management plans (FMPs)[408].

The North Pacific Council has maintained a solid history of science-based, sustainable fisheries management since the implementation of the MSA in 1976. For the past 45 years, the sustainable harvest of groundfish in the North Pacific has exceeded 2,200,000 metric tons annually, representing nearly 60% of the entire U.S. catch. The yields stem from Council management of sustainable fisheries that benefit harvesters, processors, recreational and subsistence users, and fishing communities. These fisheries are sustained by healthy, productive, biodiverse, and resilient marine ecosystems that provide various services; support robust populations of marine species across all trophic levels, including marine mammals and seabirds; and are managed through a precautionary, transparent, and inclusive process that facilitates tradeoff analyses, considers changing conditions, and mitigates threats. In the North Pacific, sustainable fishing and the preservation of ecosystem function and integrity are not merely compatible; they are interdependent.

The North Pacific Council has utilized area-based conservation measures as one of its tools to attain this goal. Approximately 200 conservation areas have been developed to preserve marine resources and biodiversity, safeguard fragile habitats and ecosystems, and promote healthy coastal

[408] https://www.fisherycouncils.org/s/Evaluation-of-Conservation-Areas-Report-2023.pdf

| 12. | Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed. |
|---|---|
| | communities. These regions cover 666,497 nm² that are prohibited from bottom trawling throughout the year, constituting approximately 61% of the Exclusive Economic Zone (EEZ) in the North Pacific (1,026,771 nm²). A total of 148,165 nm² are permanently closed to all bottom-tending gear, constituting 14.4% of the Exclusive Economic Zone (EEZ). Certain regions are prohibited for targeted fishing of key prey species (Atka mackerel, cod, and pollock) to reduce potential conflict with the fishing fleet for Steller sea lions.<br><br>Marine conservation areas offer long-term benefits for ecosystem components, notably deep-sea corals. However, certain regions in the North Pacific have been altered to adapt to changing environmental conditions, leading to shifts in the historic distribution of more mobile fish stocks. In 1995, the Council established Chinook and Chum Salmon Savings Areas in the Bering Sea to address the aggregation of salmon and their capture as bycatch. In 2005, the Salmon Savings areas underwent re-evaluation and were found to be ineffective as a conservation strategy. Consequently, fixed areas were abolished and substituted with a more adaptive system that allows for the opening and closing of spatial areas throughout the season for periods of 5-7 days, contingent upon relative salmon bycatch rates. Other species are altering their distributions in response to changing environmental conditions. Pacific cod are currently abundant in the northern Bering Sea, an area where the stock was previously absent due to the loss of the cold pool, which acted as a barrier to northward fish migration. Environmental changes lead to alterations in ecosystem functions and significant management challenges; thus, the issue of fixed closures in a changing climate must be acknowledged and addressed. |
| References: | Barnes C.L., Essington, T.E., Pirtle, J.L., Rooper, C.N., Laman, E.A., Holsman, K.K., Aydin, K.Y., and Thorson, J.T. 2022. Climate-informed models benefit hindcasting but present challenges when forecasting species–habitat associations. Ecography. doi: 10.1111/ecog.06189<br>Bond, N. A., M. F. Cronin, H. Freeland, and N. Mantua. 2015. Causes and impacts of the 2014 warm anomaly in the NE Pacific. Geophysical Research Letters 42:3414–3420<br>Brock, R. 2015. Representativeness of Marine Protected Areas of the United States. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Protected Areas Center, Silver Spring, MD.<br>Brodeur, R. D., M. B. Decker., L. Ciannelli, J. E., Purcell, N. A., Bond, P. J., Stabeno., E. Acuna., and G. L. Hunt. 2008. Rise and fall of jellyfish in the eastern Bering Sea in relation to climate regime shifts. Progress in Oceanography 77:103–111.<br>Buser, T. 2023. Eastern and Northern Bering Sea – Structural Epifauna. In: Siddon, E. 2023. Ecosystem Status Report 2023: Eastern Bering Sea, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, 1007 West 3rd Ave., Suite 400, Anchorage, Alaska 99501.<br>Bachman, M., D. Boelke., J.Coakley., M. Fitchett., J. Froeschke, K. Griffin., R. Pugliese., E. Reid., L. Rivera-Garcia., M. Rolon., D.Witherell. 2023. An Evaluation of Conservation Areas in the U.S. EEZ. Council Coordinating Committee Area-Based Management Subcommittee Final Report.<br>Clark, W.G., and Hare, S.R. 2002. Effects of climate and stock size on recruitment and growth of Pacific halibut. North American Journal of Fisheries Management 22: 852-862.<br>Clark, W.G., Hare, S.R., Parma, A.M., Sullivan, P.J., and Trumble, R.J. 1999. Decadal changes in growth and recruitment of Pacific halibut (*Hippoglossus stenolepis*). Canadian Journal of Fisheries and Aquatic Sciences 56: 242-252. |

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |

Coutré, K. M., A.H. Beaudreau, and P.W. Malecha. 2015. Temporal Variation in Diet Composition and Use of Pulsed Resource Subsidies by Juvenile Sablefish. Transactions of the American Fisheries Society, 144(4), 807-819.

Di Lorenzo, E., and N. Mantua. 2016. Multi-year persistence of the 2014/15 North Pacific marine heatwave. Nature Climate Change 6:1042–1047.

Dorn, M.W., and S.G. Zador. 2020. A risk table to address concerns external to stock assessments when developing fisheries harvest recommendations. Ecosyst Health Sustain. 6(1):1813634.

Echave, K. B., and P.J. F. Hulson. 2018. Assessment of the Thornyhead stock complex in the Gulf of Alaska. In Stock assessment and fishery evaluation report for the groundfish resources of the Gulf of Alaska. North Pacific Fishery Management Council, Anchorage, Alaska.

Ferriss, B.E. 2023. Ecosystem Status Report 2023: Gulf of Alaska., Stock Assessment and Fishery Evaluation Report. North Pacific Fishery Management Council, 1007 West Third Suite 400, Anchorage, Alaska 99501. 257 p.

Fissel, B., M. Dalton, B. Garber-Yonts, A. Haynie, S. Kasperski, J. Lee, D. Lew, C. Seung, K. Sparks, M. Szymkowiak, and S. Wise. 2023. "Stock Assessment and Fishery Evaluation Report for the Groundfish Fisheries of the Gulf of Alaska and Bering Sea/Aleutian Island Area: Economic Status of the Groundfish Fisheries off Alaska, 2022'', NPFMC, November 2023.

Gao, Y., S.H. Joner, R.A. Svec, and K.L. Weinberg. 2004. Stable isotopic comparison in otoliths of juvenile sablefish (*Anoplopoma fimbria*) from waters off the Washington and Oregon coast. Fisheries Research, 68(1), 351-360.

Gharrett, A.J., A.P. Matala, E.L. Peterson, A.K. Gray, Z. Li, and J. Heifetz. 2005. Two genetically distinct forms of rougheye rockfish are different species. Transactions. American. Fisheries. Society. 132:242-260.

Gharrett, A.J., Z. Li, C.M. Kondzela, and A.W. Kendall. 2002. Final report: species of rockfish (Sebastes spp.) collected during ABL-OCC cruises in the GOA in 1998-2002. (Unpubl. manuscr. available from the NMFS Auke Bay Laboratory, 11305 Glacier Hwy., Juneau AK 99801).

Goethel, D. R., D. H. Hanselman, C. J. Rodgveller, K. H. Fenske, S. K. Shotwell, K. B. Echave, P. W. Malecha, K. A. Siwicke, and C. R. Lunsford. 2020. Assessment of the Sablefish Stock in Alaska. In Stock assessment and fishery evaluation report for the groundfish resources of the Bering Sea and Aleutian Islands. North Pacific Fishery Management Council, Anchorage. 257 p.

Goethel, D.R., Cheng, M.L.H., Echave, K.B., Marsh, C., Rodgveller, C.J., Shotwell, K., and Siwicke, K. 2023. Assessment of the sablefish stock in Alaska. North Pacific Fishery Management Council, Anchorage, AK.

Goldstein, E.D., Pirtle, J. L., Duffy-Anderson, J.T., Stockhausen, W.T., Zimmermann, M., Wilson, M.T., and Mordy, C.W. 2020. Eddy retention and seafloor terrain facilitate cross-shelf transport and delivery of fish larvae to suitable nursery habitats. Limnol. Oceanogr, 65: 2800–2818.

Grover, J. J. and B. L. Olla. 1990. Food habits of larval sablefish *Anoplopoma fimbria* from the Bering Sea. Fish. Bull. 88: 811-814.

Harrington, G. A., J. L. Pirtle, M. Zaleski, C. Felkley, S. Rheinsmith, and J. T. Thorson. 2023. Essential Fish Habitat 2023 5-year Review Summary Report. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-f/AKR-31, 135 p.

Holsman, K., Hazen, E., Haynie, A., Gourguet, S., Hollowed, A., Borgrad, S., et al. (2019). Toward climate-resiliency in fisheries management. ICES J. Mar. Sci. 76, 1368–1378.

IPHC. 2024c. International Pacific Halibut Commission 5-Year program of integrated research and monitoring (2022-26). Seattle, WA, U.S.A. IPHC–2023-5YPIRM, 58 pp.

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |

Ito, D.H. 1999. Assessing shortraker and rougheye rockfishes in the Gulf of Alaska: addressing a problem of habitat specificity and sampling capability. Ph. D. Thesis. Univ. Washington, Seattle. 204 p.

Kramer, D.E., and V.M. O'Connell. 1988. A Guide to Northeast Pacific Rockfishes: Genera *Sebastes* and *Sebastolobus*. In: Alaska Sea Grant Advisory Bulletin, 25. In National Marine Fisheries Service 2001(a).

Laidig, T. E., P. B. Adams, and W. M. Samiere. 1997. Feeding habits of Sablefish, *Anoplopoma fimbria*, off the coast of Oregon and California. NOAA Technical Report NMFS 130: 65–80.

Laman ,N. 2022. Structural Epifauna in the Aleutian Islands Ecosystem In Ortiz, I. and Zador, S. 2022. Ecosystem Status Report 2022: Aleutian Islands, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, 1007 West Third, Suite 400, Anchorage, Alaska 99501.

Laman, N., A. Dowling .2023. Structural Epifauna—Gulf of Alaska In : Ferriss, B.E. 2023. Ecosystem Status Report 2023: Gulf of Alaska, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, 1007 West Third, Suite 400, Anchorage, Alaska 99501.

Mantua, N.J., Hare, S.R., Zhang, Y., Wallace, J.R., and Francis, R.C. 1997. A Pacific interdecadal climate oscillation with impacts on salmon production. Bulletin of the American Meteorological Society 78(6): 1069-1079.

Matarese, A.C., A.W. Kendall, Jr., D.M. Blood, and B.M. Vinter. 1989. Laboratory guide to early life history stages of northeast Pacific fishes. NOAA Technical. Report. NMFS 80, 652 p.

McDermott, S.F. 1994. Reproductive biology of rougheye and shortraker rockfish, *Sebastes aleutianus* and *Sebastes borealis*. Master's thesis. University of Washington, Seattle 76 pp

NMFS. 2004. Alaska Groundfish Fisheries Final Programmatic SEIS. NMFS, Alaska Region. P. O. Box 21668, Juneau, AK 99802.

NMFS. 2016. Ecosystem-Based Fisheries Management Policy of the National Marine Fisheries Service, National Oceanic and Atmospheric Administration.

NOAA. 2024. North Pacific Observer Program 2023 Annual Report. AFSC Processed Rep. 2024-10, 128 p. Alaska Fish. Sci. Cent., NOAA, Natl. Mar. Fish. Serv., 7600 Sand Point Way NE, Seattle WA 98115.

Olson, J. 2022. Area Disturbed by Trawl Fishing Gear in Alaska In Ortiz, I. and Zador, S. 2022. Ecosystem Status Report 2022: Aleutian Islands, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, 1007 West Third, Suite 400, Anchorage, Alaska 99501.

Ormseth, O. A. 2019. Assessment of the skate stock complex in the Gulf of Alaska. In Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Gulf of Alaska. North Pacific Fishery Management Council, 1007 West Third, Suite 400 Anchorage, AK 99501.

Orr, J.W. and S. Hawkins. 2008. Species of the rougheye rockfish complex: resurrection of *Sebastes melanostictus* (Matsubara, 1934) and a redescription of *Sebastes aleutianus* (Jordan and Evermann, 1898) (Teleostei: Scorpaeniformes). Fisheries Bulletin. 106: 111-134.

Ortiz, I., and Zador, S. 2023. Ecosystem Status Report 2023: Aleutian Islands., Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council. 1007 West Third, Suite 400, Anchorage, Alaska 99501. 93 p.

Peters, R., A.R. Marshak, M.M. Brady, S.K. Brown, K. Osgood, C. Greene, V. Guida, M. Johnson, T. Kellison, R. McConnaughey, T. Noji, M. Parke, C. Rooper, W. Wakefield, and M. Yoklavich. 2018. Habitat Science is a Fundamental in an Ecosystem-Based Fisheries Management Framework: An

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |

Update to the Marine Fisheries Habitat Assessment Improvement Plan. U.S. Dept. of Commerce, NOAA. NOAA Technical Memorandum NMFS-F/SPO-181, 29 p.

Pikitch,E, P.D. Boersma, I. Boyd, D. Conover, P. Cury, T. Essington, S. Heppell, E. Houde, M. Mangel, D. Pauly. 2012. Little Fish, Big Impact: Managing a Crucial Link in Ocean Food Webs Lenfest Ocean Program, Washington, DC, p. 108.

Pirtle, J. L., J. T. Thorson, S. R. Bayer, T. P. Hurst, M. E. Matta, and M. C. Siple. 2024. Alaska Essential Fish Habitat Research Plan: A Research Plan for the National Marine Fisheries Service's Alaska Fisheries Science Center and Alaska Regional Office. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/ AKR-33, 17 p.

Purcell, J. E., and M. N. Arai. 2001. Interactions of pelagic cnidarians and ctenophores with fish: a review. Hydrobiologia 451:27–44.

Purcell, J. E., and M. V. Sturdevant. 2001. Prey selection and dietary overlap among zooplanktivorous jellyfish and juvenile fishes in Prince William Sound, Alaska. Marine Ecology Progress Series 210:67–83.

Purcell, J. E. 2005. Climate effects on formation of jellyfish and ctenophore blooms: a review. Journal of the Marine Biological Association of the United Kingdom 85:461–476

Robinson, K. L., J. J. Ruzicka, and M. B. Decker. 2014. Jellyfish, Forage Fish, and the World's Major Fisheries Oceanography 27:104–115.

Rooper C.N., Ortiz, I., Hermann, A.J., Laman, E.A., Cheng, W., Kearney, K., and Aydin, K. 2021. Predicted shifts of groundfish distribution in the eastern Bering Sea under climate change, with implications for fish populations and fisheries management. ICES J. Mar. Sci. 78(1): 220–234.

Shotwell S.K., K. Blackhart, C. Cunningham, E. Fedewa, D. Hanselman, K. Aydin, M. Doyle, B. Fissel, P. Lynch, O. Ormseth, P. Spencer & S. Zador. 2023. Introducing the Ecosystem and Socioeconomic Profile, a Proving Ground for Next Generation Stock Assessments, Coastal Management, 51(5–6), 319–352.

Shotwell, S. K., J. L. Pirtle, J. T. Watson, A. L. Deary, M. J. Doyle, S. J. Barbeaux, M. Dorn, et al. 2022a. Synthesizing integrated ecosystem research to create informed stock-specific indicators for next generation stock assessments. Deep-Sea Res. II, GOA SI IV. doi: 10.1016/j.dsr2.2022.105070.

Shotwell, S.K., Bryan, M., Hanselman, D., Markowitz, M., Siddon, E., Spies, I. and Sullivan, J. 2022b. Assessment of the arrowtooth flounder stock in the Bering Sea and Aleutian Islands. North Pacific Fishery Management Council, Anchorage, AK.

Shotwell, S.K., Bryan, M., Hanselman, D., Markowitz, M., Siddon, E., Spies, I. and Sullivan,

Siddon, E. 2023. Ecosystem status report 2023: Eastern Bering Sea. Stock assessment and Fishery Evaluation Report. North Pacific Fishery Management Council. 1007 West 3rd Ave. Suite 400. Anchorage, Alaska 99501. 242 p.

Simpson, S. C., Eagleton, M. P., Olson, J. V., Harrington, G. A., and Kelly, S.R. 2017. Final Essential Fish Habitat (EFH) 5-year Review, Summary Report: 2010 through 2015. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/AKR-15, 115p.

Smeltz, T. S., B. P. Harris, J. V. Olson, and S. A. Sethi. 2019. A seascape-scale habitat model to support management of fishing impacts on benthic ecosystems. Canadian Journal of Fisheries and Aquatic Sciences 76:1836–1844.

Stewart, I., and Hicks, A. 2024. Assessment of the Pacific halibut (*Hippoglossus stenolepis*) stock at the end of 2023. IPHC-2024-SA-01. 39 p.

| | | |
|---|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** | |

Sullivan, J., C. Monnahan, P. Hulson, J. Ianelli, J. Thorson, and A. Havron. 2022a. REMA: a consensus version of the random effects model for ABC apportionment and Tier 4/5 assessments. Plan Team Report, Joint Groundfish Plan Teams, North Pacific Fishery Management Council. 605 W 4th Ave, Suite 306 Anchorage, AK 99501

Tanasichuk, R. W. 1997. Diet of Sablefish, *Anoplopoma fimbria,* from the southwest coast of Vancouver Island. NOAA Technical Report NMFS 130:93–97.

Tide, C. and Eich, A.M. 2022. Seabird Bycatch Estimates for Alaska Groundfish Fisheries: 2021. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-F/AKR-25, 46 p.

Tribuzio, C.A., M.E. Matta, and S. Barbeaux. 2023. Assessment of the skate stock complex in the Bering Sea and Aleutian Islands. North Pacific Fishery Management Council, Anchorage, AK.

Whitehouse G.A., S. Gaichas. 2023a. Time Trends in Non-Target Species Catch In Ortiz, I. and Zador, S. 2023. Ecosystem Status Report 2023: Aleutian Islands, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, 1007 West Third, Suite 400, Anchorage, Alaska 99501.

Whitehouse G.A., S. Gaichas. 2023b. Time Trends in Non-Target Species Catch IN: Ferriss, B.E. 2023. Ecosystem Status Report 2023: Gulf of Alaska, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, 1007 West Third, Suite 400, Anchorage, Alaska 99501.

Whitehouse G.A., S. Gaichas 2023c. Time Trends in Non-Target Species Catch In Siddon, E. 2023. Ecosystem Status Report 2023:Eastern Bering Sea, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, 1007 West 3rd Ave., Suite 400, Anchorage, Alaska 99501.

Yang, M-S. and M. W. Nelson. 2000. Food habits of the commercially important groundfishes in the Gulf of Alaska in 1990, 1993, and 1996. NOAA Tech. Memo. NMFS-AFSC-112. 174 p.

Yang, M-S. K. Dodd, R. Hibpshman, and A. Whitehouse. 2006. Food habits of groundfishes in the Gulf of Alaska in 1999 and 2001. NOAA Tech. Memo. NMFS-AFSC-164. 199 p.

Young, N. C., Brower, A. A., Muto, M. M., Freed, J. C., Angliss, R. P., Friday, N. A., Boveng, P. L., *et al*. 2023. Alaska marine mammal stock assessments, 2022. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-474, 316 p.

Zaleski, M., S. Smeltz., F. Restrepo.,M. Smith. 2023a Area Disturbed by Trawl Fishing Gear in the Eastern Bering Sea. IN Siddon, E. 2023. Ecosystem Status Report 2023: Eastern Bering Sea, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, 1007 West 3rd Ave., Suite 400, Anchorage, Alaska 99501.

Zaleski, M., T. S. Smeltz, S. Gardiner, J. L. Pirtle, and G. A. Harrington. 2024. 2022 Evaluation of Fishing Effects on Essential Fish Habitat. NOAA Technical Memorandum NMFS-F/AKR-29, 212 p. doi: 10.25923/c2gh-0w03

Zaleski, M., T. S. Smeltz, S. Rheinsmith, J. L. Pirtle, and G. A. Harrington. 2023b. 2022 Evaluation of the Fishing Effects on Essential Fish Habitat. Report, U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/AKR-29, 205 p.

Zaleski,M., M. Smith., S.Smeltz.,F. Restrepo. 2023c Fishing Effects to Essential Fish Habitat. IN: Ferriss, B.E. 2023c. Ecosystem Status Report 2023: Gulf of Alaska, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, 1007 West Third, Suite 400, Anchorage, Alaska 99501.

| | |
|---|---|
| **12.** | **Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.** |
| Statement of consistency to the RFM Fishery Standard | **The fishery continues to conform to the requirements of Fundamental Clause 12 of the RFM Fishery Standard** |

## 8. Update on compliance and progress with non-conformances and agreed action plans

This section details compliance and progress with non-conformances and agreed action plans including:

a) A review of the performance of the Client specific to agreed corrective action plans to address non-conformances raised in the most recent assessment or re-assessment or at subsequent surveillance audits including a summary of progress toward resolution.
b) A list of pre-existing non-conformances that remain unresolved, new nonconformances raised during this surveillance, and non-conformances that have been closed during this surveillance.
c) Details of any new or revised corrective action plans including the Client's signed acceptance of those plans.
d) An update of proposed future surveillance activities.

### 8.1. Closed non-conformances

There are no closed non-conformances.

### 8.2. Progress against open non-conformances

There are no open non-conformances.

### 8.3. New non-conformances

There are no new non-conformances.

### 8.4. New or revised corrective action plans.

There are no new corrective action plans or pre-existing plans that have been revised as well as Client-signed acceptance of the action plan.

### 8.5. Proposed surveillance activities

This fishery will be assessed again on the 2nd surveillance.

# 9. Recommendations for continued certification

## 9.1. Certification Recommendation

**Following this surveillance audit, the Assessment Team recommends that the fishery, the U.S. Alaska Pacific Halibut commercial fishery, under international (IPHC), federal (NMFS/NPFMC) and state (ADFG) management, fished with benthic longline, pots and troll (within Alaska's 200 nm EEZ) fishery be awarded continuing certified against RFM Certification Program Fisheries Standard Version 2.1**

**Following this surveillance audit, the Assessment Team recommends that the fishery, the U.S. Alaska Sablefish commercial fishery, under federal (NMFS/NPFMC) and state (ADFG) management, fished with benthic longline, pots and troll (within Alaska's 200 nm EEZ) be awarded continuing certified against RFM Certification Program Fisheries Standard Version 2.1**

## 10. References

ADFG. 2020. 2021 demersal shelf rockfish fisheries. DSR Fisheries Announcement December 31, 2020.

ADFG. 2024. State of Alaska Groundfish fisheries associated investigations in 2023. Report prepared for the Sixty-fourth Annual Meeting of the Technical Subcommittee of the Canada-United States Groundfish Committee. 50 pages

Armstrong, J., and S. Cunningham. 2018. Discussion Paper: Sablefish Discard Allowance. Report to North Pacific Fisheries Management Council, 605 W 4th Ave, Suite 306, Anchorage, AK 99501. 32 p.

Bachman,M., D. Boelke., J. Coakley., M. Fitchett., J. Froeschke, K. Griffin., R. Pugliese, E. Reid., L. Rivera-Garcia, M. Rolon., D. Witherell. 2023. An Evaluation of Conservation Areas in the U.S. EEZ. Council Coordinating Committee Area-Based Management Subcommittee Final Report.

Barnes, C.L., Essington, T.E., Pirtle, J.L., Rooper, C.N., Laman, E.A., Holsman, K.K., Aydin, K.Y., and Thorson, J.T. 2022. Climate-informed models benefit hindcasting but present challenges when forecasting species–habitat associations. Ecography. doi: 10.1111/ecog.06189.

Benaka, L. R., L. Sharpe., K. Abrams., M. Campbell., J. Cope., F. Darby., E.J. Dick., *et al.,* 2016. Action Plan for Fish Release Mortality Science. U.S. Dept. of Commer., NOAA. NOAA Technical Memorandum NMFS-F/SPO-161, 29 p.

Boas, F. 1910. Tsimshian Mythology. Bureau of American Ethnology, Annual Report 1909-1910, U.S. Government Printing Office, Washington, D.C., pp. 27-1037.

Bond, N. A., M. F. Cronin, H. Freeland, N. Mantua. 2015. Causes and impacts of the 2014 warm anomaly in the NE Pacific. Geophysical Research Letters 42:3414–3420.

Brock, R. 2015. Representativeness of Marine Protected Areas of the United States. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Protected Areas Center, Silver Spring, MD.

Brodeur, R. D., M. B. Decker, L. Ciannelli, J. E. Purcell, N. A. Bond, P. J. Stabeno, E. Acuna, G. L. Hunt. 2008. Rise and fall of jellyfish in the eastern Bering Sea in relation to climate regime shifts. Progress in Oceanography 77:103–111.

Brown, E. S. 1986. Preliminary results of the 1984 U.S.-Japan cooperative bottom trawl survey of the central and western Gulf of Alaska. In R.L. Major (editor), Condition of groundfish resources of the Gulf of Alaska as assessed in 1985, p. 259. U.S. Dep. Commer., NOAA Tech. Memo. NMFS F/NWC-106.

Buser, T. 2023. In: Siddon, E. 2023. Ecosystem Status Report 2023: Eastern Bering Sea, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, 1007 West 3rd Ave., Suite 400, Anchorage, Alaska 99501.

Cahalan, J., J. Gasper. 2022. The commercial size limit for the Pacific halibut fishery off Alaska and its relationship to observer-derived estimates of at-sea discard. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-432, 42 p.

Cahalan, J., J. Gasper. 2022. The commercial size limit for the Pacific halibut fishery off Alaska and its relationship to observer-derived estimates of at-sea discard. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-432, 42 p.

Cahalan, J., J. Gasper, J. Mondragon. 2014. 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.

Carpi, P., Loher, T., Sadorus, L.L., Forsberg, J.E., Webster, R.A., Planas, J.V., Jasonowicz, A. *et al.* 2021. Ontogenetic and spawning migration of Pacific halibut: a review. Reviews in Fish Biology and Fisheries. 31: 879-908.

Clark, W.G., Hare, S.R. 2002. Effects of climate and stock size on recruitment and growth of Pacific halibut. North American Journal of Fisheries Management 22: 852-862.

Clark, W.G., Hare, S.R., Parma, A.M., Sullivan, P.J., and Trumble, R.J. 1999. Decadal changes in growth and recruitment of Pacific halibut (*Hippoglossus stenolepis*). Canadian Journal of Fisheries and Aquatic Sciences 56: 242-252.

Coutré, K. M., A.H. Beaudreau, P.W. Malecha. 2015. Temporal Variation in Diet Composition and Use of Pulsed Resource Subsidies by Juvenile Sablefish. Transactions of the American Fisheries Society, 144(4), 807-819.

Di Lorenzo, E., N. Mantua. 2016. Multi-year persistence of the 2014/15 North Pacific marine heatwave. Nature Climate Change 6:1042–1047.

Dorn, M.W., S.G. Zador. 2020. A risk table to address concerns external to stock assessments when developing fisheries harvest recommendations. Ecosystem Health Sustain. 6(1):1813634.

Dykstra, C. 2018. Discard mortality rates and post-release survival in the directed Pacific halibut fishery. IPHC-2018-RAB019-10.

Dykstra, C.L., Soderlund, E.D. 2010. Categorizing marine mammal depredation on IPHC standardized setline surveys. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2010:435-444.

Echave, K. B., P.J. F. Hulson. 2018. Assessment of the Thornyhead stock complex in the Gulf of Alaska. In Stock assessment and fishery evaluation report for the groundfish resources of the Gulf of Alaska. North Pacific Fishery Management Council, Anchorage, Alaska.

Echave, K., M. Eagleton, E. Farley, J. Orsi. 2012. A refined description of essential fish habitat for Pacific salmon within the U.S. Exclusive Economic Zone in Alaska. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-236, 104 p.

Ferriss, B.E. 2023. Ecosystem Status Report 2023: Gulf of Alaska., Stock Assessment and Fishery Evaluation Report. North Pacific Fishery Management Council, 1007 West Third Suite 400, Anchorage, Alaska 99501. 257 p.

Fissel, B., M. Dalton, B. Garber-Yonts, A. Haynie, S. Kasperski, J. Lee, D. Lew, C. Seung, K. Sparks, M. Szymkowiak, S. Wise. 2023. "Stock Assessment and Fishery Evaluation Report for the Groundfish Fisheries of the Gulf of Alaska and Bering Sea/Aleutian Island Area: Economic Status of the Groundfish Fisheries off Alaska, 2022'', NPFMC, November 2023.

Gharrett, A.J., A.P. Matala, E.L. Peterson, A.K. Gray, Z. Li, J. Heifetz. 2005. Two genetically distinct forms of rougheye rockfish are different species. Transactions. American. Fisheries. Society. 132:242-260.

Gharrett, A.J., Z. Li, C.M. Kondzela, A.W. Kendall. 2002. Final report: species of rockfish (*Sebastes* spp.) collected during ABL-OCC cruises in the GOA in 1998-2002. (Unpublished manuscript available from the NMFS Auke Bay Laboratory, 11305 Glacier Hwy., Juneau AK 99801).

Goethel, D. R., D. H. Hanselman, C. J. Rodgveller, K. H. Fenske, S. K. Shotwell, K. B. Echave, P. W. Malecha, *et al.* 2020. Assessment of the Sablefish Stock in Alaska. In Stock assessment and fishery evaluation report for the groundfish resources of the Bering Sea and Aleutian Islands. North Pacific Fishery Management Council, Anchorage. 257 p.

Goethel, D.R.,Hanselman, D.H., Rodgveller, C., Echave, K.B., Williams, B.C., Shotwell, S.K., Sullivan, J.Y., *et al.* 2021. Assessment of the sablefish stock in Alaska. North Pacific Fishery Management Council, Anchorage, AK.

Goethel, D., Rodgveller, C., Echave, K.,Shotwell, K., Siwicke, K., Hanselman, D.,Malecha, P.,*et al.* 2022. Alaska Sablefish Stock Assessment and Fishery Evaluation (SAFE) Report. North Pacific Fishery Management Council Anchorage AK. Pp.182

Goethel, D.R., Cheng, M.L.H., Echave, K.B., Marsh, C., Rodgveller, C.J., Shotwell, K., and Siwicke, K. 2023. Assessment of the sablefish stock in Alaska. North Pacific Fishery Management Council, Anchorage, AK.

Goldstein, E.D., Pirtle, J. L., Duffy-Anderson, J.T., Stockhausen, W.T., Zimmermann, M., Wilson, M.T., Mordy, C.W. 2020. Eddy retention and seafloor terrain facilitate cross-shelf transport and delivery of fish larvae to suitable nursery habitats. Limnology and Oceanography 65: 2800–2818.

Grover, J. J., B. L. Olla. 1990. Food habits of larval sablefish *Anoplopoma fimbria* from the Bering Sea. Fishery Bulletin. 88: 811-814.

Hanselman, D.H., J. Heifetz, K.B. Echave, S.C. Dressel. 2015. Move it or lose it: Movement and mortality of sablefish tagged in Alaska. Canadian Journal of Fish and Aquatic Sciences. 72(5): 238-251.

Harrington, G. A., J. L. Pirtle, M. Zaleski, C. Felkley, S. Rheinsmith, J. T. Thorson. 2023. Essential Fish Habitat 2023 5-year Review Summary Report. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-f/AKR-31, 135 p.

Head M.A., Keller A.A., Bradburn M. 2014. Maturity and growth of sablefish, *Anoplopoma fimbria*, along the US west coast. Fisheries Research 159 :56–67

Heifetz, J., and Maloney, N.E. 2001. Estimation of tag-reporting rates for sablefish in the northeastern Pacific Ocean. Alaska Fishery Research Bulletin. 8(1):1–11.

Hicks A., I. Stewart., D. Wilson. 2024. IPHC Management Strategy Evaluation and Harvest Strategy Policy Updates for 2023 IPHC-2024-MSE-01.

Hixon, M.A., Johnson, D.W., Sogard, S.M. 2014. BOFFFFs: on the importance of conserving old-growth age structure in fishery populations. ICES Journal of Marine Sciences 71(8): 2171-2185. doi:10.1093/icesjms/fst200

Holsman, K., Hazen, E., Haynie, A., Gourguet, S., Hollowed, A., Borgrad, S., *et al*. 2019. Toward climate-resiliency in fisheries management. ICES Journal of Marine Sciences 76, 1368–1378.

Hutniczak, B. 2022. Assessing cross-regional flows of economic benefits: A case study of Pacific halibut commercial fishing in Alaska. Fisheries Research, 255:106449.

Hutniczak, B. 2021. Bio-socioeconomic conditions index for Pacific halibut fisheries. IPHC-2021-IM097-INF03.

IPHC. 2016. Report of Assessment and Research Activities 2015. RARA2015_01TOC.pdf

IPHC 2019. Peer review process for IPHC science products. IPHC-2019-AM095-15

IPHC. 2023a. IPHC Fishery-Independent Setline Survey seabird observations. Table IPHC-2023-FISS-SBD-000

IPHC. 2023b.International Pacific Halibut Commission Strategic Plan (2023-27). Seattle, WA, U.S.A. IPHC–2023–SP,7 pp.

IPHC. 2024a. International Pacific Halibut Commission (IPHC) Fishery Regulations (2024).

IPHC. 2024b. Table IPHC-2024-TSD-007: Fishery landings by IPHC Regulatory Area.

IPHC.2024c. Subsistence Mortality by IPHC Area. iphc-2024-tsd-020

IPHC 2024d. IPHC Fishery-Independent Setline Survey Sampling Manual (2024) IPHC–2024–VSM01,39 pp.

IPHC 2024f. International Pacific Halibut Commission 5-Year program of integrated research and monitoring (2022-26). Seattle, WA, U.S.A. IPHC–2023-5YPIRM, 58 pp.

Ito, D.H. 1999. Assessing shortraker and rougheye rockfishes in the Gulf of Alaska: addressing a problem of habitat specificity and sampling capability. Ph. D. Thesis. Univ. Washington, Seattle. 204 p.

Kaimmer, S.M., Trumble, R.J. Injury, condition, and mortality of Pacific halibut bycatch following careful release by Pacific cod and sablefish longline fisheries. 1998. Fisheries Research. 38: 131–144.

Kapur, M. S., Haltuch, M. A., Connors, B., Berger, A., Holt, K., Marshall, K., & Punt, A. E. 2024. Range-wide contrast in management outcomes for transboundary Northeast Pacific sablefish. Canadian Journal of Fisheries and Aquatic Sciences, 81(7), 810-827.

Kimura D.K., Shimada A.M., Shaw, F.R. 1998. Stock structure and movement of tagged sablefish, *Anoplopoma fimbria* , in offshore northeast Pacific waters and the effects of El Nino southern oscillation on migration and growth. Fishery Bulletin, 96 :462–81.

Kramer, D.E., V.M. O'Connell. 1988. A Guide to Northeast Pacific Rockfishes: Genera Sebastes and Sebastolobus. In: Alaska Sea Grant Advisory Bulletin, 25. In National Marine Fisheries Service 2001(a).

Kroetz, K., Reimer, M. N., Sanchirico, J. N., Lew, D. K., & Huetteman, J. 2019. Defining the economic scope for ecosystem-based fishery management. Proceedings of the National Academy of Sciences of the United States of America, 116[10], 4188–4193.

Laidig, T.E., P.B. Adams, W.M. Samiere. 1997. Feeding habits of Sablefish, *Anoplopoma fimbria,* off the coast of Oregon and California. NOAA Technical Report NMFS 130: 65–80.

Laman, N. 2022. Structural epifauna in the Aleutian Islands ecosystem. In Ortiz, I., Zador, S. 2022. Ecosystem Status Report 2022: Aleutian Islands, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, 1007 West Third, Suite 400, Anchorage, Alaska 99501.

Laman, N., A. Dowling. 2023. Structural Epifauna—Gulf of Alaska In: Ferriss, B.E. 2023. Ecosystem Status Report 2023: Gulf of Alaska, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, 1007 West Third, Suite 400, Anchorage, Alaska 99501.

Lew, D. K., & Larson, D. M. 2012. Economic values for saltwater sport fishing in Alaska: a stated preference analysis. North American journal of fisheries management, 32[4]:745-759.

Licandeo, R., Duplisea, D.E., Senay, C., Marentette, J.R., McAllister, M.K. 2020. Management strategies for spasmodic stocks: a Canadian Atlantic redfish fishery case study. Canadian Journal Fisheries and Aquatic Sciences, 77(4):684-702.

Loher, T., Dykstra, C.L., Hicks, A., Stewart, I.J., Wolf, N., Harris, B.P., Planas, J.V. 2022. Estimation of post release longline mortality in Pacific halibut using acceleration-logging tags. North American Journal of Fisheries Management, 42:37-49.

Lomeli, M.J.M., Wakefield, W.W., 2013. A flexible sorting grid to reduce Pacific halibut (*Hippoglossus stenolepis*) bycatch in the U.S. West Coast groundfish bottom trawl fishery. Fisheries Research, 143: 102-108.

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

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

Lowerre-Barbieri, S., DeCelles, G., Pepin, P., Catalan, I.A., Muhling, B., Erisman, B., Cadrin, S.X., *et al.* 2016. Reproductive resilience: a paradigm shifts in understanding spawner-recruit systems in exploited marine fish. Fish and Fisheries, 18(2): 285-312.

Mantua, N.J., Hare, S.R., Zhang, Y., Wallace, J.R., and Francis, R.C. 1997. A Pacific interdecadal climate oscillation with impacts on salmon production. Bulletin of the American Meteorological Society, 78(6): 1069-1079.

Matarese, A.C., A.W. Kendall, Jr., D.M. Blood, and B.M. Vinter. 1989. Laboratory guide to early life history stages of northeast Pacific fishes. NOAA Technical. Report. NMFS 80, 652 p.

Mateo,I, R. Leaf., R.J. Allain. 2023. U.S Alaska Pacific halibut and sablefish commercial fisheries RFM Reassessment Report. Global Trust 387 pp.

Matulich, S. C., M. L. Clark. 2003. North Pacific halibut and sablefish IFQ policy design: quantifying the impacts on processors. Marine Resource Economics, 18: 149–166.

McDermott S., C. Rodgveller, M. Bryan, and N. Laman. 2024. Alaska Fisheries Science Center of the National Marine Fisheries Service 2023. Agency Report to the Technical Subcommittee of the Canada-US Groundfish Committee April 2024 80p.

McDermott, S.F. 1994. Reproductive biology of rougheye and shortraker rockfish, *Sebastes aleutianus* and *Sebastes borealis*. Master's thesis. University of Washington, Seattle 76 pp.

NMFS. 2004. Alaska Groundfish Fisheries Final Programmatic SEIS. NMFS, Alaska Region. P. O. Box 21668, Juneau, AK 99802.

NMFS. 2016. Ecosystem-Based Fisheries Management Policy of the National Marine Fisheries Service, National Oceanic and Atmospheric Administration.
NMFS. 2019. Status of U.S. Fisheries. Summary of stock status for FSSI stocks.
NMFS. 2022. 2023 Annual Deployment Plan for Observers and Electronic Monitoring in the Groundfish and Halibut Fisheries off Alaska. National Oceanic and Atmospheric Administration, 709 West 9th Street. Juneau, Alaska.
NMFS. 2024. Essential Fish Habitat Omnibus Amendments: July 2024. Final Environmental Assessment for: Amendment 127 to the Fishery Management Plan for the Groundfish Fishery of the Bering Sea and Aleutian Islands Area, Amendment 115 to the Fishery Management Plan for Groundfish of the Gulf of Alaska, Amendment 56 to the Fishery Management Plan for Bering Sea/Aleutian Islands King and Tanner Crabs, Amendment 3 to the Fishery Management Plan for Fish Resources of the Arctic Management Area, Amendment 17 to the Fishery Management Plan for the Salmon Fisheries in the EEZ off Alaska.
NOAA. 2024. North Pacific Observer Program 2023 Annual Report. AFSC Processed Rep. 2024-10, 128 p. Alaska Fish. Sci. Cent., NOAA, National Marine Fisheries Service, 7600 Sand Point Way NE, Seattle WA 98115.
NPFMC. 2013. Trawl Sweep Modification in the Flatfish Fishery in the Central Gulf of Alaska. Environmental Assessment, Regulatory Impact Review, and Initial Regulatory Flexibility Analysis for Proposed Amendment 89 to the Fishery Management Plan for Groundfish of the Gulf of Alaska. North Pacific Fishery Management Council, Anchorage, Alaska.
NPFMC. 2021. Assessment of the demersal shelf rockfish stock complex in the Southeast Outside Subdistrict of the Gulf of Alaska. North Pacific Fishery Management Council, Anchorage, Alaska.
NPFMC. 2024a. Fishery Management Plan for the Groundfish fisheries of the Gulf of Alaska.
NPFMC. 2024b. Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area.
Olson, J. 2022. Area Disturbed by Trawl Fishing Gear in Alaska In Ortiz, I. and Zador, S. 2022. Ecosystem Status Report 2022: Aleutian Islands, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, 1007 West Third, Suite 400, Anchorage, Alaska 99501.
Ormseth, O. A. 2019. Assessment of the skate stock complex in the Gulf of Alaska. In Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Gulf of Alaska. North Pacific Fishery Management Council, 1007 West Third, Suite 400 Anchorage, AK 99501.
Orozco-Ruiz A.M., Galvan-Tirado C., Orlov A.M., Orlova S.Y., Garcia de León, F.J. 2023. Genetic analyses reveal a non-panmictic genetic structure in the sablefish *Anoplopoma fimbria* in the northern Pacific. ICES Journal of Marine Sciences, 80(5):1319–28.
Orr, J.W., S. Hawkins. 2008. Species of the rougheye rockfish complex: resurrection of *Sebastes melanostictus* (Matsubara, 1934) and a redescription of *Sebastes aleutianus* (Jordan and Evermann, 1898) (Teleostei: Scorpaeniformes). Fisheries Bulletin. 106: 111-134.
Ortiz, I., and Zador, S. 2023. Ecosystem Status Report 2023: Aleutian Islands., Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council. 1007 West Third, Suite 400, Anchorage, Alaska 99501. 93 p.
Peters, R., A.R. Marshak, M.M. Brady, S.K. Brown, K. Osgood, C. Greene, V. Guida, *et al.* 2018. Habitat Science is a Fundamental in an Ecosystem-Based Fisheries Management Framework: An Update to the Marine Fisheries Habitat Assessment Improvement Plan. U.S. Dept. of Commerce, NOAA. NOAA Technical Memorandum NMFS-F/SPO-181, 29 p.
Pikitch,E, P.D. Boersma, I. Boyd, D. Conover, P. Cury, T. Essington, S. Heppell, *et al.* 2012. Little Fish, Big Impact: Managing a Crucial Link in Ocean Food Webs Lenfest Ocean Program, Washington, DC. p. 108.

Pirtle, J.L., J.T. Thorson., S.R. Bayer, T.P. Hurst., M.E. Matta., M.C. Siple. 2024. Alaska Essential Fish Habitat Research Plan: A Research Plan for the National Marine Fisheries Service's Alaska Fisheries Science Center and Alaska Regional Office. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/ AKR-33, 17 p.

Punt, A., Butterworth, D., de Moor, C., De Oliveira, J., Haddon, M. 2016. Management strategy evaluation: Best practices. Fish and Fisheries. 17. 303-334.

Purcell, J.E., M.N. Arai. 2001a. Interactions of pelagic cnidarians and ctenophores with fish: a review. Hydrobiologia, 451:27–44.

Purcell, J. E., and M. V. Sturdevant. 2001b. Prey selection and dietary overlap among zooplanktivorous jellyfish and juvenile fishes in Prince William Sound, Alaska. Marine Ecology Progress Series 210:67–83.

Purcell, J. E. 2005. Climate effects on formation of jellyfish and ctenophore blooms: a review. Journal of the Marine Biological Association of the United Kingdom 85:461–476

Richards, L.J., Fargo, J.F., Schnute, J.T. 1995. Factors Influencing Bycatch Mortality of Trawl-Caught Pacific Halibut. North American Journal of Fisheries Management, 15, 266-276.

Robinson, K. L., J. J. Ruzicka, and M. B. Decker. 2014. Jellyfish, Forage Fish, and the World's Major Fisheries Oceanography 27:104–115.

Rodgveller, C. J. 2017. Female sablefish age-at-maturity in Alaska applicable to stock assessment. AFSC Processed Rep. 2017-12, 23 p. Alaska Fish. Sci. Cent., NOAA, Natl. Mar. Fish. Serv., 7600 Sand Point Way NE, Seattle WA 98115.

Rooper C.N., Ortiz, I., Hermann, A.J., Laman, E.A., Cheng, W., Kearney, K., and Aydin, K. 2021. Predicted shifts of groundfish distribution in the eastern Bering Sea under climate change, with implications for fish populations and fisheries management. ICES Journal of Marine Sciences, 78(1): 220–234.

Rose, C.S. 1999. Initial tests of a flexible grate for size selection of trawl caught fish. Mar Technol Soc J 33:57–6

Rose, C.S., Nielsen, J.K., Gauvin, J.R., Loher, T., Sethi, S.A., Seitz, A.C., Courtney, M.B., *et al.* 2019. Survival outcome patterns revealed by deploying advanced tags in quantity: Pacific halibut (*Hippoglossus stenolepis*) survivals after release from trawl catches through expedited sorting. Canadian Journal of Fisheries and Aquatic Sciences, 76, 2215-2224.

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

Seitz, A.C., Loher, T., Norcross, B.L., Nielsen, J.L. 2011. Dispersal and behavior of Pacific halibut *Hippoglossus stenolepis* in the Bering Sea and Aleutian Islands region. Aquatic Bioliology, 12:225-239.

Shotwell S.K., K. Blackhart, C. Cunningham, E. Fedewa, D. Hanselman, K. Aydin, M. Doyle, B. Fissel, P. Lynch, O. Ormseth, P. Spencer, S. Zador. 2023. Introducing the Ecosystem and Socioeconomic Profile, a Proving Ground for Next Generation Stock Assessments, Coastal Management, 51(5–6), 319–352.

Shotwell, S. K., J. L. Pirtle, J. T. Watson, A. L. Deary, M. J. Doyle, S. J. Barbeaux, M. Dorn, *et al*. 2022a. Synthesizing integrated ecosystem research to create informed stock-specific indicators for next generation stock assessments. Deep-Sea Research. II, GOA SI IV. doi: 10.1016/j.dsr2.2022.105070

Shotwell, S.K., Bryan, M., Hanselman, D., Markowitz, M., Siddon, E., Spies, I., Sullivan, J. 2022b. Assessment of the arrowtooth flounder stock in the Bering Sea and Aleutian Islands. North Pacific Fishery Management Council, Anchorage, AK.

Shotwell S.K., K. Echave, B. Ferriss, D.Goethel, .C. Lunsford, K. Oke, E. Siddon, K. Siwicke, J. Sullivan, M. Szymkowiak, and B. Williams. 2023. Ecosystem and Socioeconomic Profile of the Sablefish stock in Alaska - Report Card. In Goethel, D. R., Cheng, M. L., Echave, K. B., Marsh, C., Rodgveller, C. J., Shotwell, K., & Siwicke, K. 2023. Assessment of the Sablefish Stock in Alaska. North Pacific Fisheries Management Council.

Siddon, E. 2023. Ecosystem status report 2023: Eastern Bering Sea. Stock assessment and Fishery Evaluation Report. North Pacific Fishery Management Council. 1007 West 3rd Ave. Suite 400. Anchorage, Alaska 99501. 242 p.

Sigler, M., Lunsford, C. 2008. Sperm whale depredation of sablefish longline gear in the northeast Pacific Ocean. Marine Mammal Science, 24(1): 16-27.

Smeltz, T.S., B.P. Harris, J.V. Olson, S.A. Sethi. 2019. A seascape-scale habitat model to support management of fishing impacts on benthic ecosystems. Canadian Journal of Fisheries and Aquatic Sciences 76:1836–1844.

Soderlund, E., Randolph, D.L., Dykstra, C. 2012. IPHC Setline Charters 1963 through 2003. Int. Pac. Hal. Comm. Tech. Rep. 58.

Stachura M.M., Lunsford C.R, Rodgveller C.J, Heifetz J. 2012. Estimation of discard mortality of sablefish (Anoplopoma fimbria) in Alaska longline fisheries. Fishery Bulletin. 110: 271–279.

Stevenson, D. E., M. Moon, M. Rickett, and M. Vechter. 2016. Species identification in the North Pacific Observer Program: Training, protocols, and data monitoring. AFSC Processed Rep. 2016-04, 37 p. Alaska Fish. Sci. Cent., NOAA, Natl. Mar. Fish. Serv., 7600 Sand Point Way NE, Seattle WA 98115.

Stewart, I., and Hicks, A. 2023. Assessment of the Pacific halibut (*Hippoglossus stenolepis*) stock at the end of 2022. IPHC-2023-SA-01. 39 p.

Stewart, I., and Hicks, A. 2024. Assessment of the Pacific halibut (*Hippoglossus stenolepis*) stock at the end of 2023. IPHC-2024-SA-01. 39 p.

Stewart, I., Webster, R. 2018. Overview of data sources for the Pacific halibut stock assessment, harvest strategy policy, and related analyses. IPHC-2018-AM094-09. 83 p.

Sullivan, J., C. Monnahan, P. Hulson, J. Ianelli, J. Thorson, A. Havron. 2022a. REMA: a consensus version of the random effects model for ABC apportionment and Tier 4/5 assessments. Plan Team Report, Joint Groundfish Plan Teams, North Pacific Fishery Management Council. 605 W 4th Ave, Suite 306 Anchorage, AK 99501.

Tanasichuk, R. W. 1997. Diet of Sablefish, *Anoplopoma fimbria*, from the southwest coast of Vancouver Island. NOAA Technical Report NMFS 130:93–97.

Tide, C., Eich, A.M. 2022. Seabird Bycatch Estimates for Alaska Groundfish Fisheries: 2021. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-F/AKR-25, 46 p.

Tixier, P., Lea, M.A., Hindell, Mark, A., Welsford, D., Mazé, C., Gourguet, S., and Arnould, J.P.Y. 2021. When large marine predators feed on fisheries catches: Global patterns of the depredation conflict and directions for coexistence. Fish and Fisheries 22(1), 31-53.

Tribuzio, C.A., M.E. Matta, and S. Barbeaux. 2023. Assessment of the skate stock complex in the Bering Sea and Aleutian Islands. North Pacific Fishery Management Council, Anchorage, AK.

Trimm L.E, W.A. Larson, A.J. Jasonowicz, K.M. Nichols. 2024. Whole genome resequencing of sablefish at the northern end of their range reveals genetic panmixia and large putative inversions, ICES Journal of Marine Science, Volume 81, Issue 6, Pages 1096–1110,

Trumble, R.J., Kaimmer, S.M., Williams, G.H. 2000. Estimation of Discard Mortality Rates for Pacific Halibut Bycatch in Groundfish Longline Fisheries. North American Journal of Fisheries Management, 20, 931-939

Ualesi, K., Wilson, D., Jones, C., Rillera, R., and Jack, T. 2022. IPHC Fishery Independent Setline Survey (FISS) design and implementation in 2021. IPHC-2022-AM098-07. 13 p

Ualesi K., Jack T., Rillera R., and Coll, K. 2024. IPHC Fishery-Independent Setline Survey (FISS) design and implementation in 2023. IPHC-2024-AM100-08 Rev_1.

Webster, R.A., Clark, W.G., Leaman, B.M., and Forsberg, J.E. 2013. Pacific halibut on the move: A renewed understanding of adult migration from a coastwide tagging study. Canadian Journal of Fisheries and Aquatic Sciences 70, 642-653.

Werner, T., Northridge, S., McClellan, Press K., and Young, N. 2015. Mitigating bycatch and depredation of marine mammals in longline fisheries. ICES Journal of Marine Science 72(5): 1576-1586.

Whitehouse G.A., S. Gaichas. 2023a. Time Trends in Non-Target Species Catch In Ortiz, I. and Zador, S. 2023. Ecosystem Status Report 2023: Aleutian Islands, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, 1007 West Third, Suite 400, Anchorage, Alaska 99501.

Whitehouse G.A., S. Gaichas. 2023c. Time Trends in Non-Target Species Catch In Siddon, E. 2023. Ecosystem Status Report 2023: Eastern Bering Sea, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, 1007 West 3rd Ave., Suite 400, Anchorage, Alaska 99501.

Whitehouse G.A., S. Gaichas. 2023c. Time Trends in Non-Target Species Catch In: Ferriss, B.E. 2023. Ecosystem Status Report 2023: Gulf of Alaska, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, 1007 West Third, Suite 400, Anchorage, Alaska 99501.

Wilson, D., Jannot, J. 2023. Minimum data collection standards for Pacific halibut by scientific observer programs. 2022. IPHC-2023-AM099-16

Witherell D., M. Fay. 2023. Fish Bycatch in the North Pacific Halibut, *Hippoglossus stenolepis*, and Groundfish Fisheries. Marine Fisheries Review. Vol 85, Issue 1-4, p31

Wong, N. 2015. Marine mammal depredation on IPHC standardized setline surveys: a look at killer whales and sperm whales as major depredators in Alaskan waters. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2015:418-441.

Yang, M-S. and M. W. Nelson. 2000. Food habits of the commercially important ground fishes in the Gulf of Alaska in 1990, 1993, and 1996. NOAA Tech. Memo. NMFS-AFSC-112. 174 p.

Yang, M-S. K. Dodd, R. Hibpshman, and A. Whitehouse. 2006. Food habits of groundfishes in the Gulf of Alaska in 1999 and 2001. NOAA Tech. Memo. NMFS-AFSC-164. 199 p.

Young, N. C., Brower, A. A., Muto, M. M., Freed, J. C., Angliss, R. P., Friday, N. A., Boveng, P. L., *et al.* 2023. Alaska marine mammal stock assessments, 2022. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-474, 316 p.

Zaleski, M., S. Smeltz, F. Restrepo, M. Smith. 2023a. Area Disturbed by Trawl Fishing Gear in the Eastern Bering Sea. In Siddon, E. 2023. Ecosystem Status Report 2023: Eastern Bering Sea, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, 1007 West 3rd Ave., Suite 400, Anchorage, Alaska 99501.

Zaleski, M., T. S. Smeltz, S. Rheinsmith, J. L. Pirtle, and G. A. Harrington. 2023b. 2022 Evaluation of the Fishing Effects on Essential Fish Habitat. Report, U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/AKR-29, 205 p.

Zaleski,M., M. Smith., S.Smeltz.,F. Restrepo. 2023c Fishing Effects to Essential Fish Habitat. IN: Ferriss, B.E. 2023b. Ecosystem Status Report 2023: Gulf of Alaska, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, 1007 West Third, Suite 400, Anchorage, Alaska 99501.

Zaleski, M., T. S. Smeltz, S. Gardiner, J. L. Pirtle, and G. A. Harrington. 2024. 2022 Evaluation of Fishing Effects on Essential Fish Habitat. NOAA Technical Memorandum NMFS-F/AKR-29, 212 p. doi: 10.25923/c2gh-0w03.

Zolotov, A. O. 2022. The Long-Term Dynamics of Sablefish (*Anoplopoma fimbria*) Stocks in the Western Bering Sea and Prospects for their Commercial Exploitation. Russian Journal of Marine Biology 2021 47:7, 47[7], 563–582.

# 11. Appendices

## 11.1. Appendix 1

### 11.1.1. Assessment Team Bios

Based on the technical expertise required to carry out this assessment, an Assessment Team was selected as follows.

**Dr. Ivan Mateo, Lead Assessor**

Dr. Ivan Mateo has over 25 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 bio-energetic modelling for Atlantic cod. Dr. Mateo has also 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. In addition, 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 modelling of Alaska sablefish and early life history/recruitment dynamics of Pacific ocean perch.

**Dr. Robert Leaf, Assessor 1**

Dr. Robert Leaf has 20 years of experience working in the field of natural resource management of fin and shellfish. He specializes in the evaluation of management strategies of harvested species and the identification of environmental drivers that impact their population dynamics. Dr. Leaf received his master's degree in marine science at Moss Landing Marine Laboratories and his PhD in Fisheries and Wildlife Sciences from Virginia Polytechnic and State Institute. His last professional post was as a post-doc under Dr. Kevin Friedland at the Northeast Fishery Science Center's Narragansett Laboratory. There, he worked on understanding the impact of environmental conditions on fish stock productivity and recruitment. He has worked in the Gulf of Mexico for the last three years working on fish stock assessment of commercially and recreationally important species in that area. Dr. Leaf is a member of the Gulf of Mexico Fishery Management Council's Red Drum working group and NOAA's Marine Fisheries and Climate Taskforce. He currently supervises four master's level students working on various state and federally managed fish stocks.