Responsible Fishery Management (RFM)

Alaska Pacific Halibut Commercial Fishery

4th Surveillance Report

Certification Body (CB):	**Global Trust Certification**
Assessment team:	Dr. Ivan Mateo, Lead Assessor Dr. Robert Leaf, Assessor R.J. (Bob) Allain, Assessor
Fishery client:	'Eat on the Wild Side' (FVOA)
Assessment Type:	Surveillance 4
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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://www.alaskaseafood.org/rfm-certification/

1 Contents

1.1 List of Figures

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2 Glossary

AAC – Alaska Administrative Code
ABC – Acceptable Biological Catch
ADFG – Alaska Department of Fish and Game
ADPS – Alaska Department of Public Safety
AK – Alaska
AI – Aleutian Islands
AS – Alaska Statutes
ASMI Alaska Seafood Marketing Institute AWT – Alaska Wildlife Trooper
BS – Bering Sea
CDQ – Community Development Quota
CFEC – Commercial Fisheries Entry Commission
EQS – Equal Quota Share
FMP – Fishery Management Plan
GHL – Guidance Harvest Level
GOA – Gulf of Alaska
IFQ – Individual Fishing Quota
MCS – Monitoring, Control and Surveillance
MSFCMA – Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA or MSA)
NMFS – National Marine Fishery Service
NOAA – National Oceanographic and Atmospheric Administration
NPFMC – North Pacific Fishery Management Council
NSEI – Northern Southeast Inside (sub-district)
OLE – Office of Law Enforcement (NOAA)
PSC – Prohibited Species Catch
RFM – Responsible Fishery Management (Standard)
SAFE – Stock Assessment and Fishery Evaluation
SSEI – Southern Southeast Inside (sub-district)
TAC – Total Allowable Catch
USCG – United States Coast Guard
VMS – Vessel Monitoring System

3 Executive Summary

3.1 Brief intro and description of surveillance process.

This Surveillance Report documents the 4th Surveillance Assessment of the Alaska Pacific Halibut Commercial Fishery (200nm EEZ) originally certified on 23rd April 2011, and recertified 9th January 2017, and presents the recommendation of the Assessment Team for continued AK RFM Certification.

Unit of Certification

The Alaska Pacific Halibut Commercial Fishery (200nm EEZ) legally employing demersal longline (mainly), pot and trawl gear within Alaska's jurisdiction (200 nautical miles EEZ) under federal [National Marine Fisheries Service (NMFS)/North Pacific Fishery Management Council (NPFMC)] and state [Alaska Department of Fish and Game (ADFG) and Board of Fisheries (BOF)] management, underwent its 1st surveillance assessment against the requirements of the Alaska FAO-Based RFM Conformance Criteria Version 1.3 Fundamental clauses.

This Surveillance Report documents the assessment results for the continued certification of commercially exploited Alaska Pacific Halibut fisheries to the Alaska RFM Certification Program. This is a voluntary program that has been supported by ASMI 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 Alaska RFM Conformance Criteria Version (v1.3, May 2016) in accordance with ISO 17065 accredited certification procedures.

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

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

These 6 major components are supported by 12 fundamental clauses (+ 1 in case of enhanced fisheries) that guide the AK RFM Certification Program surveillance assessment

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

3.2 Summary of main findings

The Audit team has determined that the commercial halibut fishery operated within the defined Alaskan UoA remained in compliance with the RFM Fishery Standard's Fundamental Clauses for the Fisheries Management System component (Clauses 1, 2, and 3) Precautionary approach (Clauses 4,5,6) Management Measures (Clauses 7,8,9) and the Monitoring and Control component (Clauses 10 and 11). No evidence exists to indicate that non-conformance situations arose during the 4th Surveillance audit.

3.3 Recommendation with respect to continuing Certification

Following this 4th Surveillance Assessment, the Audit team recommends that continued Certification under the Alaska Responsible Fisheries Management Certification Program is maintained for the management system of the applicant fisheries, the US Alaska Pacific Halibut commercial fishery, under international (IPHC), federal (NMFS/NPFMC) and state (ADFG) management, fished with benthic longlines, salmon trolls and sablefish pots 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 8,9,12
- Dr. Robert Leaf – Assessor 1, Responsible for Fundamental Clauses 4,5,6,7
- R.J. (Bob) Allain – Assessor 2, Responsible for Fundamental Clauses 1, 2, 3, 10, 11

3.5 Details of Applicable RFM Documents

This audit assessment was conducted according to the relevant program documents outlined in Table 1 below.

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 1.3, May 2016	Standard
Responsible Fisheries Management Certification Program Guidance to Performance Evaluation for the Certification of Wild Capture and Enhanced Fisheries in North America	Version 1.3, May 2016	Guidance to Standard

4 Client contact details

Table 2. Client details and key contact information.		
Applicant Information		
Organization/Company Name:		Eat on the Wild Side (Fishing Vessel Owners' Association (FVOA)
Address:	Street:	4005 - 20th Ave. West, Room 232
	City:	Seattle
	State:	Washington
	Country:	USA
	Zip code	98199
Applicant Key Contact Information		
Name:		Robert Alverson
Position:		Manager
E-mail:		robertalverson@msn.com

5 Unit(s) of Certification

5.1 Unit(s) of Certification

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

Table 3. Units of Certification.

Units of Certification			
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: ▪ International Pacific Halibut Commission (IPHC) ▪ National Marine Fisheries Service (NMFS) ▪ North Pacific Fishery Management Council (NPFMC) ▪ Alaska Department of Fish and Game (ADFG) and Board of Fisheries (BOF)	
Fishing gear/method:		UoC 1	Benthic longline
		UoC 2	Pots
		UoC 3	Troll
Client group:		Fishing Vessel Owner Association (FVOA)	

5.2 Changes to the Unit(s) of Certification (if any)

There have not been any changes to the Units of Certification.

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 4. Summary of site visits and/or consultation meetings.

Meeting Date and Location	Personnel	Areas of discussion
Date: 05/18/2021	IPHC Ian Stewart	Topics Discussed: ▪ Metapopulation dynamics ▪ Tagging work ▪ Stock status ▪ Observer coverage on commercial vessels < 40' LOA ▪ MSE process
Date: 05/19/2021 Location: Conference call	ADFG: Forrest Bowers Audit Team Members: Ivan Mateo, Lead Assessor Robert Leaf, Assessor Robert Allain, Assessor	Topics Discussed: ▪ robustness of the estimates of the commercial landings; ▪ issue of vessels less than 40 ft LOA to be considered for the EM selection pool in the future; ▪ progress in developing EM systems on trawl vessels in the Bering Sea and Gulf of Alaska; ▪ tagging survey in Chatham Strait conducted by ADFG as part of a mark-recapture study to estimate population abundance? ▪ significant/strategic changes to organizational structure, mandate, and core responsibilities in 2020 that impacted the management framework for the fishery?
Date: 05/19/2021 Location: Conference call	AWT: Lt. Jon Streifel Audit Team Members: Ivan Mateo, Lead Assessor Robert Leaf, Assessor Robert Allain, Assessor	Topics Discussed: ▪ enforcement legislation, rules, or proposals. Significant changes and updates over calendar years 2019 and 2020; ▪ enforcement of management measures that support the reduction of bycatch and discards, reduction of impacts on habitat, 2019 and 2020 updates; ▪ number of boarding, number of violations detected, types of violations for the species in question. General level of compliance overall. Updates for 2019 and 2020.
Date: 05/24/2021 Location: Conference call	NOAA Regional Office Mary Furuness Assessment Team Members: Ivan Mateo, Lead Assessor Robert Leaf, Assessor Robert Allain, Assessor	Topics Discussed: ▪ developments in the scientific assessment methodology of the stock; ▪ changes to the harvest strategy and control rules for the fishery; ▪ changes and updates on fishery data and information, ongoing research activities.

7 Summary findings

The Audit team has determined that the commercial Pacific halibut fishery operating within the defined Alaskan UoA remained in compliance with the RFM Fishery Standard's Fundamental Clauses for the Fisheries Management System component (Clauses 1, 2, and 3) and the Monitoring and Control component (Clauses 10 and 11).
No evidence exists to indicate that non-conformance situations arose during the 4th Surveillance audit.
The non-conformance in 4.2 was closed under this 4th surveillance audit

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 Audit 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

7.2 Changes in the management regime and processes

There were no significant federal changes to the legislation and regulations regime that governs the commercial Pacific halibut fishery in federally-managed waters of Alaska in 2020. The Audit Team noted that the IPHC and NOAA continued their annual practice of amending specific regulatory provisions and rules so that changes to the fishery's management measures are legally binding and enforceable (refer to Meeting Item 11 at: https://iphc.int/uploads/pdf/am/2020am/iphc-2020-am096-r.pdf). Similarly, a reading of the annual report for 2020 by the Legislative Affairs Agency of the State of Alaska indicates that there were no repeals or amendments of legislation in respect of the Pacific halibut fishery managed by the state (available at: http://akleg.gov/publications.php and select Summary of legislation 2020).

The core management regime and processes for the 2020 commercial Pacific halibut fishery within Alaska's EEZ involving binational (IPHC), national (NOAA-NMFS, NPFMC, USCG) and state (ADFG) agencies remained largely unchanged from the 2019 core management regime and process. Changes that did occur were driven by the typical year-over-year adjustments that are needed to support an evolving and diverse fishery (i.e., various allocation tables, quota sharing, bycatch provisions, area closures, opening and closing dates, at-sea observer coverage etc.). The Audit Team continued to follow developments in respect of the IPHC's goal of developing and implementing a Management Strategy Evaluation for the fishery. The MSE is expected to go before the full Commission in 2021 (refer to Meeting Item 10 at: https://iphc.int/uploads/pdf/am/2020am/iphc-2020-am096-r.pdf).

The Audit Team concludes that the outcome of certification or the effect of the fishery on resources were not affected by adjustments to the fishery management measures and processes, including to existing federal and state legislation and regulations.

7.3 Changes to the organizational responsibility of the main management agencies

The organizational structures, mandates, and core responsibilities of the main management agencies that comprise the management framework for the commercial Pacific halibut fishery have remained unchanged from the previous surveillance audit. However, there were a number of changes to key staff professionals within most of the main agencies, including to some of their subordinate bodies. These changes were both rotational and replacement in nature. The Audit team concludes that the personnel changes did not have a material impact on the governance systems of the principle organizations.

7.4 New information on the status of stocks

The 2019 stock assessment produced the following scientific advice regarding the Pacific halibut stock:

1. Fishing intensity: The IPHC does not have an explicit coastwide fishing intensity target or limit reference point, making it difficult to determine if current levels of fishing intensity are consistent with the interim harvest strategy policy objectives. The 2019 mortality corresponded to a point estimate of SPR = 42%; there is a 59% chance that fishing intensity exceeded the IPHC's reference level of 46% Although the stock is projected to decline over the next three years, the estimated probability of dropping below the SB20% limit reference point remains less than 23% for all levels of mortality less than or equal to the status quo, the stock is therefore classified as **not subject to overfishing**. However, at current catch limits, there is a 1 in 2 chance that the stock will be below the SB30% fishery trigger in each of the next 3 years, and a 1 in 5 chance of being below the SB20% biological limit in 2023.
2. Spawning biomass: Based on the dynamic reference point calculations, female spawning stock biomass of Pacific halibut at the beginning of 2020 was estimated to be 32% (22–46%) of the SB0 (unfished levels). The probability that the stock is below the SB30% level (IPHC trigger) is estimated to be 46%, with less than a 1% chance that the stock is below SB20% (IPHC limit reference point). Thus, on the weight of evidence available, the Pacific halibut stock is determined to be **not overfished** (SB2020 > SB20%).
3. Outlook: The stock is projected to decrease over the period 2021-23 for all TCEYs greater than 18.4 million pounds (~8,350 t), corresponding to a Spawning Potential Ratio (SPR) of 63%. At the reference level (SPR of 46% and a TCEY of 31.9 Mlbs or ~14,500 t) the probability of a decrease in stock size decreases over time from 89% (2021) to 75% (2023). There is a 43% chance that the stock will decline below the threshold reference point (SB30%) in one-year at the reference level of fishing intensity and a 49% chance at the status quo TCEY.

7.5 Update on fishery catches

Known Pacific halibut mortality consists of target commercial fishery landings and discard mortality (including research), recreational fisheries, subsistence, and discard mortality in fisheries targeting other species ('non-directed' fisheries where Pacific halibut retention is prohibited). Over the period 1920-2019 mortality has totalled 7.2 billion pounds (~3.3 million metric tons, t), ranging annually from 34 to 100 million pounds (16,000-45,000 t) with an annual average of 63 million pounds (~29,000 t; Figure 1). Annual mortality was above this long-term average from 1985 through 2010, and has averaged 41 million pounds (~18,500 t) from 2016-19.

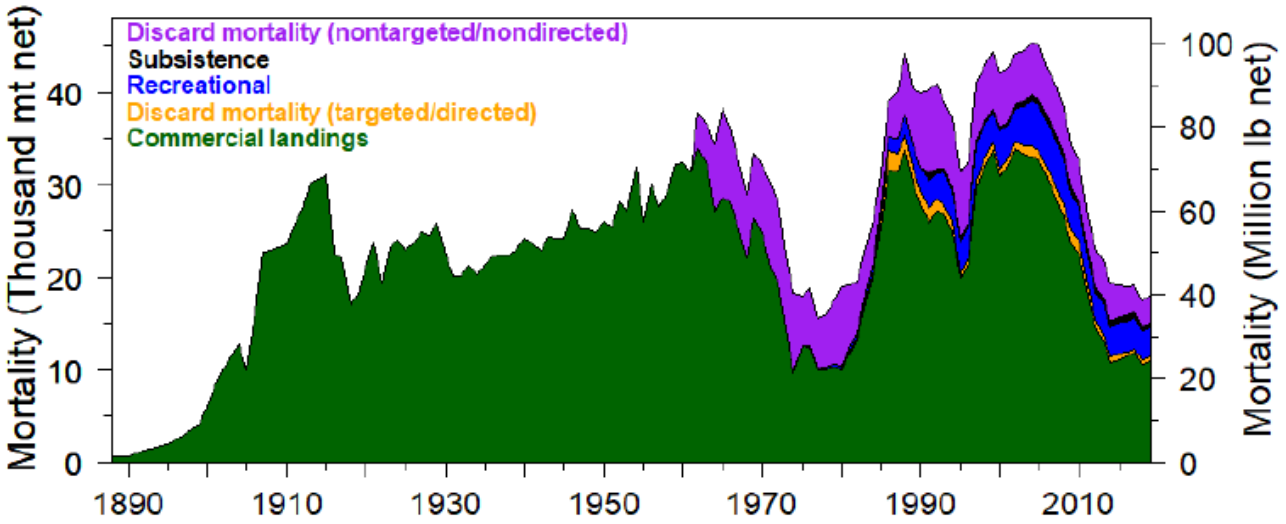


Figure 1. Summary of estimated historical mortality by source (colors), 1888-2019.

7.6 Significant changes in the ecosystem effects of the fishery

There were no significant changes in the ecosystem effects of the fishery other than in January 2020 NMFS issued a Rule that authorized the use of longline pots for the Halibut fishery in Bering Sea.[1]

7.7 Violations and enforcement information

The 2020 fishing season marked the first full year in which the Enforcement Section of NOAA's Office of General Counsel's Policy for the Assessment of Civil Administrative Penalties and Permit Sanctions (June 2019) was in effect. Like its predecessor, the updated policy is very comprehensive and prescriptive. All major federal statutes are embodied in the policy and it is believed that the quality of the guidance provided to prosecutors and law enforcement managers results in ensuring that (i) penalties and permit sanctions decisions are assessed fairly and consistently and are appropriate for the gravity of the violation, and (ii) economic incentives for non-compliance are eliminated.

NOAA Office of Law Enforcement (Alaska Division)

NOAA's Alaska Enforcement Division utilizes enforcement officers, special agents, and partnerships with the Alaska Wildlife Troopers and the U.S. Coast Guard to enforce federal fishing regulations in Alaska.

In its 2020 annual enforcement summary report to the IPHC, NOAA-OLE personnel spent over 3,210 hours conducting patrols to deter potential violators, to monitor fishing and other marine activities, detect violations, provide compliance assistance, and provide outreach and education. OLE boarded 1,129 vessels with 648 of those boardings being related to halibut; of the 648 boarding, 314 targeted the commercial fishery (compared to 216 in 2019 and 473 in 2018). Personnel opened 885 halibut-related incidents, including outreach, vessel boardings, dockside monitoring, and compliance assistance. Of those 885 incidents, officers identified 396 halibut-related violations, which were resolved by compliance assistance, summary settlement, or a written warning. The commercial halibut fishery accounted for 197 violations (compared to 250 in 2019 and 136 in 2018).

[1] https://www.federalregister.gov/documents/2020/01/08/2019-27903/fisheries-of-the-exclusive-economic-zone-off-alaska-authorize-the-retention-of-halibut-in-pot-gear

In Fiscal Year 2020, NOAA-OLE received 597 observer statements of potential violations, with 3,422 occurrences described therein. By contrast, in FY 2019 NOAA-OLE received 956 statements describing 7,576 occurrences. According to OLE, a number of factors may have driven the decline. For example, there has been a greater lag time before debriefing, potentially stalling delivery of some statements. Longer observer deployments may have reduced the number of statements.

OLE referred 4 civil administrative cases to the NOAA Office of General Counsel, Enforcement Section which resulted in settlements totalling $245,899; one case was referred for criminal prosecution (outcome not available). From April 1 to September 30, 2020, the OLE conducted several multiday patrols. Patrols were often coordinated with partners including U.S. Customs and Border Protection (CBP), U.S. Fish and Wildlife Service (USFWS), U.S. Coast Guard (USCG), Alaska Wildlife Troopers (AWT) and National Park Service (NPS).

U.S Coast Guard (17th District)
In Areas 2C through 4E, the 2020 commercial fishing season was rationalized lasting from March 14 to November 15. Enforcement personnel patrolled the fishing grounds, often conducting joint boardings with or in collaboration with NOAA OLE.

The USCG in 2020 reported that it conducted 418 boardings of vessels engaged in halibut fishing (compared to 676 in 2019), a 38% decrease due largely to a significant decline in charter halibut boardings as a result of COVID-19. It reported 11 violations in 2020 (same for 2019) with the violation type (i) illegal biodegradable mesh opening, (ii) not retaining Pacific Cod or Rockfish, (iii) logbook irregularities, and (iv) not transmitting VMS data while directing for sablefish. logbook irregularities. The agency commented that the lack of a universal requirement for fishing vessels targeting halibut to be equipped with VMS on board means there is not a centralized means to assess and monitor fishing activity in Areas 2C through 4E.

While the number of Coast Guard H60/65 (rotary wing) air hours were the lowest in the 5-year time series in 2020 (520 hrs. vs. 1,043 hrs. in 2016), the number of patrol boat hours were the highest in the time series in 2020 (12,076 hrs. vs. 7,742 hrs. in 2016). **The overall compliance rate remained very high with a violation rate that averaged only 1.8% over the past 4 years**.

The annual reports filed with the IPHC by both agencies are available at:
https://www.iphc.int/uploads/pdf/am/am097/iphc-2021-am097-nr02.pdf.

7.8 Other information that may affect the outcome of certification

There was no information that may affect the outcome of certification and there were new fishery developments since certification not already covered in other sections.

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

1.	**There shall be a structured and legally mandated management system based upon and respecting International, National and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment.**
Summary of relevant changes:	The management systems for the Pacific halibut commercial fisheries have remained highly structured and legally supported by federal and state statutes and regulations, including by international convention. Changes to the management systems in 2020 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. The IPHC's work in formulating a Management Strategy Evaluation (MSE) for the fishery (first begun in 2013) continued to progress in 2020 with an adjustment to F from F_{46} to F_{43}. The interim management procedure introduced in 2019 is expected to remain until 2023 at which time the MSE is scheduled to be finalized. At the IPHC Annual Meeting in January 2021, the Commission requested that the IPHC Secretariat consider and develop a draft MSE Program of Work for review by the Commission. The MSE Program of Work should describe technical versus policy oriented issues, linkages between/among specific work products, and sequencing considerations between/among items. It should also describe the resources required to complete items. The Commission agreed to meet inter-sessionally to review the draft MSE program of work and provide direction on the prioritisation of tasks over the next 1-2 years, as well as the role of the MSAB in contributing to those tasks.
References:	1.Federal statutes: Lacey Act, Magnuson-Stevens Fishery Conservation and Management Reorganization Act, Sustainable Fisheries Act, Marine Mammal Protection Act, Coastal Zone Management Act, Sustainable Fisheries Act, Endangered Species Act, National Environmental Policy Act, National Marine Sanctuaries Act, Northern Pacific Halibut Act. 2. State statutes: Alaska Administrative Code, Alaska Statutes. 3. Binational: Convention between the United States and Canada for the Preservation of the Halibut Fishery of the North Pacific Ocean and Bering Sea, Northern Pacific Halibut Act. 4. Management Agencies: annual reports, committee meeting minutes, press releases (2019-2020). 5. Site visit (virtual): May 18, 2012 with IPHC official Ian Stewart. 6. Site visit (virtual): May 19, 2021 with AFDFG staff - Forrest Bowers, Andrew Olson, Jan Rumble. 7. Site visit (virtual): May 19, 2021 with AWT official - Lt. Jonathan Streifel. 8. Site visit (virtual): May 24, 2021 with NOAA ARO official - Mary Furuness. 9. Site visit (virtual): May 25, 2021 with NOAA FSC staff - Chris Lunsford, Kari Fenske, Dan Goethel and Cara Rodgveller. 10. Site visit (virtual): May 27, 2021 with FVOA representative - Bob Alverson.
Statement of consistency to the RFM Fishery Standard	The fishery continues to conform to the requirements of Fundamental Clause 1 of the RFM Fishery Standard

7.9.1.2 Fundamental Clause 2

2.	**Management organizations shall participate in coastal area management institutional frameworks, decision-making processes and activities related to the fishery and its users, in support of sustainable and integrated resource use, and conflict avoidance.**
Summary of relevant changes:	The COVID-19 pandemic required that management organizations and their subordinate bodies carry out their activities and decision-making processes in a virtual setting as required by public health directives. In some cases, a planned activity was either cancelled or re-scheduled. Nonetheless, the many web-posted documents examined by the Audit team are proof positive that the organizations and their committees were successful in adapting their processes and activities to a different reality

2.	Management organizations shall participate in coastal area management institutional frameworks, decision-making processes and activities related to the fishery and its users, in support of sustainable and integrated resource use, and conflict avoidance.
	all the while meeting the standards as prescribed in regulations or in policy and procedure guidelines. Users and stakeholders were equally able to continue their participation in the processes through different internet communications platforms. The operations of the main organizations continued to be guided by multi-year strategic plans that span their various programs, and by internal policies and practices that govern all aspects of their operations. There was no evidence to indicate that the decisions rendered in 2020 led to conflicts between users or others. All major agencies at the federal and state levels participate in the NEPA processes that are intended to manage coastal area resources in a transparent, responsible and sustainable manner.
References:	1. Management organizations and committees: various technical and scientific reports, meeting minutes, formal operational policies and practices (2019-2020). 2. IPHC: anticipated 2nd Performance Review decisions in 2021 could strengthen the organization's governance systems and decision-making practices moving forward. 3. Site visit (virtual): May 18, 2012 with IPHC official Ian Stewart. 4. Site visit (virtual): May 19, 2021 with AFDFG staff - Forrest Bowers, Andrew Olson, Jan Rumble. 5. Site visit (virtual): May 19, 2021 with AWT official - Lt. Jonathan Streifel. 6. Site visit (virtual): May 24, 2021 with NOAA ARO official - Mary Furuness. 7. Site visit (virtual): May 25, 2021 with NOAA FSC staff - Chris Lunsford, Kari Fenske, Dan Goethel and Cara Rodgveller. 8. Site visit (virtual): May 27, 2021 with FVOA representative - Bob Alverson.
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

7.9.1.3 Fundamental Clause 3

3.	Management objectives shall be implemented through management rules and actions formulated in a plan or other framework.
Summary of relevant changes:	The components of the management systems for the 2020 commercial Pacific halibut fishery at the binational level (IPHC Regulatory Area) and national level (GOA and BSAI Areas) continued to reflect various long-term and short-term objectives as prescribed by established statutes and rules. The processes remained 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 continued to be applied and resulted in annual adjustments to the Fishery Management Plans (FMPs) for the GOA and BSAI Areas. 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. **Convention Area** The IPHC continued to undertake a major Management Strategy Evaluation (MSE) process 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. The IPHC also modified its' Harvest Strategy Policy by accepting a coast wide fishing intensity SPR not lower than 40% nor higher than 46%, with a target SPR of 42% - 43% and with a fishery trigger of 30% and a fishing limit of 20% in the control rule.

3.	Management objectives shall be implemented through management rules and actions formulated in a plan or other framework.
	Alaska EEZ The NPFMC and the NOAA-NMFS continued to collaborate throughout 2020 on a number of administrative and regulatory changes of importance to the GOA and BSAI groundfish management plans including for Pacific halibut. These included: <u>October 2019</u> - NMFS published a final rule to implement regulations allowing halibut to be sorted on deck of trawl catcher/processors in the non-Pollock fisheries off Alaska effective on January 20, 2020. <u>December 2019</u> - NPFMC made final recommendations on groundfish harvest specifications, PSC limits, and halibut DMRs to manage the 2020 and 2021 BSAI groundfish fisheries. - NPFMC recommended final harvest specifications for the 2020 and 2021 GOA groundfish fisheries, including OFLs and ABCs consistent with SSC recommendations, and final TACs. The Council also recommended halibut PSC limit apportionments and adopted updated halibut DMRs for 2020. - IPHC made public the independent peer review report of the IPHC stock assessment for Pacific halibut. <u>January 2020</u> - NMFS published a final rule that implements Amendment 118 to the FMP for Groundfish of the BSAI Management Area and a regulatory amendment that revises regulations on Vessel Monitoring System (VMS) requirements in the BSAI and GOA. - IPHC posted internal studies on recent learnings about characteristics of Pacific halibut including: (i) reproductive development in females and males, (ii) migratory behaviour and distribution, and (iii) discard mortality rates and post-release survival in the directed fishery. <u>March 2020</u> - NOAA, on behalf of the IPHC, published as regulations the 2020 annual management measures governing the Pacific halibut fishery that have been recommended by the IPHC and accepted by the U.S. Secretary of State. The 2020 management measures are effective until superseded. - ADFG released its 2020 Groundfish bycatch regulations for state waters and state managed groundfish taken in the federal commercial halibut and sablefish fisheries in the eastern GOA. <u>May 2020</u> - IPHC published its fishery regulations for 2020. <u>July 2020</u> - NMFS published a final rule to revise regulations for the commercial IFQ Pacific halibut fisheries for the 2020 IFQ fishing year. The rule removed limits on the maximum amount of halibut IFQ that may be harvested by a vessel, commonly known as vessel use caps, in IFQ regulatory areas 4B (Aleutian Islands), 4C (Central Bering Sea), and 4D (Eastern Bering Sea). - ADFG published its Statewide commercial groundfish regulations for 2020-2021. <u>August 2020</u> - IPHC posted an internal report on updating the 2020 stock assessment. <u>September 2020</u> - IPHC posted a circular on the independent peer review of the IPHC Management Strategy Evaluation process. <u>December 2020</u> - NPFMC made final recommendations on groundfish harvest specifications, prohibited species catch (PSC) limits, and halibut Discard Mortality Rates (DMRs) to manage the 2021 and 2022 BSAI groundfish fisheries. It also recommended final harvest specifications for the 2021 and 2022 GOA groundfish fisheries. - IPHC posted an internal summary report of the data, stock assessment, and harvest decision table for Pacific halibut (*Hippoglossus stenolepis*) at the end of 2020.

3.	**Management objectives shall be implemented through management rules and actions formulated in a plan or other framework.**
References:	1. Official meeting minutes and reports as they appeared on the websites of the NPFMC, the NMFS and the IPHC, including associated links to other documents. 2. IPHC: anticipated 2nd Performance Review decisions in 2021 could strengthen the organization's governance systems and decision-making practices moving forward. 3. Site visit (virtual): May 18, 2012 with IPHC official Ian Stewart. 4. Site visit (virtual): May 19, 2021 with AFDFG staff - Forrest Bowers, Andrew Olson, Jan Rumble. 5. Site visit (virtual): May 24, 2021 with NOAA ARO official - Mary Furuness. 6. Site visit (virtual): May 25, 2021 with NOAA FSC staff - Chris Lunsford, Kari Fenske, Dan Goethel and Cara Rodgveller.
Statement of consistency to the RFM Fishery Standard	The fishery continues to conform to the requirements of Fundamental Clause 3 of the RFM Fishery Standard.

7.9.2 Section B. Science and Stock Assessment Activities

7.9.2.1 Fundamental Clause 4

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 fishery removals and mortality of the target stock(s) shall be considered by management. A variety of data sources are used to support the stock assessment. These are updated annually to include newly available information and refined to reflect the most current and accurate information available to the IPHC. Data sources relative to management include commercial fishery WPUE, commercial fishery age composition data, and 2020 mortality estimates for all fisheries still operating after 31 October. Data for assessment use are aggregated to four Biological Regions: Region 2 (Areas 2A, 2B, and 2C), Region 3 (Areas 3A,3B), Region 4 (4A, 4CDE) and Region 4B and then coastwide. In addition to the aggregate mortality (including all sizes of Pacific halibut), the assessment includes data from both fishery dependent and fishery independent sources as well as auxiliary biological information, with the most spatially complete data available since the late-1990s. Primary sources of information for this assessment include modelled indices of abundance (IPHC-2021-AM097-07; based on the FISS (in numbers and weight) and other surveys), commercial fishery Catch-Per-Unit-Effort (weight), and biological summaries from both sources (length-, weight-, and age-composition data). In aggregate, the historical time series of data available for this assessment represents a considerable resource for analysis. The range of relative data quality and geographical scope are also considerable, with the most complete information available only in recent decades. A detailed summary of input data used in this stock assessment can be found in IPHC-2021-SA-02 on the IPHC's stock assessment webpage (the input data files are publicly available). Reliable and accurate data are provided annually to IPHC to assess the status of Pacific Halibut fisheries and ecosystems. These data include information on retained catch in the commercial, recreational and sport fisheries, the personal use and subsistence fisheries, as well as estimates of bycatch and discards. Several data reporting systems are in place for the various fishery components to ensure timely and accurate collection and reporting of catch data. These include an eLandings[256] system, in which data are checked by NMFS and entered along with observer data into the catch accounting system (CAS) which is maintained by NMFS. Data from the eLandings are made available to the three collaborating agencies, i.e. NMFS, IPHC, and ADFG. Full stock assessment consistent with contemporary methods, was completed at the end of 2020, and all fishery removals and mortality of Pacific Halibut are considered in the assessment and management of the stock.

[2] https://elandings.alaska.gov/

4.	**There shall be effective fishery data (dependent and independent) collection and analysis systems for stock management purposes.**	
		Pacific halibut mortality consists of directed/target commercial fishery landings and discard mortality (including research), recreational fisheries, subsistence, and non-directed discard mortality 'bycatch' in fisheries targeting other species and where Pacific halibut retention is prohibited. Over the period 1921-2020 mortality has totalled 7.3 billion pounds (~3.3 million metric tons, t), ranging annually from 34 to 100 million pounds (16,000-45,000 t) with an annual average of 63 million pounds (~29,000 t). Annual mortality was above this long-term average from 1985 through 2010 and has averaged 40 million pounds (~18,000 t) from 2016-20. Coastwide commercial Pacific halibut fishery landings (including research landings) in 2020 were approximately 22.7 million pounds (~11,400 t), down 6% from 2019. Discard mortality in non-directed fisheries was estimated to be 5.0 million pounds in 2020 (~2,280 t)3, down 23% from 2019 and representing the smallest estimate in the time-series. The total recreational mortality (including estimates of discard mortality) was estimated to be 6.0 million pounds (~2,700 t) down 15% from 2019 due to several sectors not reaching the full regulatory limit or projected level. Mortality from all sources decreased by 11% to an estimated 35.5 million pounds (~16,100 t) in 2020. 4.2. An observer scheme designed to collect accurate data for research and support compliance with applicable fishery management measures shall be established *The minor NC identified (lack of observer data for halibut vessels less than 40' LOA) is closed following the data and analysis provided to the Assessment Team by Alverson that was completed by a joint NMFS and IPHC effort. Because of the continued lack of monitoring data from vessels less than 40 ft. NMFS recommends that vessels less than 40 ft LOA could be considered for the EM selection pool in the future but also recognizes that the Council's priority for EM research is on trawl vessels, so it is unknown when the evaluation of data collected on fixed-gear less than 40 ft will start. The following deployment strata for 2020 was established by NMFS' Fisheries Monitoring and Analysis Division, Alaska Fisheries Science Center (December, 2019). The primary strata delineated below highlight the continued lack of observer coverage for the vessels less than 40 ft LOA.* *Recognizing the challenging logistics of putting observers on small vessels, NMFS recommended that vessels less than 40' LOA to be in the no-selection pool for observer coverage. NMFS also recognized that the Council's next priority for EM research has shifted to trawl vessels, so the evaluation of data collected on fixed-gear less than 40' will not begin immediately. However, since there is no monitoring data from this segment of the fleet, NMFS recommended that vessels less than 40' LOA could be considered for the EM selection pool in the future.* 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:* o *fixed-gear vessels less than 40 ft LOA and vessels fishing with jig gear, which includes handline, jig, troll, and dinglebar troll gear; and* o *four fixed-gear vessels voluntarily participating in EM innovation and research (Appendix D).* 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 a NMFS-approved VMP.* 3. *Observer Trip-Selection Pool: There are 3 sampling strata in the trip-selection pool for the deployment of observers:*

4.	**There shall be effective fishery data (dependent and independent) collection and analysis systems for stock management purposes.**	
		o *Hook-and-line: 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 hook-and-line gear.* o *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.* o *Trawl: This pool is composed of all vessels in the partial coverage category fishing trawl gear making a trip not covered by the EM EFP, including all trips using non-pelagic gear.* 4. *Trawl EM trip-selection pool: If the EFP application is approved and fishing occurs in 2020, this pool would be composed on all vessels fishing under the EFP permit.* *In the near term (2021) there are no plans for observer coverage on halibut vessels less than 40' LOA. To address the minor NC, we make use of analysis provided to us by a joint NFMS and IPHC effort and relayed to us by J. Alverson. The data and analysis had the goal to investigate gaps in observer coverage from 2010- 2017 for hook and line vessels less than 40ft LOA compared to larger vessels > 40ft LOA and describe the observer coverage by IPHC statistical area.* *The analysts provided J. Alverson haul-level information summarized by IPHC statistical area based on geo retrieval locations. The observer haul summaries included all hook and line data for a given IPHC statistical area, with data summaries on unique vessel count (vessels observed), total haul weight (lb), and year fishing occurred. This information was joined with the logbook information based on the IPHC area grouping factors in the logbook data. The primary issues are to understand the proportion of catch, in the form of unreported discards, that are not accounted for.* *These analyses were undertaken to get a more complete understanding of the impacts of the vessels > 40ft LOA. The analysis addressed the following questions:* • *In what areas are the <40ft fleet fishing, where is the greatest effort exerted, and how does this compare with the >40ft fleet subject to observer coverage?* *The primary findings of this aspect of the analysis indicated that there was high spatial overlap in effort between the two fleets (<40ft fleet and >40ft fleet). The under 40ft fleet had more near-shore activity in southeast Alaska than the >40ft vessels.*

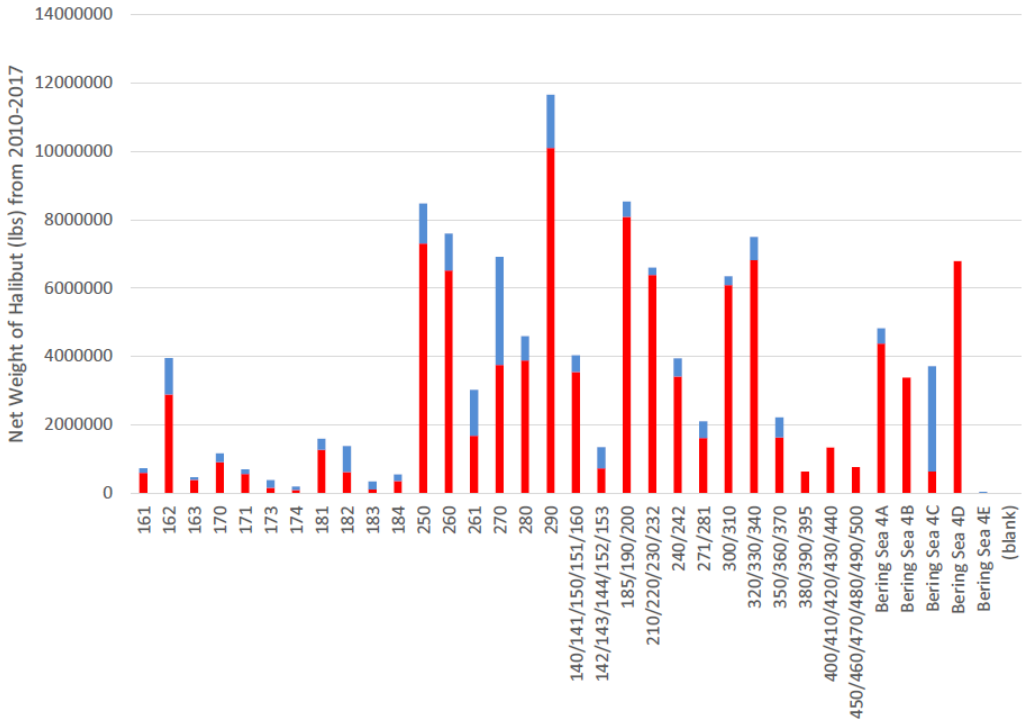


Figure 2. Net weight of halibut catches (lbs) of the <40ft and >40ft fleet of halibut vessels across the IPHC statistical areas from 2010-2017 reported in logbooks. Red bars represent the sum of the catch for the over 40ft fleet (i.e. fleet subject to observer coverage) and the blue bars are the <40ft fleet.

- *In the areas where there is substantial <40ft coverage, what is the level of observer coverage in the >40ft fleet?*

Effort for vessels <40ft from 2010-2017 was highest in the Bering 4C area, and 270. Besides Bering 4C, there was 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.

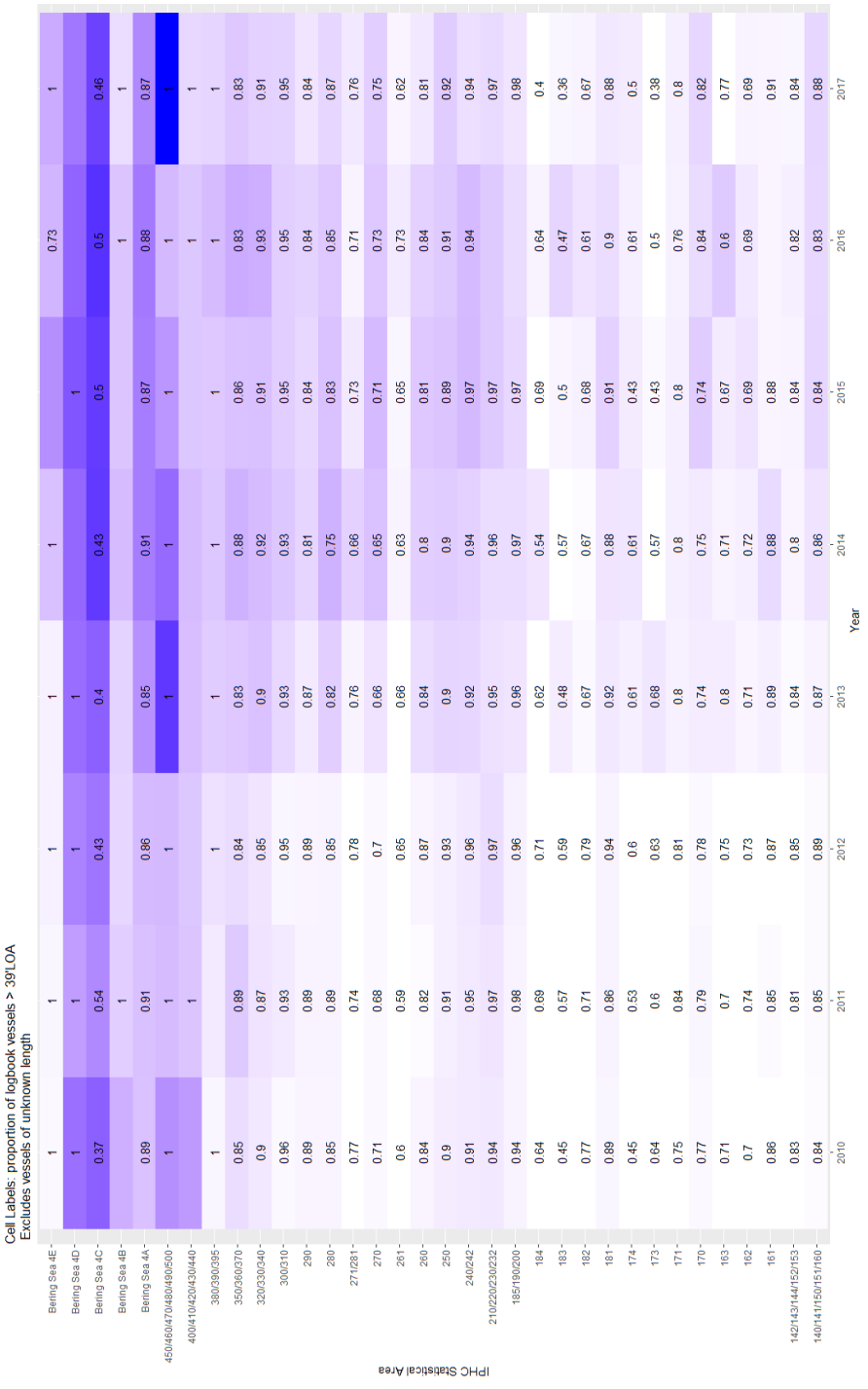
- *Based on the above results, what is the level of concern that the discarded catch from the <40ft fleet is not adequately captured by the current observer program for the >40ft fleet?*

Bering Sea 4C and 270 both had a high proportion of vessels over 40ft subject to observer coverage (over 75% and 50%, respectively). Observer coverage was low across the southeast region, where <40ft vessels comprise roughly 50% of the effort in some regions. However, effort and volume of catch of halibut is comparatively low across this region, and thus 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.

With the overlap and magnitude analysis presented above, ***the team considers that the client has addressed the minor nonconformance****. Catch data and other biological information and research*

4.	**There shall be effective fishery data (dependent and independent) collection and analysis systems for stock management purposes.**	
		results serve as inputs into the annual stock assessment process and form the basis for the setting of 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). Uncertainty in estimates of mortality create bias in this assessment. However, the analysis demonstrated that the relative volume of catch by the <40ft fleet would not present a risk to main bycatch species, where estimated catches that could be theoretically attributed to the ~20% of landings taken by the <40' fleet and overall Halibut fleet catches are not considered to jeopardize the status of any main bycatch species. The data demonstrates that in terms of effort, the >40ft fleet is dominant in most stat areas and there are few stat areas in which the <40ft fleet has significant effort with little to no effort by the >40ft fleet for the years reviewed. The data is presented as summed for all years, but has also been reviewed by year, with year-over effort generally consistent

Table 5. The proportion covered by observers from 2010-2017 for hook and line vessels less than 40’ by year (in the form of a heatmap).



4.	**There shall be effective fishery data (dependent and independent) collection and analysis systems for stock management purposes.**	
		4.3. Management entities shall make data available in a timely manner and in an agreed format in accordance with agreed procedures. The agencies tasked with management and monitoring of the fishery, primarily NMFS, ADF&G, and IPHC have extensive scientific databases which include halibut. NPFMC has extensive information on management of halibut for public dissemination. Data and data summaries are made widely available through websites, publications and at various publicly attended meetings. Some aspects of the commercial fishing data are confidential, such as those data that can be directly ascribed to individuals or individual vessels (e.g. for use in the determination of CPUE). Confidentiality is determined by the number of individuals or entities involved. For the current surveillance report, all necessary documentation such as the stock assessment report, observer report, and other documents, relevant records, and regulations were available on the website for the Pacific Halibut Research & Stock Management (IPHC, https://iphc.int/). 4.4/4.5. States shall stimulate the research required to support national policies related to fish as food and collect sufficient knowledge of social, economic and institutional factors relevant to the fishery in question to support policy formulation. State and national policies regarding seafood are guided by the Alaska Seafood Marketing Institute[363] (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 usesof seafood harvested and processed in the state. Socioeconomic 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[464] (Fissel *et al.,* 2018). 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 Pacific Halibut, and relates changes in value, price, and quantity, across species, product and gear types, to changes in the market. In work funded by Alaska Sea Grant, Criddle[501] evaluated the economic impacts of the commercial halibut industry, such as adoption of individual fishing quotas and guideline harvest limits. The modelling work they derived were used to develop a comprehensive economic model that considers biological factors such as halibut population dynamics, and market information such as prices, inventories, production costs, and markets. Their model allows fishery managers to examine the economic consequences of changes in Pacific halibut abundance and changes in the allocation of halibut among commercial, sport, and subsistence user groups. Lew et al. (2015) studied economic

[3] http://www.alaskaseafood.org
[4] https://www.afsc.noaa.gov/refm/stocks/plan_team/2018/economic.pdf
[5] https://seagrant.uaf.edu/research/projects/summary.php?id=559

4.	There shall be effective fishery data (dependent and independent) collection and analysis systems for stock management purposes.
	value of sport fishing charters in Alaska, including the significant contribution of Pacific Halibut to this sector. 4.6. States 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. 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. 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 the implementation 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 (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 (Convention).[600] 4.7. States conducting scientific research activities in waters under the jurisdiction of another State shall ensure that their vessels comply with the laws and regulations of that State and international law. The major scientific activity for Pacific Halibut is the annual setline survey conducted by IPHC, using commercial vessels from USA and Canada. In 2018[766] 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 (Erickson *et al.,* 2019). Thus, only the waters under jurisdiction of USA and Canada, the two countries involved in IPHC, 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. 4.8. States shall promote the adoption of uniform guidelines governing fisheries research conducted on the high seas. Not applicable, both fishery and survey research activities occur and are carried out within the jurisdictions of the USA and Canada EEZ. No activities occur in the high seas outside the 200 nm EEZ of the US and Canada.

[6] https://www.ecfr.gov/cgi-bin/text-idx?SID=a80834c850cc5d3289207892d2caf382&pitd=20200205&node=se50.11.300_160&rgn=div8
[7] https://iphc.int/uploads/pdf/ar/iphc-2018-annual-report.pdf

4.	**There shall be effective fishery data (dependent and independent) collection and analysis systems for stock management purposes.**
	4.9/4.10/4.11. States shall promote and enhance the research capacities of developing countries, support (upon request) States engaged in research investigations aimed at evaluating stocks which have been previously un- fished or very lightly fished. Not applicable, operations of the fishery take place in USA and Canada; these areas are not considered developing countries.
References:	Alaska Department of Fish and Game, International Pacific Halibut Commission, and NOAA Fisheries "eLandings" Interagency electronic reporting system for commercial fishery landings in Alaska. Website: https://elandings.alaska.gov/. International Pacific Halibut Commission. 2018. Annual Report. https://iphc.int/uploads/pdf/ar/iphc-2018-annual-report.pdf NOAA Fisheries Alaska Region. Website: https://alaskafisheries.noaa.gov/sites/default/files/final_2018_adp.pdf NOAA Observed Catch 2013 to 2017. Website: https://alaskafisheries.noaa.gov/sites/default/files/2013-2017-observed-catch-tables.xlsx Alaska Seafood Marketing Institute. Website: http://www.alaskaseafood.org Alaska Sea Grant Research Products. Website: https://seagrant.uaf.edu/research/projects/summary.php?id=559 NOAA Alaska Fisheries 2018 Economic Plan. Website link: https://www.afsc.noaa.gov/refm/stocks/plan_team/2018/economic.pdf International Pacific Halibut Commission. 2020. Stock Assessment. https://iphc.int/uploads/pdf/am/2020am/iphc-2020-am095-08.pdf
Statement of consistency to the RFM Fishery Standard	The fishery continues to conform to the requirements of Fundamental Cause 4 of the RFM Fishery Standard.

7.9.2.2 Fundamental Clause 5

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 States shall ensure that appropriate research is conducted into all aspects of fisheries including biology, ecology, technology, environmental science, economics, social science, aquaculture and nutritional science. The research shall be disseminated accordingly. States shall also ensure the availability of research facilities and provide appropriate training, staffing and institution building to conduct the research, taking into account the special needs of developing countries. Although some modifications in terms of additional data implemented in the stock assessment there were no significant changes in the 2020 assessment. The quantitative age-structured stock assessment is performed with contemporary methods and was at the end of 2020 (23 December 2020)[802]. The primary update to the assessment methodology is the inclusion of the sex ratio in the

[8] http://www.iphc.int/uploads/pdf/2021

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.
	commercial stock which has served to change the perception of the stock: the number of females is increased and that served to increase the scale of the biomass estimate. We detail specific and relevant changes to the assessment below. The International Pacific Halibut Commission (IPHC)[967] was established in 1923 by a Convention between the governments of Canada and the United States of America. Its mandate is research on and management of the stocks of Pacific Halibut within the Convention waters of both nations. The IPHC receives funding from both the U.S. and Canadian governments to support a director and 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. The IPHC conducts numerous research projects annually to support its ability to provide assessment for management advice[1068]. The main objectives of the Biological and Ecosystem Science Research Program at IPHC are to: 1) identify and assess critical knowledge gaps in the biology of the Pacific Halibut; 2) understand the influence of environmental conditions; and 3) apply the resulting knowledge to reduce uncertainty in current stock assessment models. As described in the Five-Year Research Plan for the period 2017-2021, the primary biological research activities at IPHC can be summarized in these main areas: 1) Reproduction 2) Growth and Physiological Condition 3) Discard Mortality and Survival 4) Distribution and Migration 5) Genetics and Genomics 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[11]69. 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[12]70. This comprehensive report (Fissel et. al. 2018) 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, 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 Pacific Halibut fishery.

[9] http://www.iphc.int/about-iphc.html
[10] https://iphc.int/uploads/pdf/am/2018am/iphc-2018-am094-13.pdf

[11] http://www.nprb.org/assets/images/uploads/01.10_bsag_web.pdf
[12] https://www.afsc.noaa.gov/refm/stocks/plan_team/2018/economic.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.
	Since 2002, IPHC has been working cooperatively with the Alaska Department of Environmental Conservation (ADEC) in a project monitoring environmental contaminants in Alaskan fish. 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 analysed for organochlorine pesticides, dioxins, furans, polybrominated diphenyl ethers, PCB congeners, methyl mercury and heavy metals (arsenic, selenium, lead, cadmium, nickel, and chromium). As per the most recent IPHC report (Dykstra, 2018), over 2700 samples of Pacific Halibut have been tested by ADEC. 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. 5.2. The state of the stocks under management jurisdiction, including the impacts of ecosystem changes resulting from fishing pressure, pollution or habitat alteration shall be monitored. Alaska's Pacific Halibut stock assessment program is extensive and comprehensive. 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. The program to determine the stock removals used in the assessment and management considerations is explained in Clause 4.1. Research capacity in environmental science is also extensive as outlined in previous clauses, and in Clause 12 below. The program to determine reference points and evaluate the stock against these in a precautionary approach is described in Clauses 6.1 –6.4 below. In the most recent stock assessment (Stewart and Hicks 2020)[1302], the authors report the status of the Pacific Halibut (*Hippoglossus stenolepis*) resource in the International Pacific Halibut Commission (IPHC) Convention Area at the end of 2020. The assessment consists of four equally weighted models, two long time-series models, and two short time-series models either using data sets by geographical region, or aggregating all data series into Coastwide summaries. Results are based on the approximate probability distributions derived from the ensemble of models, thereby incorporating the uncertainty (model misspecification) as well as the uncertainty among models. Results of this assessment are presented in Clause 6 below. Comparison of assessment output from 2020 with previous stock assessments indicates that the estimates of spawning biomass from the 2020 ensemble remain consistent with those from the 2012-19 assessments. Each of the previous terminal assessment values lie inside the predicted 50% interval of the current ensemble. The 2020 assessment estimates a slightly larger spawning biomass for the entire time-series, with the difference being more pronounced prior to around 2005. The uncertainty is much greater prior to approximately 2005 reflecting the differences among the four individual models as well as the increased uncertainty in scale resulting from the still limited time-series of sex-ratio data to inform the models. The results of the 2020 stock assessment indicate that the Pacific halibut stock declined continuously from the late 1990s to around 2012. This trend is estimated to be a result of decreasing size-at-age, as well as somewhat weaker recruitment strengths than those observed during the 1980s. The

[13] http://www.iphc.int/uploads/pdf/2021

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.
	spawning biomass (SB) was estimated to have increased gradually to 2016, and then decreased to an estimated 192 million pounds (~87,050 t) at the beginning of 2021, with an approximate 95% credible interval ranging from 125 to 292 million pounds (~56,800-132,600 t). The differences among the individual models contributing to the ensemble are most pronounced prior to the early 2000s; however, current stock size estimates (at the beginning of 2020) also differ substantially among the four models. The differences in both scale and recent trend reflect the structural assumptions, e.g., higher natural mortality estimated in the long coastwide model and dome-shaped selectivity for Regions 2 and 3 in the AAF models. 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 (Geernaert 2018), and impacts of marine mammal on setline depredation (Wong 2016). 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 Considerations reports[1474]are produced annually to compile and summarize information about the status of the Alaska marine ecosystems for the NNPFMC, the scientific community and the public. As of 2018, 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 the context of ecosystem conditions, the 2020 stock assessment reported that the average Pacific halibut recruitment is estimated to be higher (70 and 75% for the coastwide and AAF models respectively) during favourable Pacific Decadal Oscillation (PDO) regimes, a widely used indicator of productivity in the north Pacific. Historically, these regimes included positive conditions prior to 1947, poor conditions from 1947-77, positive conditions from 1978-2006, and poor conditions from 2007-13. Annual averages from 2014 through 2019 were positive, with 2020 showing negative average conditions through September. Although strongly correlated with historical recruitments, it is unclear whether recent anomalous conditions in both the Bering Sea and Gulf of Alaska (especially since 2014) are comparable to those observed in previous decades. NOAA identifies habitats essential for managed species and conserves habitats from adverse effects on those habitats. 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. More specific information on EFH and recent 5 year review are described in Clause 12 below 5.3. Management organizations shall cooperate with relevant international organizations to encourage research in order to ensure optimum utilization of fishery resources

[14] https://access.afsc.noaa.gov/reem/ecoweb/

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.**	
		IPHC is, by definition, an international organization established in 1923 for the preservation of the Pacific Halibut fishery in waters off Canada and the United States of America. Thus 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. For halibut management, there has also been cooperative research and surveys carried out on the stock involving other nations, such as the 1984 US-Japan bottom trawl survey in the GOA (Brown 1986), but it has been quite limited. Pacific Halibut caught in Russian areas of the Bering Seas are believed to be of a different stock, and are thus not included in the IPHC assessments. There is ongoing contact between IPHC and Russian scientists regarding halibut research in the Bering Sea area (I. Stewart, pers. com). 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[1575], designed to improve coordination between the Council and IPHC. One goal is for better alignment of the two management bodies when dealing with halibut needs among the various directed fishery and bycatch user groups. <u>5.4. The fishery management organizations shall directly, or in conjunction with other States, develop collaborative technical and research programmes to improve understanding of the biology, environment and status of trans-boundary aquatic stocks</u> The only relevant 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 annual Reports of Assessment and Research Activities. <u>5.5. Data generated by research shall be analysed and the results of such analyses published in a way that ensures confidentiality is respected, where appropriate</u> Data collected by scientists from the many surveys and halibut fisheries are analysed and presented in peer reviewed meetings and/or in primary literature, following rigorous and established scientific protocols. Results of these analyses are disseminated in a timely fashion through numerous methods, including scientific publications, and as information on IPHC, NMFS and the NPFMC websites, in order to contribute to fisheries conservation and management. Halibut-specific information for 2020 is documented on the IPHC website page as well as in the stock assessment. Confidentiality of individuals or individual vessels (e.g. in the analysis of fishery CPUE data) is fully respected where necessary. By Alaska Statute (16.05.815 Confidential Nature of Certain Reports and Records)[1677], except for certain circumstances, all records obtained by the state concerning the landing of fish, shellfish, or fishery products and annual statistical reports of fishermen, buyers, and

[15] https://www.npfmc.org/halibut-management-committee/

[16] http://touchngo.com/lglcntr/akstats/Statutes/Title16/Chapter05/Section815.htm

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.
	processors may not be released. To ensure confidentiality, fishery data are routinely redacted from ADFG reports if the data for a time/area stratum were obtained from a small number of participants.
References:	International Pacific Halibut Commission. 2020. Stock Assessment. Website: http://www.iphc.int/uploads/pdf/2021 North Pacific Research Board. Website: http://www.nprb.org/assets/images/uploads/01.10_bsag_web.pdf NOAA Alaska Fisheries 2018 Economic Plan. Website link: https://www.afsc.noaa.gov/refm/stocks/plan_team/2018/economic.pdf International Pacific Halibut Commission. 2018. Annual Report. https://iphc.int/uploads/pdf/ar/iphc-2018-annual-report.pdf Ecosystems & Fisheries-Oceanography Coordinated Investigations Website, IPHC Stock Assessment Survey profile data. Website: https://www.ecofoci.noaa.gov/projects/IPHC/efoci_IPHCData.shtml Alaska Fisheries Science Center. Website: https://access.afsc.noaa.gov/reem/ecoweb/ Halibut Management Committee. Website: https://www.npfmc.org/halibut-management-committee/ Alaska Legal Resource Center, Alaska Statute Title 15, Chapter 5, Section 810. Website link: http://touchngo.com/lglcntr/akstats/Statutes/Title16/Chapter05/Section815.htm
Statement of consistency to the RFM Fishery Standard	The fishery continues to conform to the requirements of Fundamental Cause 5 of the RFM Fishery Standard.

7.9.3 Section C. The Precautionary Approach

7.9.3.1 Fundamental Clause 6

6.	The current state of the stock shall be defined in relation to reference points or relevant proxies or verifiable substitutes allowing for effective management objectives and targets. Remedial actions shall be available and taken where reference point or other suitable proxies are approached or exceeded.
Summary of relevant changes:	6.1/6.2/6.3/6.4 States shall determine for the stock both safe targets for management (Target Reference Points) and limits for exploitation (Limit Reference Points), shall measure the status of the stock against these reference points and agree to actions to be undertaken if reference points are exceeded. 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. 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 rates 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*.

6.	**The current state of the stock shall be defined in relation to reference points or relevant proxies or verifiable substitutes allowing for effective management objectives and targets. Remedial actions shall be available and taken where reference point or other suitable proxies are approached or exceeded.**
	The IPHC's current interim management procedure specifies a target 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. The IPHC's interim management procedure uses a relative spawning biomass of 30% as a trigger, below which the target fishing intensity is reduced. At a spawning biomass limit of 20%, directed fishing is halted due to the critically low biomass condition. Based on the 2020 assessment, the 2020 fishing intensity is estimated to correspond to an *F48%*, less than the values estimated over the previous several years. This drop in fishing intensity corresponds to the reduction in mortality limits adopted for 2020 and the actual mortality of several sectors totalling less than predicted. Comparing the relative spawning biomass and fishing intensity over the recent historical period provides for an evaluation of trends conditioned on the currently defined reference points via a 'phase' plot. The phase plot for Pacific halibut shows that the relative spawning biomass decreased as fishing intensity increased through 2010, then increased as the fishing intensity decreased through 2016, and has been relatively stable since then.
References:	
Statement of consistency to the RFM Fishery Standard	The fishery continues to conform to the requirements of Fundamental Cause 6 of the RFM Fishery Standard

7.9.3.2 Fundamental Clause 7

7.	**Management actions and measures for the conservation of stock and the aquatic environment shall be based on the precautionary approach. Where information is deficient a suitable method using risk assessment shall be adopted to take into account uncertainty.**
Summary of relevant changes:	7.1. <u>The precautionary approach shall be applied widely to conservation, management and exploitation of living aquatic resources in order to protect them and preserve the aquatic environment</u> The IPHC conducts an annual stock assessment, using data from the fishery-independent setline survey (FISS), the commercial Pacific halibut and other fisheries, as well biological information from its research program. Data sources are updated each year to reflect the most recent scientific information available for use in management decision making[1783]. The most recent stock assessment was published in December 2020 and relied on an ensemble of four population dynamics models to estimate the probability distributions describing the current stock size, trend, and demographics. The ensemble is designed to capture both uncertainty related to the data and stock dynamics (due to estimation) as well as uncertainty related to our understanding of the way in which the Pacific halibut stock functions and is best approximated by a statistical model (structural uncertainty). Stock assessment results are then used as inputs for harvest strategy calculations. The data and assessment models used by the IPHC are reviewed by the IPHC's Scientific Review Board comprised of non-IPHC scientists who provide an independent scientific review of the stock assessment data and models and provide recommendations to IPHC staff and to the Commission. Independent peer

[17] https://www.iphc.int/management/science-and-research/stock-assessment

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

review did not find major issues with the stock and the NMFS stated that the IPHC's data and assessments models constitute best available science[1884].

Alternative harvest options and the associated risks to the stock and fishery is presented below.

Table 6. Harvest decision table for 2020. Columns correspond to yield alternatives and rows to risk metrics. Values in the table represent the probability, in "times out of 100" (or percent chance) of a particular risk (source: Dec. 2020 IPHC Stock Assessment

2021 Alternative				3-Year Surplus		Status quo		*Reference* $F_{43\%}$				
Total mortality (M lb)			0.0	25.7	36.8	37.9	39.1	40.3	41.5	42.9	44.1	61.3	
TCEY (M lb)			0.0	24.4	35.5	36.6	37.8	39.0	40.3	41.6	42.8	60.0	
2021 fishing intensity			$F_{100\%}$	$F_{98\%}$	$F_{46\%}$	$F_{45\%}$	$F_{44\%}$	$F_{43\%}$	$F_{42\%}$	$F_{41\%}$	$F_{40\%}$	$F_{39\%}$	
Fishing intensity interval			--	39-76%	29-65%	29-64%	28-63%	27-62%	26-61%	26-60%	25-59%	18-49%	
Stock Trend (spawning biomass)	in 2022	is less than 2021	<1	42	61	62	64	65	66	67	69	82	a
		is 5% less than 2021	<1	7	32	34	36	39	41	44	46	66	b
	in 2023	is less than 2021	<1	51	62	63	64	65	66	67	69	81	c
		is 5% less than 2021	<1	32	53	54	55	56	57	59	59	74	d
	in 2024	is less than 2021	<1	50	60	61	62	63	64	66	67	80	e
		is 5% less than 2021	<1	40	55	56	57	57	58	59	60	74	f
Stock Status (Spawning biomass)	in 2022	is less than 30%	29	35	39	40	40	41	41	42	42	47	g
		is less than 20%	<1	<1	<1	<1	1	1	1	1	1	4	h
	in 2023	is less than 30%	23	32	39	40	40	41	42	43	43	49	i
		is less than 20%	<1	<1	2	2	3	3	4	5	5	19	j
	in 2024	is less than 30%	12	29	38	39	40	41	42	43	44	50	k
		is less than 20%	<1	<1	4	5	6	8	9	10	12	25	l
Fishery Trend (TCEY)	in 2022	is less than 2021	0	17	48	49	50	50	50	51	51	77	m
		is 10% less than 2021	0	6	41	44	46	48	49	50	50	63	n
	in 2023	is less than 2021	0	21	49	50	50	50	50	51	51	75	o
		is 10% less than 2021	0	11	45	47	48	49	50	50	50	64	p
	in 2024	is less than 2021	0	23	49	50	50	50	50	51	51	74	q
		is 10% less than 2021	0	13	47	48	49	49	50	50	50	64	r
Fishery Status (Fishing intensity)	in 2021	is above $F_{43\%}$	0	15	48	49	50	50	50	51	51	78	s

The 96th Session of the IPHC Annual Meeting (AM096) was held in from 3 to 7 February 2020 and determined mortality and fishery limits. The Commission recommended to the governments of Canada and the United States of America a total mortality limit for 2020 of 16,601 tonnes (36.60 million pounds) net weight with Regulatory Area -specific allocation

[18] https://www.federalregister.gov/documents/2019/03/14/2019-04714/pacific-halibut-fisheries-catch-sharing-plan

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

Table 7. Adopted mortality limits (net weight) from AM096

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

7.2 For new and exploratory fisheries, procedures shall be in place for promptly applying precautionary management measures, including catch or effort limits.
This clause is not applicable for this fishery. The halibut fisheries in the US and Canada are under the overarching management of the IPHC. These are mature fisheries and cannot be considered exploratory, abundance indices are available since 1910 and catch data since 1890. Current management measures and their performance have been presented in detail under Fundamental clause 4, 5, 6, 7 and 8

References:

International Pacific Halibut Commission, Harvest Strategy Policy. Website link: https://iphc.int/the-commission/harvest-strategy-policy

Website: https://www.federalregister.gov/documents/2019/03/14/2019-04714/pacific-halibut-fisheries-catch-sharing-plan

International Pacific Halibut Commission, 2019.
Website: https://www.iphc.int/uploads/pdf/contract/iphc-2019-consultant-02.pdf

International Pacific Halibut Commission Research and Stock Assessment Summary.
Website: https://www.iphc.int/management/science-and-research/stock-assessment

Federal Register, Pacific Halibut Catch Sharing Plan.
Website: https://www.federalregister.gov/documents/2019/03/14/2019-04714/pacific-halibut-fisheries-catch-sharing-plan

Statement of consistency to the RFM Fishery Standard	The fishery continues to conform to the requirements of Fundamental Cause 7 of the RFM Fishery Standard

7.9.4 Section D. Management Measures

7.9.4.1 Fundamental Clause 8

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 be based upon verifiable evidence and advice from available scientific and objective, 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 the objective of optimum utilization, and be based on verifiable and objective scientific and/or traditional sources. In the evaluation of alternative conservation and management measures, their cost-effectiveness and social impact shall be considered. The management of the fishery is geared towards long-term sustainability, and is primarily based on the IPHC's interim management procedure, which targets to maintain the total mortality of halibut across its range from all sources based on a reference level of fishing intensity so that the Spawning Potential Ratio (SPR) is equal to 46%[19]. The previous harvest strategy was revoked, in recognition of the development process of the management strategy evaluation. In previous years, the harvest policy was 20% of the coastwide exploitable biomass when the spawning biomass is estimated to be above 30% of the level defined as unfished. Currently, the reference fishing intensity of F46 percent SPR seeks to allow a level of fishing intensity that is expected to result in approximately 46 percent of the spawning stock biomass per recruit compared to an unfished stock with zero fishing mortality). Overall, the 2020 spawning biomass is currently estimated to be 194 million pounds (87,850 tonnes), which is 32 percent of unfished levels, as defined by the IPHC's interim harvest strategy policy[20]. The 16th Session of the International Pacific Halibut Commission (IPHC) Management Strategy Advisory Board (MSAB016) was held in an electronic format (remote participation), from 19-22 October 2020. The MSAB RECOMMENDED that the performance metrics related to the current primary objectives (Appendix VI) be considered when evaluating MPs. MSAB016-Rec.2 (para. 53) The MSAB RECOMMENDED the following MPs for analysis and consideration in 2021: a) MP-J in combination with a fixed TCEY of 1.65 Mlbs in Regulatory Area 2A, as in paragraph 97 b) of IPHC-2020-AM096-R, with total mortality rebalanced among remaining U.S.A. IPHC Regulatory Areas to maintain a constant SPR; c) MP-J in combination with a minimum TCEY of 1.65 Mlbs in Regulatory Area 2A which allows the TCEY to exceed 1.65 in IPHC Regulatory Area 2A with total mortality rebalanced among remaining U.S.A. IPHC Regulatory Areas to maintain a constant SPR.

[19] https://www.federalregister.gov/documents/2019/03/14/2019-04714/pacific-halibut-fisheries-catch-sharing-plan

[20] https://iphc.int/uploads/pdf/am/2020am/iphc-2020-am096-09.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 be based upon verifiable evidence and advice from available scientific and objective, traditional sources.**

Aside from the harvest strategy, all key management measures are listed in the Pacific Halibut Fishery Regulations for 2021 . The main difference from the 2021 regulations are the catch limits for the 2020 commercial fishery, which are shown in (Table 8):

Table 8. Distributed mortality limits (TCEY) (net weight)

IPHC Regulatory Area	Tonnes (t)	Million Pounds (Mlb)
Area 2C (southeastern Alaska)	2,631	5.8
Area 3A (central Gulf of Alaska)	6,350	14
Area 3B (western Gulf of Alaska)	1,415	3.12
Area 4A (eastern Aleutians)	930	2.05
Area 4B (central/western Aleutians)	635	1.4
Areas 4CDE (Bering Sea)	1,805	3.98
Total	13,766	30.35

The Pacific Halibut and Sablefish Individual Fishing Quota (IFQ) Program was adopted by the North Pacific Fishery Management Council under Amendment 15 to the Bering Sea and Aleutian Islands Fishery Management Plan and Amendment 20 to the Gulf of Alaska Fishery Management Plan in October 1992. The final rule was published on November 9, 1993.

Fishery regulations for the 2021 season also include vessel licensing, provisions for in-season actions to establish or modify current management measures, seasonal closures per regulatory area , 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 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.

Halibut are routinely taken as incidental catch in federally managed groundfish trawl, hook-and-line, and pot fisheries in the GOA and BSAI. Interception of juvenile and adult halibut occurs in trawl fisheries targeting groundfish species (such as rockfish, flatfish, pollock, and Pacific cod). Incidental catch of halibut also occurs in groundfish hook-and-line and pot fisheries that typically focus on Pacific cod93. Regulations require that all halibut caught incidentally in these groundfish fisheries must be discarded, regardless of whether the fish is living or dead. Halibut catch is controlled in the groundfish fisheries using prohibited species catch (PSC) limits94in the GOA and the BSAI. The NPFMC is in the process of amending the current PSC limits for halibut (further information below).

Observers and EM systems collect fishery-dependent information used to estimate total catch and interactions with protected species. Managers use these data to manage groundfish and PSC within established limits and to document and reduce fishery interactions with protected resources. Scientists use fishery-dependent data to assess fish stocks, to provide scientific information for fisheries and ecosystem research and fishing fleet behavior, to assess marine mammal interactions with fishing gear, and to assess fishing interactions with habitat. Each year, the Annual Deployment

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 be based upon verifiable evidence and advice from available scientific and objective, traditional sources.**	
		Plan (ADP) describes the science-driven method for deployment of observers on vessels in the partial coverage category (50 CFR 679.51(a)) in the halibut and groundfish fisheries off Alaska. The North Pacific Observer Program 2018 Annual Report offered a number of highlights relevant to the halibut fisheries95: • 2018 was the first year that EM was integrated into the Observer Program under regulations. NMFS approved 141 vessels in the 2018 EM selection pool and approved a Vessel Monitoring Plan (VMP) for 134 vessels (the other 7 boats in EM selection pool did not submit a VMP). • For all federal fisheries off Alaska, 4,423 trips (41.6%) and 492 vessels (45.4%) were monitored by either an observer or EM system in 2018. • The overall coverage levels (i.e. all catch and catcher-processor vessels) for hook and line fisheries in the GOA where 22% for retained catch and 18% for discarded catch, while in the BSAI these figures were higher at 98% for retained catch and 94% for discarded catch. Halibut vessels in Alaska are required to use of seabird avoidance measures (e.g. paired and single streamer lines), which have reduced seabird bycatch four-fold100. They are required to be used by operators of all vessels greater than 26 feet in length overall using hook-and-line gear. Other than noted above, vessel operators using hook-and-line gear and fishing for groundfish in waters off the state of Alaska must refer to seabird avoidance measures in state regulations (5AAC 28.055). No changes have occurred to this requirement since 2009. 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 and crab fisheries off Alaska. Using the NEPA process, 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[21]. 8.2. States shall prohibit dynamiting, poisoning and other comparable destructive fishing practices. 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 regulations published at 50 CFR Part 679[22]. 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. 8.3. States shall seek to identify domestic parties having a legitimate interest in the use and management of the fishery. The IPHC currently apportions the quota shares for the halibut fishery among commercial, sport and personal use subsistence sectors coastwise in the US and Canada. 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[23]. 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.

[21] https://www.epa.gov/nepa/what-national-environmental-policy-act
[22] https://www.ecfr.gov/cgi-bin/text-idx?SID=0cc954068b4cef56066a93c0ecbd605f&mc=true&node=pt50.13.679&rgn=div5#se50.13.679_124
[23] http://www.adfg.alaska.gov/index.cfm?adfg=halibut.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 be based upon verifiable evidence and advice from available scientific and objective, traditional sources.**

There are two main channels used in Alaska to identify and involve parties having a legitimate interest in the use and management of fisheries. One is through the IPHC and the other through NPFMC processes.

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. As of 2019 there were 79 representative members and two officers in the CB.

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

Other Boards existing within IPHC include the Management Strategy Advisory Board (MSAB), the Research Advisory Board (RAB), and a Scientific Review Board (SRB). These are shown in (Figure 3).

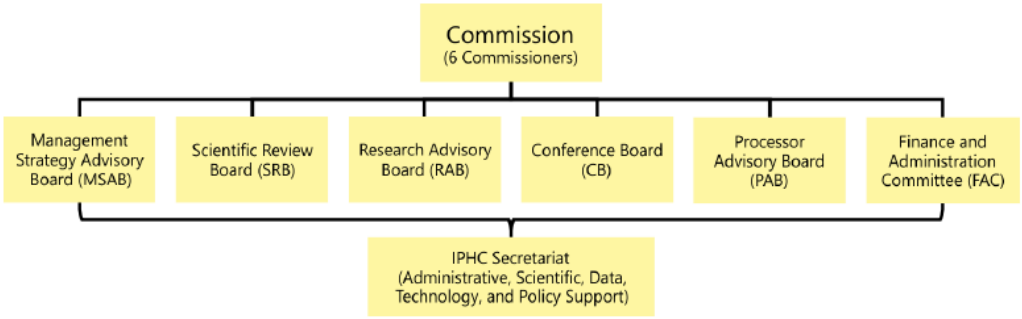


Figure 3. Structure of IPHC Boards

8.4. Mechanisms shall be established where excess capacity exists, to reduce capacity. Fleet capacity operating in the fishery shall be measured. States 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.

The Halibut fishery in Alaska is a closed access fishery managed using an IFQ system. The number of vessels participating in the fleet has decreased significantly since implementation of the IFQ program in the mid 1990's[24]. 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[25]. NMFS monitors allocations and subsequent landings.

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 halibut was about 4%, with 863 active vessels in the halibut IFQ fishery in 2016, compared to 2060 in 1995 (Fissel et. al 2017). This demonstrates a clear ability to control and reduce capacity as necessary.

[24] https://www.sciencedirect.com/science/article/pii/S0165783616300649
[25] https://www.fisheries.noaa.gov/alaska/commercial-fishing/pacific-halibut-and-sablefish-individual-fishing-quota-ifq-program

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 be based upon verifiable evidence and advice from available scientific and objective, traditional sources.**	
		8.5. Technical measures shall be taken into account, where appropriate, in relation to: fish size, mesh size or gear, closed seasons, closed areas, areas reserved for particular (e.g. artisanal) fisheries, protection of juveniles or spawners. Updated IPHC regulations covering the directed halibut fisheries (commercial and sport) in 2021 can be found on the IPHC website[26]. The full suite of NMFS fishery regulations for Alaskan waters can be found on their website[27]. Concerning specific technical measures, a brief summary by category, as contained in these IPHC regulations, is show below. Fishery regulations for the 2021 season 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. For further information on each of these technical and other management measures, refer to the 2021 Pacific Halibut Regulations on the IPHC website[28]. Incidental halibut catch is controlled in the groundfish fisheries (i.e. non halibut-sablefish IFQ fisheries) using PSC limits[29]in the GOA and the BSAI. The NPFMC is in the process of amending the current PSC limits for halibut. Areas closed to halibut fishing are defined in IPHC regulations and include certain specific waters in the Bering Sea in Isanotski Strait (note recommendation for revision during RAB020 meeting119). A large number of areas in GOA and BSAI waters are closed to trawling (and thus to halibut bycatch outside the directed fisheries). Details on these closures set up to for habitat protection are available on the NPFMC website[30]. 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[31]. 8.6. Fishing gear shall be marked. The 2021 IPHC gear regulations[32] 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.

[26] https://www.iphc.int/uploads/pdf/regs/iphc-2021-regs.pdf
[27] https://www.ecfr.gov/cgi-bin/text-idx?SID=e928699f8903a416bed34b9bcaae6903&mc=true&node=pt50.13.679&rgn=div5
[28] https://www.iphc.int/uploads/pdf/regs/iphc-2021-regs.pdf
[29] https://www.npfmc.org/bsai-halibut-bycatch/
[30] https://www.npfmc.org/habitat-protections/
[31] https://www.npfmc.org/habitat-protections/gear-modifications/
[32] https://www.iphc.int/uploads/pdf/regs/iphc-2021-regs.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 be based upon verifiable evidence and advice from available scientific and objective, traditional sources.**
	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 NMFS Federal Fishery Register halibut catch sharing plan regulation published in April 2021[33]. 8.7. Measures shall be introduced to identify and protect depleted resources and those resources 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 resources which have been adversely affected by fishing or other human activities are restored. The most recent stock assessment was published in January 2020 and relied on an ensemble of four population dynamics models to estimate the probability distributions describing the current stock size, trend, and demographics. A comparison of the median 2019 ensemble SB estimate to reference levels specified by the IPHC's interim management procedure suggests that the stock is currently (in 2020) at 32% of unfished levels (approximate 95% credible range = 22-46%), compared to 43% in 2019. The probability that the stock is below the SB30% level is estimated to be 46%, with less than a 1% chance that the stock is below SB20%[34]. The IPHC adopted catch limits for 2020 totaling 36,600,000 lb (16601.480742mt) coastwide, corresponding to a fishing intensity of F46%, which is slightly less conservative than the interim reference level of F47%[35]. The halibut resource is not considered depleted. Management measures detailed in previous clauses explain the various management measures in place, including the interim management procedure, implemented to ensure the halibut stock remains productive and to ensure its sustainable management and conservation, as per IPHC's fisheries management objectives. The IPHC is in the process of formulating a more formal harvest strategy containing reference points and harvest rules, as specified in the Management Strategy Advisory Board (MSAB013) meeting held in May 2019 (see table 1 in the meeting report document[36]). Currently IPHC is investigating management procedures related to the distribution of the Total Constant Exploitation Yield (TCEY). The TCEY is the mortality limit composed of mortality from all sources except under- 26-inch (66.0 cm, U26) non-directed discard mortality, and is determined by the Commission at each Annual Meeting for each IPHC Regulatory Area[37]. In terms of habitats, there are significant closures in the Bering Sea, Aleutians and the Gulf Alaska, coupled to modified sweeps requirements for demersal trawl gear, that together limit potential habitat impacts that could negatively affect the halibut stock in Alaska[38]. Furthermore, considering that the halibut fishery is a hook and line fishery, habitat effects of this specific gear is considered quite small. 8.8/8.9/8.10/8.11/8.12/8.13. States shall encourage the development and implementation of technologies and operational methods that reduce waste and discards and reduce the loss of fishing gear. The implications of the introduction of new fishing gears, methods and operations shall be

[33] https://www.federalregister.gov/documents/2021/04/21/2021-08242/pacific-halibut-fisheries-catch-sharing-plan
[34] https://iphc.int/uploads/pdf/am/2020am/iphc-2020-am096-09.pdf
[35] https://www.federalregister.gov/documents/2020/03/13/2020-05228/pacific-halibut-fisheries-catch-sharing-plan
[36] https://www.iphc.int/uploads/pdf/msab/msab13/iphc-2019-msab013-r.pdf
[37] https://iphc.int/uploads/pdf/am/2020am/iphc-2020-am096-12.pdf
[38] https://www.npfmc.org/habitat-protections/

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 be based upon verifiable evidence and advice from available scientific and objective, traditional sources.**
	assessed and the effects of such introductions monitored. New developments shall be made available to all fishers and shall be disseminated and applied appropriately. 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 2021 fishing regulations state the following[39]: 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. Since 1990, Pacific halibut bycatch management of U.S.A. domestic groundfish fisheries in Alaska has principally been conducted through the use of limits to the annual amount of Pacific halibut bycatch mortality in both the GOA and the BSAI. Once these PSC limits are reached, fisheries are closed. Except for other longline fisheries for which the harvester holds individual quota shares for Pacific halibut, any Pacific halibut encountered by these other groundfish fisheries must be returned to the sea as quickly as possible with a minimum of injury, under the IPHC fishery regulations. Discard mortality rates (DMRs) are estimates of the proportion of incidentally captured Pacific halibut (by both directed and non-directed fisheries) that do not survive after being returned to the water. The magnitude of discard mortality varies according to both the capture and release methods. 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[40]. In late 2020, a final report was provided for NPFMC consideration on a halibut deck-sorting experimental fishing permit (EFP), authorized by NMFS to better elucidate the mortality rate of discarded halibut. The report highlighted increased vessel participation (22 CP vessels in 2019) in the study, and that average discard mortality from 2015-2019 was averaging 49.5[41]. In terms of bycatch of halibut in trawl fisheries, the groundfish trawl industry in Alaska have deployed halibut excluder devices in their gear with success. The NMFS, in collaboration with the Pacific States Marine Fisheries Commission (PSMFC) and the Alaska Whitefish Trawlers Association, tested the efficacy of a flexible sorting grate bycatch reduction device (BRD) designed to reduce halibut bycatch[42]129. The results showed that halibut bycatch was reduced numerically by 57% and by 62% by weight. Target species loss ranged from 9% to 22%.

[39] https://iphc.int/uploads/pdf/regs/iphc-2021-regs.pdf
[40] https://iphc.int/management/science-and-research/biological-and-ecosystem-science-research-program-bandesrp/-bandesrp-discard-mortality-and-survival
[41] https://media.fisheries.noaa.gov/dam-migration/efp-halibut2018-01-final-rpt.pdf
[42] http://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 be based upon verifiable evidence and advice from available scientific and objective, traditional sources.**
	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. Since the implementation of the quota share (IFQ) fisheries, the amount of halibut fishing gear deployed has been reduced significantly, and therefore lost gear is much less common in the fishery of recent years. Under the IFQ program, there is also more incentive for fishermen to retrieve any lost gear, as it does not result in reduced income, and decreases gear replacement costs. Under IPHC regulations, vessels fishing for halibut in Alaska must record the amount and location of all fishing gear deployed, including any lost gear (see article 17, 2nd para, IPHC 2021 Regulations). There is no evidence that regulations involving gear selectivity are being circumvented either by omission, or through the illegal use of gear technology. Advancements or developments in gear are made widely available to fishers through websites and public meetings and other forms of communication. New fishing gears have seldom been allowed for halibut fishing, where longline is been the de facto fishing method of catching halibut under IPHC management. However, since January 2017, Amendment 101 to the Fishery Management Plan for Groundfish of the Gulf of Alaska authorizes the use of longline pot gear in the GOA sablefish IFQ fishery. 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. This final rule also includes regulations developed under the Northern Pacific Halibut Act of 1982 to authorize harvest of halibut IFQ caught incidentally in longline pot gear used in the GOA sablefish IFQ fishery. At their October 2018 meeting, the North Pacific Fishery Management Council (Council) adopted retention of halibut in longline or single pots in the Bering Sea in the halibut and sablefish IFQ fishery. In the October 2018 meeting the NPFMC took final action[43] to allow for: (1) more efficient harvest of the halibut resource by decreasing the wastage of legal-size halibut discarded in the BSAI sablefish pot fishery, and (2) 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. This action includes the following elements[44]: 1) an exemption to the 9-inch maximum width of the tunnel opening on pots, 2) VMS and logbook requirements for all vessels using pot gear to fish IFQ/CDQ, and 3) 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. To the extent practicable, the Council has recommended that halibut fishermen in the BSAI interested in using pot gear under this action consult with crab fishery participants on appropriate crab escape mechanisms to minimize crab bycatch.

[43] http://meetings.npfmc.org/CommentReview/DownloadFile?p=94b0f940-78a1-45d9-bc75-3686b6ccb3a9.pdf&fileName=C4%20Action%20Memo.pdf

[44] https://www.npfmc.org/halibut-in-pots/

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 be based upon verifiable evidence and advice from available scientific and objective, traditional sources.**	
	On January 2020 a NOAA NMFS issued a final rule that implements Amendment 118 to the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area (BSAI FMP)where it Authorize the Retention of Halibut in Pot Gear in the BSAI effective in February 2020[45] As summarized above, these waste, discard and bycatch reduction measures are typically implemented following rigorous scientific study and periods of allowed experimental fishing to test their effectiveness. Many of the studies and subsequent implementation have involved cooperative efforts between researchers at institutions in NMFS, DFO, IPHC, universities, and industry. All the research is published online and is widely available for both review and input through the appropriate channels at the NFMC and the IPHC. More information is also presented in Clause 12 below. NOAA/NMFS published a National Bycatch Reduction Strategy in 2016 [46]which is intended to guide and coordinate efforts to reduce bycatch and bycatch mortality in support of sustainably managing fisheries and recovering and conserving protected species. Statutory bycatch provisions are provided within the Magnuson-Stevens Act, the Marine Mammal Protection Act, and the Endangered Species At. For the purposes of this Strategy, reducing bycatch includes efforts to minimize the amount of bycatch, as well as minimize the mortality, serious injury, and adverse impacts of bycatch that do occur. In addition, reducing bycatch can also include actions that increase utilization of fish that would otherwise be economic discards. Due to the different bycatch issues across NOAA Fisheries' regions and programs, the national-level objectives and actions presented in the 2016 Strategy will be applied to the specific priorities and needs of each region and its fisheries through the implementation plans. The objectives and actions of the Strategy are designed to align ongoing and future regional, national, and international bycatch-related efforts with the overall goal of reducing bycatch and bycatch mortality. As of 2020, detailed implementation plans for Alaska have not yet been developed. 8.14. Policies shall be developed for increasing stock populations and enhancing fishing opportunities through the use of artificial structures. This clause is not applicable. The halibut fishery is not an enhanced fishery.	
References:		
Statement of consistency to the RFM Fishery Standard		The fishery continues to conform to the requirements of Fundamental Cause 8 of the RFM Fishery Standard

[45] https://www.federalregister.gov/documents/2020/01/08/2019-27903/fisheries-of-the-exclusive-economic-zone-off-alaska-authorize-the-retention-of-halibut-in-pot-gear

[46] https://www.fisheries.noaa.gov/national/bycatch/national-bycatch-reduction-strategy

7.9.4.2 Fundamental Clause 9

9.	**Fishing operations shall be carried out by fishers with appropriate standards of competence in accordance with international standards and guidelines and regulations.**
Summary of relevant changes:	9.1./9.2./9.3. Education and training programs. To be eligible to purchase halibut 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[47] in the U.S. There are several avenues for fishermen to receive training to ensure they have appropriate standards of competence. AMSEA provides marine safety training for commercial fishermen[48], 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. 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[49]. 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. 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. 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 Established in 2007 by the Alaska Sea Grant Marine Advisory Program, The Alaska Young Fishermen's Summit (AYFS) 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. In January 2020, the Alaska Sea Grant Marine Advisory Program will present the 8th Alaska Young Fishermen's Summit[50]. All regulations governing the halibut fisheries are available on the IPHC, NPFMC, and NMFS websites, as previously documented. Changes to regulations are considered only after detailed processes which include open and public discussions, and the results of any changes are widely communicated.

[47] https://www.fisheries.noaa.gov/alaska/commercial-fishing/permits-and-licenses-issued-alaska
[48] https://www.amsea.org/commercial-fishermen
[49] https://avtec.edu/department/alaska-maritime-training-center
[50] https://alaskaseagrant.org/event/2020-alaska-young-fishermens-summit/

9.	Fishing operations shall be carried out by fishers with appropriate standards of competence in accordance with international standards and guidelines and regulations.
	Fishermen do attend these meetings and participate in these processes where they input in and become better acquainted with fishery regulations. Data on the number and location of Alaskan of fishers, permits issued, current QS holders and QS units - by species, area, vessel category, blocks, and CDQ compensation flag etc. can be found online at the NMFS website. Data on fishing in state- managed fisheries can be found in the State of Alaska's CFEC website[51]
References:	
Statement of consistency to the RFM Fishery Standard	The fishery continues to conform to the requirements of Fundamental Cause 9 of the RFM Fishery Standard.

7.9.5 Section E. Implementation, Monitoring and Control

7.9.5.1 Fundamental Clause 10

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:	The legal and administrative frameworks that define how the principle 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 clear evidence of an ongoing and effective level of cooperation between all of the agencies that collectively continue to deliver positive conservation and sustainability outcomes for the Pacific halibut resource and the marine environment on which the species depends. 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 rate of effectiveness in monitoring the diverse Pacific halibut fishing fleet that operates within Alaska's EEZ and in applying the significant number of federal and state regulations they are mandated to enforce. The reported annual rate of compliance by fishers has consistently averaged 97-98%, a very high rate that speaks to the effectiveness of the MCS activities carried out by law enforcement personnel. The legal and administrative frameworks that inform the federal and state MCS programs within Alaska's 200 nm EEZ including program assets continued to provide the necessary tools that enforcement officers required to effectively discharge their duties. The compliance level in 2019 and 2020 by fishers and others with the fishery's regulations remained high, proof of the overall effectiveness of the program.
References:	1. Detailed annual enforcement reports provided to the IPHC and the NPFMC for 2019 and 2020 by NOAA-OLE and USCG. 2. Site visit (virtual): May 19, 2021 with AWT official - Lt. Jonathan Streifel.
Statement of consistency to the RFM Fishery Standard	The fishery continues to conform to the requirements of Fundamental Cause 10 of the RFM Fishery Standard.

[51] https://www.cfec.state.ak.us/fishery_statistics/earnings.htm

7.9.5.2 Fundamental Clause 11

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:	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. The purpose of this Policy is to continue to ensure that: (i) civil administrative penalties and permit sanctions are assessed in accordance with the laws that NOAA enforces in a fair and consistent manner; (ii) penalties and permit sanctions are appropriate for the gravity of the violation; (iii) penalties and permit sanctions are sufficient to deter both individual violators and the regulated community as a whole from committing violations; (iv) economic incentives for noncompliance are eliminated; and (v) compliance is expeditiously achieved and maintained to protect natural resources. 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. Strict liability commercial fishing penalties are covered in Section 722. The sanctions frameworks for federal and state statutes appear to be effective in supporting compliance and dissuading violations. Federal and state penal frameworks for fisheries and fisheries-related violations are in effect and are relied upon by law enforcement agents and prosecutors when decisions are required as to charging documents and what remedies to seek when guilt is admitted or proven. In both frameworks, the penalty scales are graduated to reflect the severity of the act. The rate of recidivism under both jurisdictions is believed to be low, probably about 1-2%. This suggests that the prevailing penalties and sanctions provisions are adequate to support compliance and discourage violations.
References:	1. Policy for the Assessment of Civil Administrative Penalties and Permit Sanctions NOAA Office of General Counsel - Enforcement Section: https://www.gc.noaa.gov/documents/Penalty-Policy-CLEAN-June242019.pdf 2. Alaska misdemeanor commercial fisheries penalties: http://www.touchngo.com/lglcntr/akstats/Statutes/Title16/Chapter05.htm 3. Alaska strict liability commercial fishing penalties: http://www.touchngo.com/lglcntr/akstats/Statutes/Title16/Chapter05/Section722.htm
Statement of consistency to the RFM Fishery Standard	The fishery continues to conform to the requirements of Fundamental Cause 11 of the RFM Fishery Standard.

7.9.6 Section F. Serious Impacts of the Fishery on the Ecosystem

7.9.6.1 Fundamental Clause 12

12.	**Considerations of fishery interactions and effects on the ecosystem shall be based on best available science, local knowledge where it can be objectively verified and using a risk based management approach for determining most probable adverse impacts. Adverse impacts on the fishery on the ecosystem shall be appropriately assessed and effectively addressed.**
Summary of relevant changes:	12.1. Assessment of environmental effects on target stocks and ecosystem The impacts of environmental factors on halibut and other fish or non-fish species associated or dependent upon them continue to be assessed appropriately by the IPHC, NMFS/NPFMC and ADFG. IPHC scientists recognized in the late 1990s that monitoring environmental conditions coincident with catch might eventually contribute clarity to the stock assessment and aid in the evaluation of harvest strategies. Every year, as part of the IPHC fishery-independent setline survey (FISS), the IPHC has conducted oceanographic monitoring by deploying water column profilers at more than 1,200

12.	**Considerations of fishery interactions and effects on the ecosystem shall be based on best available science, local knowledge where it can be objectively verified and using a risk based management approach for determining most probable adverse impacts. Adverse impacts on the fishery on the ecosystem shall be appropriately assessed and effectively addressed.**
	fishery-independent setline survey stations coastwide from northern California to the Gulf of Alaska and into the Bering Sea and Aleutian Islands. The Gulf of Alaska tends to experience cooler temperatures, higher dissolved oxygen, higher pH, and lower salinity than the west coast region. In the Bering Sea, Pacific halibut are found over a broad area from inner Bristol Bay to the shelf edge, but in most years, the survey covers only the shelf edge and habitat around the Pribilof Islands and St. Matthew Island as well as both the north and south sides of the Aleutian Island chain. The monitored habitat is characterized by much cooler temperatures, high dissolved oxygen concentration except at very deep stations, pH similar to the Gulf of Alaska (but higher than the west coast), and intermediate salinity, i.e. lower than the west coast region but higher than the Gulf of Alaska. The 2020 IPHC stock assessment[52] lists some of the key environmental conditions affecting Pacific halibut abundance and highlights that based on the two long time-series models, average Pacific halibut recruitment is estimated to be higher (70 and 56% for the coastwide and AAF models respectively) during favorable Pacific Decadal Oscillation (PDO) regimes, a widely used indicator of productivity in the north Pacific. Historically, these regimes included positive conditions prior to 1947, poor conditions from 1947- 77, positive conditions from 1978-2006, and poor conditions from 2007-13. Annual averages from 2014 through October 2018 have been positive; however, many other environmental indicators, current and temperature patterns have been anomalous relative to historical periods and therefore historical patterns of productivity related to the PDO may not be relevant to the most recent few years. Furthermore, in 2019, the IPHC published the 5-year Biological and Ecosystem Sciences Research Program Update[53]. The main objectives are to: 1) identify and assess critical knowledge gaps in the biology of the Pacific halibut; 2) understand the influence of environmental conditions; and 3) apply the resulting knowledge to reduce uncertainty in current stock assessment models. The primary biological research activities at the IPHC that follow Commission objectives are identified and described in the Five-Year Research Plan for the period 2017-21. These activities can be summarized in five broad categories: 1) Migration, 2) Reproduction, 3) Growth and Physiological Condition, 4) Discard Mortality Rates (DMRs) and Survival, and 5) Genetics and Genomics, and have been selected for their important management implications. Some of these studies include: somatic growth processes in the Pacific halibut and their response to temperature, density and stress manipulation effects (NPRB Award No. 1704), adapting Towed Array Hydrophones to support information sharing networks to reduce interactions between sperm whales and Longline Gear in Alaska, and use of LED artificial illumination to reduce Pacific halibut catches before trawl entrainment, among others. The NMFS' Alaska Fisheries Science Center also publishes yearly Ecosystem Status Reports that provide links between ecosystem research and fishery management. Key findings from the 2020 status reports are briefly summarized below[54].

[52] https://iphc.int/uploads/pdf/sa/2021/iphc-2021-sa-01.pdf

[53] https://www.iphc.int/uploads/pdf/am/2019am/iphc-2019-am095-14.pdf

[54] https://apps-afsc.fisheries.noaa.gov/refm/docs/2020/sablefish.pdf

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	Noting that larval Pacific halibut feed mainly on zooplankton while adults aggressively prey on a variety of groundfish, sculpins, sand lance, herring, octopus, crabs, clams, and occasionally smaller Pacific halibut, environmental conditions have an effect on the halibut resource and on other associated species in the ecosystem. **Bering Sea** Following two years of physical oceanographic perturbations, the eastern Bering Sea experienced a return to near-normal climatic conditions in 2020. The winters of 2017/2018 and 2018/2019 had unprecedentedly low sea ice and reduced spatial extent of the cold pool, removing the thermal barrier between the southern and northern Bering Sea shelves. Distributional shifts in groundfish stocks were observed (e.g., more than 50% of the overall biomass of Pacific cod biomass occurred in the northern Bering Sea in 2018). Ecosystem impacts in response to these conditions include changes in overall productivity and the potential for new trophic pathways. Considerable cooling during winter2019/2020 allowed for rapid build-up of sea ice, exceeding median ice extent in parts of February and March 2020. However, ice thickness was low, and retreated quickly in spring. This ephemeral ice was sufficient to form a cold pool of average spatial extent, but above-average sea surface temperatures returned in spring and remained above average through summer 2020. The southeastern and northern Bering Sea are experiencing a persistent warm stanza, greater in both magnitude and duration than that of the early 2000s. Data and Information Mitigation Strategies. During 2020, the vast majority of NOAA Fisheries surveys were canceled in the eastern and northern Bering Sea due to COVID-19 travel restrictions. This was an on-year for the biennial NOAA ecosystem and acoustics surveys, in addition to annual trawl surveys, therefore numerous contributions of ecosystem information for this Report were unable to be updated this year. While gaps exist throughout the Report (e.g., forage fish), NOAA scientists, state/university partners, tribal governments, and coastal community members provided new and innovative contributions to inform our understanding of the current ecosystem state. The Bering 10K Regional Ocean Modeling System (ROMS**)** hindcast simulation provided critical information of bottom water conditions over the Bering Sea shelf in 2020. First, the evolution of modeled bottom temperatures between November of the previous year through the beginning of August placed 2020 in historical context as an 'average' year in terms of <2°C and <0°C waters in the standard bottom trawl survey area and spatial extent of the cold pool. Second, a new indicator of ocean acidification, based on Ωarag undersaturation, estimates the percent of the Bering Sea shelf where bottom waters are corrosive. This operationalizing of the ROMS model has great potential for the Ecosystem Status Report (ESR) as well as groundfish and crab Ecosystem and Socio-economic Profiles (ESPs). Satellite-derived indicators were developed this year to better describe and understand oceano-graphic conditions. Sea surface temperature is a foundational metric; new analyses presented in 2020 may help to identify mechanisms or critical periods through which SST has the greatest impacts on Bering Sea ecosystem and fisheries. As an example, the accumulation of SST throughout the year provides a better understanding of the annual thermal exposure experienced by the system. Marine heatwave thresholds were defined and demonstrate that recent heatwaves have been persistent and intense. Heatwaves occurred during early years of the time series, but the frequency and durations have increased dramatically, especially in the northern Bering Sea, where residual heat and low sea ice extent resulted in dramatically increased cumulative annual thermal exposure.

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		The 2020 Eastern Bering Sea ESR includes the Integrated Seabird Information section and the Physical Environment Synthesis, both intended to incorporate information from a variety of knowledge sources and provide comprehensive overviews and implications for fisheries management. In fact, the U.S. Fish and Wildlife Service was unable to conduct seabird research in the eastern and northern Bering Sea in 2020 due to COVID-19 travel restrictions. Coastal community members, tribal governments, and state/university partners provided all information on seabird dynamics for this Report and the U.S. Fish and Wildlife biologists helped to synthesize this information and provide implications. Bridging Across Gaps Due to survey limitations in 2020, the contributions received ranged from basin-scale, satellite derived indicators to local-scale community observations. The mesoscale patterns gleaned from comprehensive shelf-wide surveys were absent. Trophic gaps in information occurred, as well. For example, for 2020, no indicators from zooplankton to adult fish were available. The interpretation of the current ecosystem state bridges across these gaps and hinges on existing understanding of mechanistic relationships and dynamics in the eastern Bering Sea. Tracking the seasonal progression and retreat of sea ice over the shelf highlights the interactive roles of water temperature (i.e., residual warmth in the system) and winds. Late arrival of sea ice is more and more common with a strong negative linear trend of early ice (Oct–Dec) over the past 40 years. Delayed freeze-up leads to shortened ice seasons that has impacts on ice thickness, ice algae, and thermal modulation as well as impacts to transportation and subsistence activities. After two years of little to no sea ice over the Bering Sea shelf, the near-normal ice extent observed in 2020 appeared to have only minimal mitigating effects on the warmth in the upper water column (i.e., sea surface temperatures), but did result in an 'average' cold pool extent. This vertical stratification of the water column is more typical of shelf conditions and affects predator/prey dynamics. Chlorophyll-a concentrations were lower in 2020 than 2019 in all regions except the southern outer domain. Chl-a concentrations over the southern inner and middle shelves have been below average since 2016. In the northern Bering Sea, the concentrations over the inner and middle shelves were below average and the outer shelf was low and continued a decreasing trend since 2014. Primary producers provide fundamental energy and nutrients for zooplankton grazers and higher trophic level species; these trends indicate lower energy transfer to support the food web over the southern and northern Bering Sea shelves in 2020. The timing of the peak spring bloom in 2020 was earlier than the long-term average; for the southern inner and middle shelves it occurred about a week earlier. This contrasts with 2018 which was among the latest while 2017 was among the earliest spring blooms. The coccolithophore bloom index was below average in 2018 and 2019 but increased, particularly on the middle shelf, in 2020. Coccolithophores may be a less desirable food source for microzooplankton in this region and smaller coccolithophores result in longer trophic chains. The striking milky aquamarine color of the water during a coccolithophore bloom can also reduce foraging success for visual predators. Combined, these indicators of primary production suggest limited and/or poor quality of the prey base to support trophic energy transfer (e.g., juvenile fish, seabirds) in 2020. The 2020 Togiak herring population is predominantly comprised of age-6 and age-7 fish (the 2013- and 2014-year classes). The 2014-year class remains the largest estimated recruitment since 1982. Oceanographic conditions over the southeastern Bering Sea shelf transitioned from below-average (i.e., cold) in 2013 to above-average (i.e., warm) in 2014 and neither year experienced temperatures that exceeded the marine heatwave threshold. While the recruitment of age-4 fish to the spawning population in 2018 was still the largest estimated recruitment since 1982, the magnitude of that recruit class was estimated in the 2020-forecast model to be lower than was previously estimated.

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	2018 was above-average (i.e., warm) with little cooling effect from sea ice and just over 200 days that exceeded the marine heatwave threshold. Preliminary data from ADF&G for 2020 commercial salmon harvests indicate that statewide total harvests are below the preseason forecast but nearing the 2018 total harvest (as of 22 Sept 2020). The 2020 Bristol Bay salmon inshore run was the 5th largest on record and 74.5% higher than the 1963–2019 average. The current period of high Bristol Bay sockeye salmon production now exceeds the previous high production stanza that occurred 1989–1995. A projected decrease in the number of pink salmon in 2020 could have a positive impact on fish-eating seabirds (i.e., less prey competition). In 2020, at the Pribilof Islands, seabird attendance appeared similar to recent years while breeding observations suggest that it was an average, to slightly below average, year for most fish-eating species (e.g., kittiwakes, murres). Planktivorous species (i.e., auklets) have been declining in recent years and continued to be low in 2020, at least for St. Paul Island. Warmer water temperatures from 2014–2019 seem to have negatively affected least auklets, and likely parakeet auklets, as evidenced by declines in reproductive success and colony attendance. In the northern Bering Sea, on St. Lawrence Island, reproductive success and colony attendance differed among fish-eating and planktivorous seabirds suggesting foraging impacts across trophic levels. In the Bering Strait region, emaciation and starvation were observed in some individuals throughout the summer and beach-cast carcasses of several species of seabirds were observed on the eastern and western sides of the Bering Strait. Direct and indirect indicators of groundfish recruitment success provide information on the status of recent year classes. The 2020 springtime drift pattern was mixed, indicating larvae (e.g., pollock) may have be retained over the southern middle shelf. Lower primary production in this region may limit the prey base to support trophic energy transfer to large, lipid-rich copepod taxa (i.e., Calanus spp.). The 2019 pollock year class experienced unfavorable temperature conditions from age-0 to age-1 and is predicted to have below-average recruitment to age-4 in 2023. Concurrently, low abundance of large copepods during late-summer in 2017–2019 indicate poor overwinter survival and recruitment to age-3 in 2020–2022. Recent years of low recruitment for pollock have resulted in lower rates of cannibalism. The climate-enhanced multispecies model (CEATTLE) estimates of age-1 predation mortality for pollock is at the long-term mean as declines in total predator biomass are contributing to reduced predation rates and mortality. **Aleutian Islands** This year, due to the COVID-19 pandemic, most surveys and fieldwork were cancelled, so there are no biological indicators updated for 2020. The new information in this assessment is largely from remote-sensing, updated analysis of 2019 data, and local observations. Whenever possible we included data for 2019 as an update from the previous 2018 Aleutian Islands Ecosystem Status Report. Cancelled surveys and data streams include: 1. AFSC AI 2020 biennial bottom trawl survey, which provides data for: (a) Aleutian Islands Trawl Survey Water Temperature Analysis (b) Jellyfish in the Bottom Trawl Survey (c) Aleutian Islands Groundfish Condition (d) Distribution of Rockfish Species in the Aleutian Islands (e) Miscellaneous Species in the Aleutian Islands (f) Stability of Groundfish Biomass in the Aleutian Islands (g) Mean Length of the Fish Community in the Aleutian Islands (h) Mean Lifespan of the Fish Community in the Aleutian Islands 2. AMNWR seabird monitoring, which provides data for:

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	(a) Hatching dates at Buldir and Aiktak (b) Reproductive success at Buldir and Aiktak (c) Seabird diets—tufted puffin chicks diets (d) Seabirds die-offs (contribute data to overall dataset) 3. AFSC Steller sea lion surveys, which provides data for: (a) Counts of non-pups at rookeries and haul-outs (b) Counts of pups at rookeries and haul-outs 4. COASST year-round citizen scientists surveys, which provide data for: (a) Seabird die-offs (b) Beached bird relative abundance 5. Fish and Wildlife Survey periodic sea otter survey that was planned this year. During 2019–2020, the state of the North Pacific atmosphere-ocean system featured the continuance of warm sea surface temperature anomalies in the Gulf of Alaska with an almost year-long marine heat wave in 2019 that decreased significantly towards the west, with subsurface warmer temperatures throughout the chain that reached the western Aleutians. Bottom trawl survey temperatures from 2019 support model results from the Global Ocean Data Assimilation System that show the persistence of subsurface warmer temperatures in the 100–250 m deep layer that have stayed statistically above the long-term mean. The warm temperatures can be attributed in part to slower at-depth processes. In 2020, the surface temperatures cooled, and climate indices were near average, potentially offering more favorable environmental conditions for biota relative to recent years. Newly estimated indices show eddies have a distinctly different signature across the island chain, with discrete, strong events characterizing the east and multiple or multi-year but less intense events towards the west. The role of these eddies and how they are processed within the system are yet to be understood, as stocks and overall populations are subject to the dynamics in the east and the west throughout their life cycle. Eddy kinetic energy has remained low since 2013 in the east, and this coincides with the North Pacific Gyre Oscillation more than with the North Pacific Index, which is typically the more characteristic index of the region. Model results suggest moderate increases in the strength of the Alaskan Stream Current increases flow through the eastern passes such as Amukta, while stronger flows carry the current westward, decreasing flows through the eastern passes and increasing them through the wider and deeper passes prevalent in the central and western Aleutians. With average or close to average climate conditions throughout, 2020 is expected to be a return to more favorable conditions for the biological components of the Aleutian Islands ecosystem. <u>Biological summary through 2019</u> In general, warmer temperatures increase bioenergetic costs for ectothermic fish, and all else being equal, prey consumption must increase to maintain fish condition. These increased bioenergetic costs and consumption demands may partly explain why the observed body condition of several commercial groundfish (adult pollock, Pacific cod, northern rockfish and Pacific ocean perch) has been lower than the survey mean since 2012, as last measured by length-weight residuals during the biennial summer bottom trawl survey during 2018. We note however, that for Pacific Ocean perch and northern rockfish, intraspecific competition might be a contributing factor, as their abundance increased and appears to have now stabilized at high biomasses (e.g. Pacific Ocean perch) that now surpass that of Atka mackerel and pollock combined. While Pacific Ocean perch condition has also been lower than the long term mean, it has decreased less than that of the rockfish. The poorer condition of fish, particularly of species such as Atka mackerel and pollock that when small serve as prey for piscivorous seabirds and apex fish predators like Pacific cod and arrowtooth flounder, also

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	means that that their quality as prey has decreased, with potential cascading effects on their predators. Warmer temperatures may also impact ontogenesis of Atka mackerel eggs (Lauth et al., 2007). Surface temperature was found to be the most important determinant of egg and larval stage distribution of commercial fish in Alaska based on the distribution models used to define EFH. For many of the commercial groundfish for which the youngest age in the stock assessment is 4 years old or older, effects of this sustained warmer temperature on recruitment will not be immediately apparent. These generally unfavorable conditions seem to be improving, as seabirds—both plankton and fish-eating species—had earlier to average hatch dates and average to above-average reproductive success in 2019. This seems particularly true for surface-feeding seabirds which have been shown to respond more consistently with changes in their phenology as warmer temperatures bring earlier spring blooms. This flexibility and higher response to fluctuations in the environment is also coherent with the lower response to variable environmental conditions that is observed in fish and seabirds used to generally more stable processes at depth throughout their lifespan. In addition to physical drivers, Kamchatka pink salmon (a new indicator this year), with a marked biennial signal in their abundance that peaks in odd years, has been shown to be correlated with copepod abundance, otolith growth in Atka mackerel, planktivorous seabird reproductive success (Batten et al., 2018; Matta et al., 2020; Springer and van Vliet, 2014), and potentially, Pacific ocean perch young of the year. With record abundance in 2019 and an increasing trend over the past decade, their potential for competitive impacts on prey availability for other groundfish and cascading ecosystem effects warrants consideration. These competitive impacts may differ for fish feeding in shallow versus deeper waters as other biological processes may confound physical forcing driven by surface temperatures or may have a lagged effect in deeper waters. While, in general, Kamchatka pink salmon abundance correlates with a lower copepod abundance in off years, 2019 was an exception, as shown by the CPR timeseries which shows an increase in the mean size of the copepod community and its abundance -as supported by the decreased biomass of large diatoms which signals a potential increased predation pressure from copepods. With a potential cascading effect on plankton feeding species and young-of-year fish, this may partly explain the success of fish feeding seabirds in 2019. Understanding the interplay of vertical and horizontal spatial variability in food-web and oceanographic dynamics is particularly relevant given the higher reliance on plankton in the western Aleutians versus more piscivorous and invertivore feeding habits of fish and seabirds towards the eastern Aleutians. The largest total biomass of both fish apex predators and pelagic foragers is located in the central Aleutians, the ecoregion with the largest shelf area under 500m. The lowest apex predator biomass is located in the western Aleutians whereas that of pelagic foragers is found in the eastern Aleutians. This pattern has been consistent since 1991, though individual species group fluctuations do not necessarily follow the same behavior. Finally, the increase of Pacific Ocean perch biomass and its stable high population, might be driving some spatial dynamics, where it may be encroaching onto other species' habitats, as seen by the estimated increase in the area occupied shown in the Pacific Ocean perch stock assessment. This increase in abundance and area occupied may be the cause of the increased bycatch of Pacific Ocean perch. <u>Western Ecoregion</u> In the western ecoregion, the reproductive success of planktivorous auklets, serving as indicators of zooplankton production, was above average during 2019. Both least and crested auklets hatched chicks earlier than the long term average. These species feed their chicks mainly euphausiids and copepods, respectively. Parakeet, whiskered, and crested auklets all had high reproductive success in 2019, while that of least auklets was average. While the overall timing of

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	breeding for fish-eating seabirds was average in 2019, their reproductive success varied. Glaucous-winged gulls and horned puffins had high reproductive success, tufted puffins and thick billed murres had average reproductive success, and common murres failed. There was an increase in the variety of fish brought back to feed tufted puffin chicks. Increased diversity in chick diets may indicate that more favored prey were less available. There was a slight increase in the proportion of gadids fed but lower proportions of hexagrammids (likely age-0) and Ammodytes. It is still unknown whether the high number of hexagrammids seen in 2013 and 2014 possibly indicated high recruitment in Atka mackerel, as their overall abundance has been in decline since 2006. Steller sea lion non-pup counts continue to decline with the lowest estimated numbers yet in 2019. The diet of Steller sea lions consists primarily of commercially fished species, many of which seem to have had poorer body condition in recent years. The declining Steller sea lion trends in both numbers and birth rates are topics of active research, and prey quality may play a role in their lack of recovery. Central Ecoregion There was a slight increase in Steller sea lions non-pup estimates in 2019, which although small, have been consistent since 2015. School enrolment was slightly higher, pointing perhaps to more stable conditions for families in the area. The increase was driven by both students in Adak and Atka. Eastern Ecoregion Pollock and Pacific Ocean perch commonly comprise more than half the pelagic foraging fish biomass observed in the bottom trawl survey, and 2019 was no exception. There are almost no northern rockfish in this area, but Pacific Ocean perch has been increasing their spatial extent, as seen by the estimated area occupied in the Pacific Ocean perch stock assessment. All the piscivorous seabirds species monitored for reproductive timing at Aiktak Island in Unimak Pass, hatched chicks early or on average in 2019, signalling favorable foraging conditions in the region. Reproductive success was high for red-faced cormorants, thick-billed murres, and puffins. This is despite the low forage fish availability of sandlance Ammodytes, gadiids and hexagrammids as suggested by the 2019 diets of tufted puffin chicks. Chick-provisioning patterns suggest puffins are responding to changes in forage fish availability. As in the west, the diversity of fish prey in puffin diets increased in 2019, possibly indicating that more favored prey were less available. Planktivorous auklets are not as numerous in the eastern ecoregion as in the central and western ecoregion and are not monitored in the Eastern ecoregion. **Gulf of Alaska** Current Environmental State—Gulf of Alaska 2020 **Western Gulf of Alaska** The WGOA returned to near-average sea surface temperatures in the winter of 2020, after the previous marine heatwave ended in December 2019. Temperatures were close to long-term mean levels for winter and spring followed by elevated temperatures in the summer and fall. Temperatures oscillated around the heatwave threshold throughout the summer and have remained in heatwave conditions since September (as of Oct. 30th). Residual heat from previous warm years remains at depth, as seen along the Seward Line, which remains a concern for lagged ecological recovery from previous heatwaves. Indicators of surface transport described upwelling-favorable westerly winds causing eastward and southward sea surface transport (described by satellite data and supported by the Papa Trajectory Index) due to anomalously high sea level pressure during winter 2019/2020 (satellite data and a strongly positive state of the Arctic Oscillation). Spring winds in Shelikof Strait were downwelling-favorable northeasterly winds, conducive to enhanced retention of larval and juvenile pollock. High eddy kinetic energy was present off the shelf west of Kodiak, potentially

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	enhancing higher phytoplankton biomass in that region. La Niña conditions are predicted for winter 2020–2021, along with moderate to cooler sea surface temperatures across the GOA. Chlorophyll-a data indicate early peak phytoplankton bloom timing, similar to that in 2017 and 2018, and approximately average phytoplankton biomass in WGOA. Spring biomass estimates of large copepods and euphausiids were near the long-term average along the Seward Line (May 2020), suggesting prey were not limiting. A lack of additional zooplankton data makes this trend difficult to extrapolate across the WGOA, due to an "off-year" of GOA surveys and COVID-related cancellations of planktivorous seabird surveys. The limited forage fish data show mixed trends in WGOA. Forage fish-eating seabirds (surface feeding and diving) at Middleton Island found sufficient prey to successfully rear chicks, although chick diets were diverse and included a notable increased proportion of greenlings. These diets suggested that the more typical forage fish, such as capelin, were not abundant. Preliminary analysis of ichthyoplankton surveys from 2019 reported relatively high abundance of larval sand lance (highest since 2007) indicating potential for elevated age-1 sand lance populations in 2020, although no surveys were conducted this year to verify. Prince William Sound herring spawning stocks increased slightly from 2019 due to a strong age 3+ recruitment, but they remain very low. Several indicators of good age-1 walleye pollock recruitment in 2020 include southwest wind trajectories in Shelikof Strait and an early spring phytoplankton bloom (similar to 2017 and 2018). Indications of groundfish biomass trends in 2020, an "off-year" for the GOA-wide bottom trawl surveys, are based on ADF&G surveys off Kodiak Island over Barnabus Gully and in two inshore bays. Catch rates were below the long-term mean for arrowtooth flounder, flathead sole, Pacific cod, Pacific halibut, skates, and walleye pollock, and above the long-term mean for Tanner crab. Paralytic shellfish toxin (saxitoxin) monitoring in phytoplankton and shellfish in SEAK, Kachemak Bay, and Kodiak Island reported a consistent presence of harmful algal blooms (HABs). Bivalve shellfish from areas that are well known for having PSP levels above the regulatory limit, including Southeast Alaska and Kodiak, continued to test above the regulatory limit in 2020, while Kachemak Bay shellfish did not exceed the limit this year. Whales and seabirds continue to show mixed trends in the WGOA in 2020. Humpback whale counts in Prince William Sound remained lower in 2020 than pre-2014 heatwave levels. 2020 is the second year of an unusual mortality event that included 44 dead grey whales found within Alaskan waters, 24 of which were in the GOA (primarily western). Given that benthic prey (primarily ampelecid amphipods) in the Bering, Chukchi, and Beaufort Seas are considered the mainstay of gray whale foraging, it is reasonable to assume that the mortalities located in the GOA are linked to the extreme changes in their foraging grounds to the north. Overall, the status of seabirds was fair to good in the WGOA in 2020, based on an integration of qualitative and quantitative, limited data from Middleton Island, Cook Inlet, and the Kodiak Archipelago. Colony attendance remains low in some populations compared to historic levels, and some colonies were newly abandoned. However, when birds did arrive to breed, reproductive success was fair to good for both fish-eating, surface-feeding birds and fish-eating, diving birds. There was spatial variability in colony attendance and reproductive success, with Middleton Island birds performing more strongly than Kodiak Island or Cook Inlet. Middleton Island populations from both these groups experienced their strongest breeding seasons since the marine heatwave began in 2014, suggesting an increase in the availability of small schooling fish in that region of WGOA. The Alaska Maritime National Wildlife Refuge's seabird reproductive success

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	time series were not updated in 2020, due to COVID-19 related survey cancellations, making these reported data trends difficult to compare to previous years' ESRs. **Eastern Gulf of Alaska** The EGOA returned to near-average sea surface temperatures in the winter of 2020, after the previous GOA marine heatwave ended in December 2019. Sea surface temperatures were close to long-term mean levels for winter, spring, and summer (cooler than WGOA), followed by elevated temperatures in the fall in EGOA. The EGOA is experiencing warmer sea surface temperatures than fall 2019 but has not exceeded the marine heatwave threshold (as of Oct 30th). Indicators of surface transport described upwelling-favorable westerly winds causing eastward and southward sea surface transport (shown with satellite data and supported by the Papa Trajectory Index), due to anomalously high sea level pressure during winter 2019/2020 (satellite data and a strongly positive state of the Arctic Oscillation). La Niña conditions are predicted for winter 2020-2021, along with moderate sea surface temperatures in the EGOA. Chlorophyll-a data indicate early peak phytoplankton bloom timing and approximately average phytoplankton biomass in EGOA. Total zooplankton density in SEAK inside waters (Icy Strait, summer) was near the long-term average, but included increases in large copepods, decreases in small copepods, and decreases in euphausiids. A lack of additional zooplankton data makes these trends difficult to extrapolate across the EGOA, including offshore waters, due to an off-year of GOA surveys and COVID-19 related cancellations of planktivorous seabird surveys. Limited forage fish data show mixed trends in EGOA. Preliminary results of mature spawning herring (age 3+) show strong recruitment in 2020, continuing the 2019 high levels in Sitka Sound and Craig (ocean influenced populations). Juvenile pink and chum salmon CPUE in inside waters (Icy Strait) increased to average levels for the first time since 2016 while sockeye and coho remain lower. Humpback whale productivity and juvenile survival in Glacier Bay and Icy Strait returned to more typical, pre-2014 heatwave levels, reflecting good feeding conditions (for females) from 2018–2020. This could include the increased herring abundance described above. Phytoplankton and shellfish monitoring for paralytic shellfish toxins (saxitoxins) in Southeast Alaska included samples exceeding the regulatory limit in 26 out of 40 sites, slightly lower than the 30 sites observed in 2019. The lower toxicity levels may be attributed to the rainy summer and cooler temperatures in 2020. Salmon commercial harvest was low across most of GOA, and lowest in SEAK since 1976, resulting in numerous requests for the State to declare salmon fishery disasters. The low returns in SEAK were primarily driven by low chum and sockeye. Low adult returns are tied to juvenile mortality in 2017 (and years since then for certain species) but the mechanism driving that trend (e.g., environment, predation) is still uncertain. **ACLIM**

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	The Alaska Climate Integrated Modeling project (ACLIM) is a NOAA sponsored interdisciplinary collaboration to project and evaluate climate impacts on marine fisheries in the Bering Sea, Alaska[55]. It connects research on global climate and socioeconomic projections to regional circulation, climate enhanced biological models, and socio-economic and harvest scenarios. To evaluate a range of possible future conditions, scientists are evaluating the effectiveness of existing fishery management actions under 11 different climate scenarios (spanning high and low CO2 futures expected to lead to different degrees of warming). They will also look at how human fishing fleets and communities can adapt to climate change through climate-informed management. Results of the ACLIM have been presented to the Council. In December 2018 the North Pacific Council adopted a Bering Sea Fishery Ecosystem Plan (BS FEP). Under the overarching guidance of the Council's Ecosystem Approach Statement, the BS FEP sets goals and objectives for the Bering Sea ecosystem which direct the process by which the Council should manage fisheries, monitor the ecosystem, and prioritize new research through identification of projects, called "Action Modules" [56]. Accordingly, in June 2019, the Council sought nominations for membership for two taskforces to work on two Action Modules, or projects that implement the Council's Bering Sea FEP. One of the two is the Climate Change Action Module: tasked with evaluating short- and long-term effects of climate change on fish, fisheries, and the Bering Sea ecosystem, and develop management considerations. 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 FEP was prepared by the Bering Sea Fishery Ecosystem Plan Team, which is an interagency group of Council, NMFS, and other Federal, State and IPHC staff, with contributions from other Council and NMFS staff, and with extensive input from the Council's Ecosystem Committee. The module will leverage ongoing studies, such as ACLIM and an Alaska species vulnerability assessment, and consider how information from those existing studies can better filter into the Council process. 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) has funded long-term monitoring (LTM) projects since 2002 through its annual Request for Proposals (RFPs) and as part of its Integrated Ecosystem Research Program with projects in the Bering Sea and Gulf of Alaska[57]. The NPRB Long-term Monitoring Program was launched in 2013. The board committed an initial $400,000 per year for five years to this effort (a total of $2 million). The first long-term monitoring projects were funded in 2014 and will continue for a minimum of five years. The NPRB's Bering Sea Project[58]was founded upon the implementation and science plans for the Bering Ecosystem Study (''BEST'') supported by the National Science Foundation (NSF), and the

[55] https://www.fisheries.noaa.gov/alaska/ecosystems/alaska-climate-integrated-modeling-project
[56]https://meetings.npfmc.org/CommentReview/DownloadFile?p=c334ad33-4139-4b5a-b205-a8b7c5028562.pdf&fileName=D6%20Final%20BS%20FEP%20Jan%202019.pdf
[57] https://www.nprb.org/long-term-monitoring-program/about-the-program/
[58] https://www.nprb.org/bering-sea-project/about-the-project/

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	Bering Sea Integrated Ecosystem Research Program (''BSIERP'') supported by the NPRB. The overarching goal of the two programs was to increase our understanding of the processes that maintain the structure and function of the Bering Sea marine ecosystem, and to learn how natural and anthropogenic variation in sea ice and other physical forcing mechanisms may produce natural, economic, sociological and cultural impacts to the ecosystem. Major direct funding was provided by the National Science Foundation ("Bering Ecosystem Study"; ~$26M) and the North Pacific Research Board("Bering Sea Integrated Ecosystem Research Program", BSIERP; ~$16M). Substantial in-kind support (~$15M) was provided by other agencies. The $17.6 million Gulf of Alaska ecosystem study examines the physical and biological mechanisms that determine the survival of juvenile groundfishes in the Gulf of Alaska[59]. From 2010 to 2014, oceanographers, fisheries biologists and modelers studied commercially and ecologically important groundfishes, specifically walleye pollock, Pacific cod, Pacific ocean perch, sablefish and arrowtooth flounder, during their first year of life as these fish are transported from offshore areas where they are spawned to nearshore nursery areas. A synthesis was planned from September 2015 through February 2018. The synthesis is building upon the results of the field program and producing products that apply the results to fisheries management. <u>12.2 Research and Institutional capacity for environmental impact assessment</u> The IPHC, NPFMC and NOAA/NMFS 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. Some of these have been summarized in the previous clause. In terms of impact assessment, it is a requirement that every time a major change is proposed to regulations affecting fisheries management such as the revision of a fishery management plan, a federal National Environmental Policy Act (NEPA) analysis is initiated. Using the NEPA process, 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[60]. The halibut benthic longline fishery has minimal and temporary impacts on the seabed and therefore on habitats. As noted in Clause 8 above, gear modifications have been implemented to reduce the impacts of trawl fisheries in the BSAI and Central GOA by raising the bobbins from the seafloor. By-catches in the directed halibut fishery are recorded by observers and reported through the NMFS catch accounting system. Most of bycatch include sharks, skate, sculpins, and rockfish species, but the fishery does not appear to pose a threat to bycatch species. Issues relating to bycatch (mainly grenadiers and groundfish FMP species) and endangered, threatened and protected species (seabirds and marine mammals) are summarized in the next clause below. Streamer lines limit interactions with seabirds and the fishery has minimal impact on the short-tailedalbatross (i.e. no takes in 2018), the only seabird listed as endangered under the ESA (more information on this in the next clause/section). Interactions with whales remain a problem as they take fish off longline gear, but the fishery does not adversely affect whale populations.

[59] https://www.nprb.org/gulf-of-alaska-project/about-the-project/
[60] https://www.epa.gov/nepa/what-national-environmental-policy-act

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	The effects of lost/abandoned gear on legal O32 halibut have been considered by IPHC and NPFMC, and catch estimates have declined substantially from over 2 million pounds annually from 1986-91, to less than 100 thousand pounds annually after 2010[61]177. Much of this reduction occurred following the implementation of the IFQ program in 1995. Given the above and the more relaxed pace of the fishery due to IFQs, gear is not lost as frequently and gear loss does not currently appear to be a significant issue. Longline is typically not associated with as much ghost fishing as some other fishing gears, such as gillnets and some types of traps (NOAA 2015)[62]178. 12.3./12.4/12.5/12.6. Fishery Interaction with the ecosystem, non-target catches, discards associated, dependent or endangered species **Bycatch in non-Pacific halibut-target fisheries** The estimated mortality from fisheries where the retention of Pacific halibut is prohibited is termed 'bycatch' by the IPHC. This bycatch cannot be retained without appropriate IFQ quota and fishing gear, and termed Prohibited Species Catch (PSC). Halibut PSC are mainly caught in trawl fisheries for cod, flatfish and Pollock but also in pot and longline gear fisheries. Specific details on halibut bycatch rates - by gear, area, target, week, and processing sector in 2020 are available on the NMFS website, under the BSAI/GOA prohibited species heading[63]. Mortality by individual IPHC Regulatory Area from these non-halibut-target fisheries is reported to the IPHC by the NMFS and DFO on an annual basis. Bycatch has been delineated among Areas 4A, 4B, and 4CDE only from 1990 to the present, during which time it has declined from a peak of over 20 million lbs (~9,070 t) to a projected value of approximately 6.1 million lbs (~2,750 t) in 2018. Bycatch in IPHC Regulatory Areas 4CDE and 3A (the two largest sources coastwide) increased from 2017 to 2019, but were largely offset by a decrease in IPHC Regulatory Area 3B. The total bycatch in 2019 has one of the smallest estimate since the beginning of foreign industrial fishing in Alaska in the early 1960s[64]. **Halibut discards** Discard mortality includes all Pacific halibut that are captured during the directed commercial fishery, are subsequently estimated to die, but that do not become part of the landed catch. Discards have been decreasing steadily since 2010 and in 2018 it was estimated as the lowest in the past 30 years[65]182. Many studies looking at the survival of Pacific halibut after capture events have been conducted over the years. The two main methodologies have been captive holding experiments, and long-term tag returns by injury classifications[66]. **Bycatch of other species in the halibut fishery** As noted in the 20-year review of the IFQ program published in 2016, discards of other FMP groundfish species by the halibut IFQ fleet have historically not been estimated. The NPFMC Groundfish Plan Team has discussed estimating other FMP groundfish, non-target species, and prohibited species catch discards for the halibut IFQ fleet using observer data from the restructured

[61] https://www.npfmc.org/wp-content/PDFdocuments/halibut/IFQProgramReview_417.pdf
[62] https://marinedebris.noaa.gov/sites/default/files/publications-files/Ghostfishing_DFG.pdf
[63] https://www.fisheries.noaa.gov/alaska/commercial-fishing/fisheries-catch-and-landings-reports-alaska
[64] https://iphc.int/uploads/pdf/am/2020am/iphc-2020-am096-09.pdf
[65] https://iphc.int/uploads/pdf/am/2020am/iphc-2020-am096-09.pdf
[66] https://iphc.int/management/science-and-research/biological-and-ecosystem-science-research-program-bandesrp/-bandesrp-discard-mortality-and-survival

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	Observer Program that began in 2013. However, there are other sources of information available on bycatch in the halibut fishery, which are summarised below. Over 100 other species of fish or other organisms are consistently observed on the IPHC FISS. Approximately 818,246 pounds (371 t) of Pacific halibut, 85,716 pounds (39 t) of Pacific cod, and 51,337 pounds (23 t) of rockfish spp. were landed from the FISS stations. Pacific cod and rockfish are the bulk of incidental catches. The bycatch species observed by IPHC Regulatory Area was not reported in the 2018 FISS report but instead was published online at: https://iphc.int/static/56/fiss-bycatch . **Bycatch of other species in the target halibut fleet from EM data** One of the key updates of the 2018 North Pacific Observer Program Report was that[67] 2018 was the first year that EM was integrated into the Observer Program under regulations. In 2020[68], EM data were collected from 106 vessels from 258 trips (195 longline trips and 63 pot trips). By target species, there were 122 halibut trips, 23 Pacific cod trips, and 113 sablefish trips. The data spanned 682 halibut sea days, 86 Pacific cod sea days, and 674 sablefish sea days for a total of 1,442 sea days with trips averaging 5.6 days across all fisheries. Of the 11,491 hauls on reviewed trips, the catch level data was recorded for 3,814 hauls. All catch data presented is from this subset of hauls. Since total catch accounting is the goal for EM in the Southeast Alaska fixed gear sectors, all species of retained or discarded marine organisms were reported and summarized to the target fishery level. Video reviewers identified a high proportion of retained and discarded catch to species. Exceptions were primarily those species that reviewers have been instructed to identify to a group level because they are too similar to reliably differentiate (e.g., shortraker rockfishes, and arrowtooth/Kamchatka flounders). There were also a small proportion of rockfish that were recorded as “Rockfish – unidentified” or “Rockfish – Small Red unidentified”. Some of the most common bycatch (retained and/or discarded) in the halibut fleet component using EM included some rockfish species, notably shortracker/rougheye and yelloweye rockfish, sablefish (most of which is retained when IFQ is present), Pacific cod, arrowtooth flounder, grenadiers, sculpin, spiny dogfish and longnose skate. **Seabird bycatch** <u>Demersal Longline Gear</u> Based on standard observer sampling protocols, demersal longline gear in Alaska groundfish fisheries accounted for 78 percent of the estimated seabird mortality in 2019 (6,873 birds), which is comparatively lower than the average estimated seabird mortality from 2010 through 2018 (88 percent; range 76 to 96 percent). From 2010 through 2019, most of the demersal longline gear estimated seabird bycatch occurred in the Bering Sea (81 percent) when compared to the Aleutian Islands (5 percent) and GOA (14 percent). In fact, most (70 percent) of the total (all gear types) seabird bycatch off Alaska occurred in the Bering Sea fisheries using demersal longline gear (range 55 percent to 86 percent from 2010 through 2019).

[67] https://www.fisheries.noaa.gov/resource/document/north-pacific-observer-program-2018-annual-report
[68] https://meetings.npfmc.org/CommentReview/DownloadFile?p=9e77fc11-b9c8-44b5-a153-69bdbf5d75b8.pdf&fileName=C1%20Observer%20Program%202020%20Annual%20Report.pdf

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		Consistent with results for all gear types combined, most 2019 estimated seabird bycatch by demersal longline gear was shearwaters (51 percent; 3,497 birds); Northern fulmar (38 percent; 2,588 birds); and gulls (4 percent; 244 birds;). While estimated bycatch of shearwaters in 2019 was the highest reported in the time series, total bycatch of Northern fulmar and gulls was comparatively lower when compared to the 2010 through 2018 times series average. Estimates of seabird bycatch were also analyzed to compare C/Ps and CVs. In the BSAI, 99 percent of the total estimated seabird bycatch for vessels using demersal longline gear occurred on C/Ps in 2019 (6,327 birds). This is slightly higher than 2010 through 2018 time series average (96 percent; 4,654 birds; range of 1,427 to 8,831 birds). Northern fulmar, shearwaters, and gulls accounted for 96 percent of total estimated bycatch for C/Ps in 2019 (2,454; 3,437; 186 birds, respectively). On CVs, Northern fulmar accounted for 35 of the 37 total estimated seabirds caught as bycatch in the BSAI in 2019 (Table 7). In the GOA, 86 percent of total estimated seabird bycatch for vessels using longline gear occurred on CVs in 2019 (423 birds). This proportion is similar to the 2010 though 2018 average (746 birds; 87 percent). Black-footed albatross, gulls, and Northern fulmar were the three most prevalent seabird bycatch species for CVs in 2019 (221; 32; 82 birds, respectively; Table 7). The difference in proportion of seabird bycatch attributed to CVs and C/Ps in the BSAI and GOA is most likely a reflection of the differences in fleet characteristics between the two regions. In the BSAI, most of the longline effort is by C/Ps targeting Pacific cod, while in the GOA, most of the longline effort is by CVs targeting halibut, sablefish, and Pacific cod. Of the demersal longline fisheries that have seabird bycatch, the bulk of recent fishery effort in the Bering Sea occurs in the Pacific cod demersal longline fleet (Eich et al. 2016). While this fishery accounts for the greatest amount of seabird bycatch (2010 through 2019 average of 68 percent), it captures an average of 8 percent of the total albatross bycatch. However, nearly all of the estimated short-tailed albatross takes that have occurred since 2003 have been in the Pacific cod demersal longline fleet (24 of the total 31 birds), while the remainder were taken in the Greenland turbot demersal longline fishery. As noted earlier, no endangered short-tailed albatross takes by demersal longline gear were observed in 2019 in the Federal fisheries off Alaska Examining the three fisheries responsible for the majority of seabird bycatch—Pacific cod, sablefish, and 14 halibut demersal longline—the average annual seabird bycatch for 2010 through 2018 was 4,521, 719, and 316 birds per year, respectively. In 2019, the Pacific cod, sablefish, and halibut demersal longline—the average annual seabird bycatch for 2010 through 2018 was 4,521, 719, and 316 birds per year, respectively. In 2019, the Pacific cod, sablefish, and halibut demersal longline estimated seabird bycatch was similar with 6,385, 441, and 34 birds, respectively Focusing solely on the bycatch of albatross (unidentified, short-tailed, Laysan, and black-footed), the Pacific cod, sablefish, and halibut fisheries using demersal longline gear average 37, 359, and 76 albatross per year, respectively, for 2010 through 2019 (average for halibut fisheries calculated for 2013 through 2019). Seabird bycatch levels and rates are highly variable among years; however, sablefish has higher estimated albatross bycatch relative to other fisheries. Therefore, future conservation efforts for mitigating albatross bycatch should focus on the sablefish fleet for maximum benefit. For endangered species bycatch, the focus should remain on the Pacific cod fleet; however, the average estimated mortality (2010 through 2019) is about 2 short-tailed albatross per year. Takes

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	of short-tailed albatross have not been observed in the sablefish fishery since the mid-1990s. The only other fishery with a short-tailed albatross take is the BSAI Greenland turbot fishery in which 2 short-tailed albatross were recorded taken in 2014 (only 1 bird was in the observer sample). When expanded by the CAS, the average estimated mortality (2010 through 2019) across the Greenland turbot fishery is less than 1 short-tailed albatross per year **Marine Mammals** The 2021 List of Fisheries Summary Tables list U.S. commercial fisheries by categories according to the level of interactions that result in incidental mortality or serious injury of marine mammals. The sablefish fisheries in the GOA are listed as Category II (occasional interactions with North Pacific sperm whale and Steller sea lion, Western US) while the BSAI and state fisheries are classified as Category III[69] (remote likelihood of/no known interactions with no marine mammal species mentioned). **Sperm Whales** Sperm whales have been observed depredating both halibut and sablefish longline fisheries in the Gulf of Alaska and this is also widespread in sablefish longline fisheries in the central and eastern Gulf of Alaska; this depredation can lead to mortality or serious injury if hooking or entanglement occurs. Potential threats most likely to result in direct human-caused mortality or serious injury of this stock include entanglement in fishing gear and ship strikes due to increased vessel traffic (from increased shipping in higher latitudes). Between 2013 and 2017, three serious injuries of sperm whales were observed in the Gulf of Alaska sablefish longline fishery (two in 2013 and one in 2016) and one in the Bering Sea/Aleutian Islands halibut longline fishery (in 2015). Each of these injuries was prorated at a value of 0.75 and extrapolated to fishery-wide estimates when possible, resulting in a minimum estimated mean annual mortality and serious injury rate of 4.7 sperm whales in U.S. commercial fisheries between 2013 and 2017[70]). The Potential Biological Removal (PBR) for sperm whales is 0.5, however, this is likely an underestimate given that is was calculated based on a limited geographical subset of the whole population. On the basis of total abundance, current distribution, and regulatory measures that are in place, it is unlikely that this stock is in danger of extinction (Braham 1992). **Steller Sea Lions** Mean estimated annual mortality of Western DPS Steller sea lion was 1.1 in the GOA sablefish fishery. The minimum estimated mean annual U.S. commercial fishery-related mortality and serious injury rate (36 sea lions) is more than 10% of the PBR (10% of PBR = 32) and, therefore, cannot be considered insignificant and approaching a zero mortality and serious injury rate. Based on available data, the minimum estimated mean annual level of human-caused mortality and serious injury (247 sea lions) is below the PBR level (322) for this stock[71]. The Western U.S. stock of Steller sea lions is

[69] https://www.fisheries.noaa.gov/national/marine-mammal-protection/list-fisheries-summary-tables#table-1-category-iii

[70] https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-species-stock#pinnipeds---otariids-(eared-seals-or-fur-seals-and-sea-lions)

[71] https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-species-stock#pinnipeds---otariids-(eared-seals-or-fur-seals-and-sea-lions)

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	currently listed as endangered under the ESA and, therefore, designated as depleted under the MMPA. As a result, the stock is classified as a strategic stock. The population previously declined for unknown reasons that are not explained by the documented level of direct human-caused mortality and serious injury. **Bait fisheries** Most longline bait is purchased frozen and thawed before using. Salmon, herring, cod, and octopus or squid are typically purchased for bait. These bait species are well managed by either the State of Alaska or the NMFS, and none are classified as depleted, endangered or threatened. 12.7. Role of the "stock under consideration" in the ecosystem Pacific halibut feeds on fishes, cephalopods, crabs, clams, squids, and other invertebrates. 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 [72]. Several comprehensive studies of the food web in various regions of the northern Pacific Ocean have not indicated that halibut are heavily utilized by any predator. Predation on halibut, especially by marine mammals, is apparently low, except in cases where the fish were attached to fishing gear. 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. 12.8. Pollution – MARPOL. MARPOL 73/78 (the "International Convention for the Prevention of Pollution From Ships") is one of the most important treaties regulating pollution from ships. Six Annexes of the Convention cover the various sources of pollution from ships and provide an overarching framework for international objectives. In the U.S., the Convention is implemented through the Act to Prevent Pollution from Ships (APPS). 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). On June 27, 2011, the EPA and USCG entered into a Memorandum of Understanding (MOU) to enforce Annex VI MARPOL. The Annex VI MOU225 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. 12.9. Knowledge of the essential habitats for the "stock under consideration" and potential fishery impacts on them. There is considerable knowledge of the essential habitats for the Pacific Halibut and potential fishery impacts on them. Studies of seasonal migration and winter distribution were initiated in 2002 in the shallow nearshore waters of Regulatory Area 4C (Seitz et al. 2007), expanded to Regulatory Area 4B in 2004 (Seitz et al. 2008), and to the northern and southern extents of the IPHC's Bering Sea

[72] https://www.fishbase.se/Ecology/FishEcologySummary.php?StockCode=530&GenusName=Hippoglossus&SpeciesName=stenolepis

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	continental shelf-edge survey grid in 2006 (Seitz et al. 2016)[73]. The result was an integrated 5-site design spanning from Attu Island in the west to Unimak Pass in the east, and northward to Pervenets Canyon. With respect to stock structure, the results indicated considerable mixing on the eastern continental shelf in conjunction with relative isolation within Regulatory Area 4B (Seitz et al. 2011). Additionally, the results suggested that the stock's spawning range is considerably broader than had been traditionally assumed. Prior to the initiation of the IPHC's PAT-tagging program, the best available evidence indicated that Pacific halibut in the eastern Pacific Ocean concentrate their winter spawning activity at submarine canyons from southern British Columbia to Pribilof Canyon in the southeastern Bering Sea, with no indication of spawning along the Aleutian Ridge (St. Pierre 1984). PAT tag data suggest a spawning distribution that extends latitudinally from at least Cape Johnson, Washington (Loher and Blood 2009) northwards to Pervenets Canyon, and westward to Attu Island (Seitz et al. 2016). Still, the full range of potential spawning habitats has not been studied. Although much of the halibut harvest takes place in the Gulf of Alaska, the waters of Bristol Bay and the southeast Bering Sea shelf are nursery grounds important to the overall health of the Pacific Halibut population. As juveniles, Pacific halibut conduct potentially large-scale migrations from nearshore nursery grounds to the continental shelf habitats in which they will reside as adults. Young halibut spend two or three years growing in these rich, nursery areas, after which they migrate to other parts of the Bering Sea, through the Aleutian passes and into the North Pacific where they live out their adult lives. The importance of these nursery grounds has been recognized by fishery managers. In 1967, the IPHC closed a significant area of the southeast Bering Sea to halibut fishing in order to protect young fish during this sensitive life stage. The area was modified in 1990, and its effectiveness has recently come under review by IPHC[74]. Finally, as adults, Pacific halibut undergo annual spawning migrations that take them up and down the continental slope, between shallow feeding grounds and deeper spawning habitat, as well as sometimes-large annual migrations along the coastline. The IPHC has and continues to be involved in research on larval distribution, juvenile and adult migrations[75]. Because halibut is harvested with longline gear, habitat effects of this gear type are not deemed significant and temporary. In terms of halibut bycatch, the majority is caught by demersal trawlers targeting (non-Pollock) groundfish in the Central GOA and BSAI. The new gear uses spaced discs to elevate the trawl above the ocean floor, reducing contact with the ocean floor by as much as 90% (NOAA 2012). Non Magnuson Stevens Act fisheries include the halibut fishery Alaska managed by the IPHC, as well as other state managed fisheries. Accordingly, the effects of non-Magnuson-Stevens Act fishing activities in the 2005 EFH EIS and remain valid, as the 2015 EFH review published in 2017[76]. 12.10. Research shall be promoted on the environmental and social impacts of fishing gear and, in particular, on the impact of such gear on biodiversity and coastal fishing communities. In regard to the IFQ halibut and sablefish fisheries, one of the most important pieces of recent research was the December 2016 Twenty-Year Review of the Pacific Halibut and Sablefish IFQ Management Program. Primarily, the IFQ Program was examined with respect to how well it met its 10 original policy objectives and how it was providing entry opportunities for new participants, an

[73] https://www.iphc.int/uploads/pdf/am/2018am/iphc-2017-rara27-r.pdf
[74] https://www.iphc.int/uploads/pdf/am/2018am/iphc-2018-am094-propa1.pdf
[75] https://iphc.int/uploads/pdf/am/2020am/iphc-2020-am096-00.pdf
[76] https://www.fisheries.noaa.gov/resource/document/essential-fish-habitat-5-year-review-summary-report-2010-through-2015

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	objective that the Council has sought to provide through numerous revisions since the IFQ Program was implemented. The 10 objectives of this review spanned from access to the fishery to quota shares, community reliance to IFQ and benefits from the program, among others[77]. Socio-economic data collection and economic analyses are often included under the Regulatory Flexibility Act (RFA), the MSA, the NEPA, the Endangered Species Act, and other applicable laws. The most recent NEPA compliant Regulatory Impact Review/ Environmental Assessment was performed in regard to the proposed NPFMC action to allow halibut retention in BSAI sablefish pots, issued for public review in October 2018[78]. measure under consideration would allow (and require) retention of legal-size halibut in pot gear in the BSAI, provided the operator holds sufficient halibut IFQ or CDQ for the corresponding International Pacific Halibut Commission (IPHC) regulatory area. Currently, pot gear is not authorized as a legal gear type for the retention of halibut; thus, it is required to be discarded when caught in sablefish pots in the BSAI. This generates both conservation and socioeconomic concerns, as it impedes efficient use of the halibut resource. AFSC's Economic and Social Sciences Research Program produces an annual Economic Status Report of the Groundfish Fisheries off Alaska is published yearly. This report contains extensive socio-economic fisheries for all fisheries in Alaska, pursued with all allowed gear types[79] 12.11. Outcome indicator(s) and management objectives for non-target stocks. The main outcome indicators influencing sustainable management of bycatch are those elements expected to keep bycatch species at levels that are highly likely to be within biological limits and minimize impacts to habitat. Management of non-target species (largely FMP groundfish species) of relevance to the IFQ halibut/sablefish program consists of: 1. a catch accounting system for all species caught (FMP, non target, PSC, seabirds, marine mammals) 2. observer program to estimate catches of non-target species (observers + EM data), 3. fishery independent surveys, 4. statistical stock assessments for most non-target species, 5. a tiered system of assessments that provides for more precautionary annual catch limits when assessments use less precise methods and clear procedures for restricting catch limits if stock rebuilding is necessary, 6. mandatory use of seabird avoidance devices on all vessels larger than 55', and 7. a spatial management strategy that prohibits or restricts vessels from fishing in sensitive habits. As summarized in earlier clauses, none of the species considered common bycatch in the halibut fishery (retained and/or discarded) from 2018 EM data and that include shortracker/rougheye and yelloweye rockfish, sablefish (most of which is retained when IFQ is present), Pacific cod, arrowtooth flounder, grenadiers, sculpin, spiny dogfish and longnose skate can be considered depleted, as most of them are exploited using conservative fishing measures. The key outcome indicators for groundfish species is the ABC and OFLs set for these which dictate the management and conduct of fisheries in terms of total possible harvest. These are informed by regular (annual or bi-annual) stock assessments in the GOA and BSAI, and in-season catch accounting.

[77] https://www.npfmc.org/wp-content/PDFdocuments/halibut/IFQProgramReview_417.pdf
[78] https://meetings.npfmc.org/CommentReview/DownloadFile?p=2dcf0126-26d7-478a-a2c6-c8f1dc234d58.pdf&fileName=C4%20Halibut%20Retention%20in%20BSAI%20Pots%20Public%20Review%20-%20pdf%20version.pdf
[79] https://apps-afsc.fisheries.noaa.gov/refm/docs/2020/econGroundfishSafe.pdf

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	12.12. Outcome indicator(s) and management objectives for endangered species. The outcome indicators and main management objectives for the halibut fleet in regards to endangered species refer to regulations aimed at protecting the endangered short tailed albatrosses (as well as other albatross species and seabirds) from longline fishery interactions, as well as MMPA protected marine mammals. In Alaska, seabird avoidance measures are required[80] (i.e. streamer lines) to be used by operators of all vessels greater than 26 ft LOA using hook-and-line gear while fishing for 1) IFQ halibut, Community Development Quota halibut, or IFQ sablefish in the EEZ off Alaska or State of Alaska (State) waters (0 to 200 nm combined); or 2) groundfish in the EEZ off Alaska (3 to 200 nm). No changes occurred in 2018 to these regulations, which are still seen to be effective at reducing bycatch. No endangered short tailed albatrosses where caught as bycatch in 2018 in either the halibut or sablefish IFQ fishery. Endangered marine mammal species are managed under the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA) in close coordination with the State of Alaska and other partners. Conservation programs are developed by the NOAA Alaska Regional Office Protected Resources Division for marine mammals including whales, ice seals, harbor seals, northern fur seals, and Steller sea lions; who also develops and implements recovery programs for threatened and endangered species including Cook Inlet beluga whales, bowhead whales, North Pacific right whales, Steller sea lions, and Arctic ringed seals; coordinates the Alaska Marine Mammal Stranding Network to respond to stranded or entangled marine mammals; and consults with federal agencies to minimize the effects of proposed actions on threatened and endangered marine mammals and their critical habitat, among other tasks. All marine mammal encounters in these fishery are required to be released without harm. The 2020119 List of Fisheries Summary Tables list U.S. commercial fisheries by categories according to the level of interactions that result in incidental mortality or serious injury of marine mammals. The halibut fisheries in the GOA and the BSAI are currently listed as Category III (remote likelihood of/ no known interactions). The species listed in this category that have been known to occasionally interact with the halibut fishery are Eastern Pacific Northern fur seal and North Atlantic Sperm whale. There are also extensive management measures to protect Steller sea lions in Alaskan waters, as detailed in the NPFMC BSAI and GOA FMPs. All in all bycatch of marine mammals is not considered an issue in the halibut fleet in Alaska. 12.13. Outcome indicator(s) and management objectives for avoiding, minimizing or mitigating the impacts of the unit of certification on essential habitats for the "stock under consideration" and on habitats that are highly vulnerable to damage by the fishing gear of the unit of certification. The halibut fishery is prosecuted using longline gear which has minimal and temporary effect on sensitive and essential fish habitats, unlike fisheries that employ demersal trawl gear and have sever and lasting effects on marine habitats and vulnerable epifauna[81]. In addition to this there are extensive habitat closures in Alaska. These are shown in Figure 4. No new closures have been implemented in 2018. Further information on these is provided at https://www.npfmc.org/habitat-protections/.

[80] https://www.fisheries.noaa.gov/alaska/bycatch/seabird-avoidance-gear-and-methods
[81] http://www.fao.org/3/y3427e/y3427e04.htm#bm04.3.2

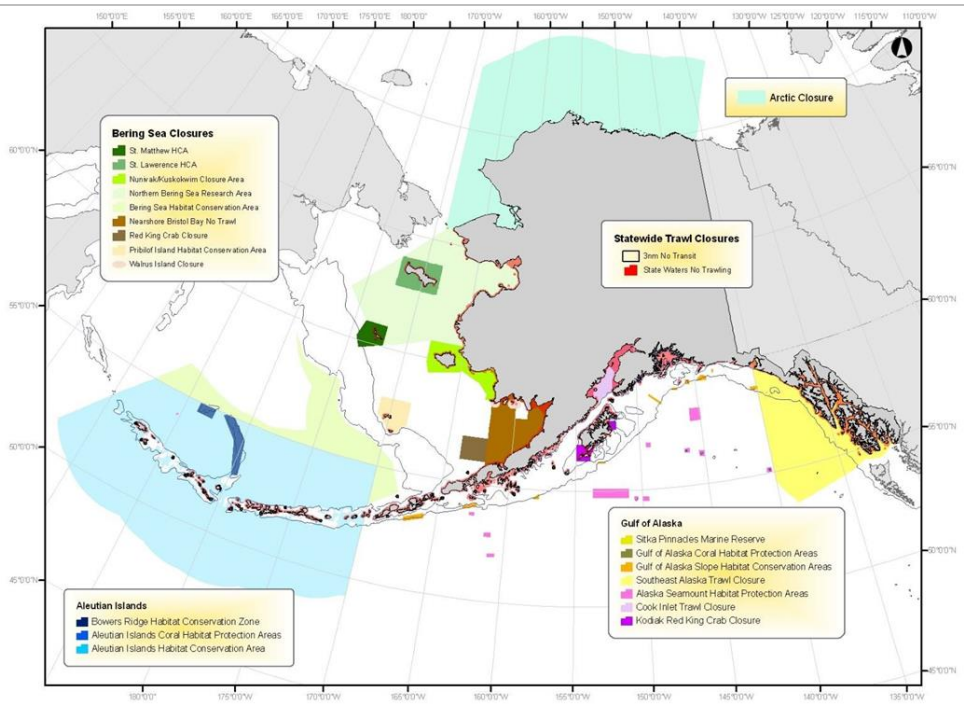

Figure 4. Fishery closures and marine reserves in Alaska.

Furthermore, the NPFMC also implemented the Artic Fishery Management Plan[82]235 covering the Arctic waters of the United States in the Chukchi and Beaufort seas. It initially prohibits commercial fishing in the Arctic waters of the region until more information is available to support sustainable fisheries management (an area roughly 150,000 sq nm2).

12.14. Outcome indicator(s) and management objectives for dependent predators.

As described in previous clauses, Pacific Halibut in Alaska are not typically categorized as a key prey species for any single marine predator. They have a trophic level of about 4 and are high up in the food chain. As such, this clause is considered not applicable.

12.15. Outcome indicator(s) and management objectives that seek to minimize adverse impacts of the unit of certification, including any enhancement activities, on the structure, processes and function of aquatic ecosystems that are likely to be irreversible or very slowly reversible.

The halibut fishery is not an enhanced fishery. The use of artificial structures is neither practical nor appropriate or considered useful for Pacific halibut in Alaska or coastwide as managed by the IPHC. As such, that portion of the Clause is not applicable

The effects on habitats, bycatch and ETP species have been considered in earlier clauses. Accordingly, the halibut fishery does not appear to have any significant negative effects on any of these components.

The IPHC, NPFMC and NOAA/NMFS conduct assessments and research related to fishery impacts on ecosystems and habitats and how environmental factors affect the fishery.

Pacific halibut are found across a large geographic area during the FISS which encompasses a wide range of oceanographic properties and environmental systems. The GOA tends to experience cooler temperatures, higher dissolved oxygen, higher pH, and lower salinity than the west coast region. In the EBS, Pacific halibut are found over a broad area from inner Bristol Bay to the shelf edge, but in

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	most years, the survey covers only the shelf edge and habitat around the Pribilof Islands and St. Matthew Island as well as both the north and south sides of the Aleutian Island chain. The monitored habitat is characterized by much cooler temperatures, high dissolved oxygen concentration except at very deep stations, pH similar to the GOA (but higher than the west coast), and intermediate salinity, i.e. lower than the west coast region but higher than the GOA. Findings and conclusions are published in the Ecosystem section of the SAFE document, annual Ecosystem Considerations documents, and the various other research reports[83]. Recent trends in climate and the physical environment, ecosystems, and fishing and fisheries are highlighted in bulleted lists of these reports. The selected list of indicators is intended to be revisited regularly. The eastern Bering Sea indicators were selected in 2010 and will be updated as part of the Fishery Ecosystem Plan currently being developed. The Aleutian Islands indicators were selected in 2011. The Gulf of Alaska indicators were selected in 2015. In December 2018 the North Pacific Council adopted a Bering Sea Fishery Ecosystem Plan (BS FEP). Under the overarching guidance of the Council's Ecosystem Approach Statement, the BS FEP sets goals and objectives for the Bering Sea ecosystem which direct the process by which the Council should manage fisheries, monitor the ecosystem, and prioritize new research through identification of projects, called "Action Modules"[84]. Accordingly, in June 2019[85], the Council sought nominations for membership for two taskforces to work on two Action Modules, or projects that implement the Council's Bering Sea FEP. The FEP was prepared by the Bering Sea Fishery Ecosystem Plan Team, which is an interagency group of Council, NMFS, and other Federal, State and IPHC staff, with contributions from other Council and NMFS staff, and with extensive input from the Council's Ecosystem Committee. The module will leverage ongoing studies, such as ACLIM and an Alaska species vulnerability assessment, and consider how information from those existing studies can better filter into the Council process. The halibut fishery is not considered to have significant effects on the structure, process and function of the North Pacific ecosystem, as documented in the Ecosystem reports for the GOA, AI and EBS[86].
References:	

[82] https://www.npfmc.org/habitat-protections/

[83] https://www.fisheries.noaa.gov/alaska/ecosystems/ecosystem-status-reports-gulf-alaska-bering-sea-and-aleutian-islands#2020-alaska-marine-ecosystem-status-reports

[84] https://meetings.npfmc.org/CommentReview/DownloadFile?p=c334ad33-4139-4b5a-b205-a8b7c5028562.pdf&fileName=D6%20Final%20BS%20FEP%20Jan%202019.pdf

[85] https://www.npfmc.org/feptaskforce/

[86] https://www.fisheries.noaa.gov/alaska/ecosystems/ecosystem-status-reports-gulf-alaska-bering-sea-and-aleutian-islands#2020-alaska-marine-ecosystem-status-reports

12.	**Considerations of fishery interactions and effects on the ecosystem shall be based on best available science, local knowledge where it can be objectively verified and using a risk based management approach for determining most probable adverse impacts. Adverse impacts on the fishery on the ecosystem shall be appropriately assessed and effectively addressed.**
Statement of consistency to the RFM Fishery Standard	The fishery continues to conform to the requirements of Fundamental Cause 12 of the RFM Fishery Standard.

7.9.6.2 Fundamental Clause 13

13.	**Where fisheries enhancement is utilized, environmental assessment and monitoring shall consider genetic diversity and ecosystem integrity.**
Summary of relevant changes:	Not applicable as this is not an enhanced fishery
References:	
Statement of consistency to 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.

8.1.1 Closed non-conformances

Non-conformance 1 (of1)	
Clause:	4.2
Non-conformance level:	Minor
Non-conformance:	An observer scheme designed to collect accurate data for research and support compliance with applicable fishery management measures is established for the Alaskan Pacific Halibut fishery. However, there is a lack of observer coverage on vessels <40ft LOA, as such the observer scheme does not sufficiently account for the risk posed by the <40ft LOA sector of the commercial Pacific Halibut fleet.
Rationale:	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. Details on the amended program can be found in Faunce (2013). Details on the sampling program, including biological data on halibut, carried out by the observers are extensively documented135. Halibut vessels are registered with the NMFS and can be selected on a vessel or trip basis, under the Observer Declare and Deploy System (ODDS), administered by the Fisheries Monitoring and Analysis Division of NMFS at AFSC. The program is covered by fees assessed on landings from both the CDQ and IFQ fisheries. Each year NMFS presents its deployment plan at the October and December meetings of NPFMC. Detailed information on the observer program can be found in the NOAA/NMFS North Pacific Groundfish and Halibut Observer Program Annual Reports website136. The NPFMC has established an intention to integrate electronic monitoring (EM) into the Observer Program for the fixed gear small-boat groundfish and halibut fisheries, so that EM may be used to collect data to be used in catch estimation (retained and discarded) for this fleet. The NPFMC has set an interim goal of pre-implementation in the small boat (40-57.5 feet length overall) longline fleet in 2016, focusing on vessels that have trouble carrying an observer due to various limitations. A fixed gear EM Workgroup (EMWG) provides a forum for all stakeholders, including the commercial fishing industry, agencies, and EM service providers, to cooperatively and collaboratively design, test, and develop EM systems, consistent with NPFMC's goal to integrate EM into the Observer Program. A document describing the EM pre-implementation plan for 2016 exists, and also noting other EM research and development that is scheduled to take place in 2016 is available on the NPFMC website137 . No observer coverage in 2016 was scheduled (i.e. vessels in the "no-selection pool") for catcher vessels less than 40 ft LOA, or vessels fishing with jig gear, or fixed gear vessels that have opted-into the EM selection pool. For 2016, 58 fixed-gear vessels 40-57.5 ft LOA will participate in the EM selection pool and will carry EM systems as described in the EM Plan. The Observer Program

Non-conformance 1 (of1)	
	Annual Report (NMFS 2015a) and the Observer Program Supplement Environmental Assessment (NMFS 2015b) have highlighted the data gaps caused by not having any observer information on vessels less than 40 ft LOA. In 2014, vessels less than 40 ft took about 20% (in value) of the longline halibut catch in Alaska (Fissel et al. 2015). NMFS recommended in its 2016 Deployment Plan138 that vessels less than 40ft LOA be considered for electronic monitoring in the future, and there are plans to partially implement EM in this sector in 2017. The lack of observer coverage for vessels less than 40 ft LOA constitutes a minor non-conformance, as there is still observer coverage for a large portion of the fishery
Corrective Action Plan (CAP):	Evidence in the form of combined data or summary of reports from the work on year 2 and 3 will be provided to the CAB that shows that EM program has been implemented by year 2019 (3rd year).
Progress against the CAP:	On the third surveillance assessment following the re-assessment in January 2017 it was found that some progress was made according to the Client Action Plan. However, the team could not find evidence of EM implementation on under the 40" fleet or plans to when is going to be implemented. Therefore, the evidence presented was not yet sufficient to be considered fulfillment of the NC. Therefore? The NC remained open. On the 4rth surveillance, to address the minor NC, the assessment team used the analysis provided by a joint NFMS and IPHC effort and relayed to us by FVOA. The data and analysis had the goal to investigate gaps in observer coverage from 2010- 2017 for hook and line vessels less than 40ft LOA compared to larger vessels > 40ft LOA and describe the observer coverage by IPHC statistical area. The NMFS and IPHC analysts provided FVOA haul-level information summarized by IPHC statistical area based on geo retrieval locations. The observer haul summaries included all hook and line data for a given IPHC statistical area, with data summaries on unique vessel count (vessels observed), total haul weight (lb), and year fishing occurred. This information was joined with the logbook information based on the IPHC area grouping factors in the logbook data. The primary issues are to understand the proportion of catch, in the form of unreported discards, that are not accounted for. These analyses were undertaken to get a more complete understanding of the impacts of the vessels > 40ft LOA. The analysis addressed the following questions: • In what areas are the <40ft fleet fishing, where is the greatest effort exerted, and how does this compare with the >40ft fleet subject to observer coverage? The primary findings of this aspect of the analysis indicated that there was high spatial overlap in effort between the two fleets (<40ft fleet and >40ft fleet). The under 40ft fleet had more near-shore activity in southeast Alaska than the >40ft vessels.

Non-conformance 1 (of1)

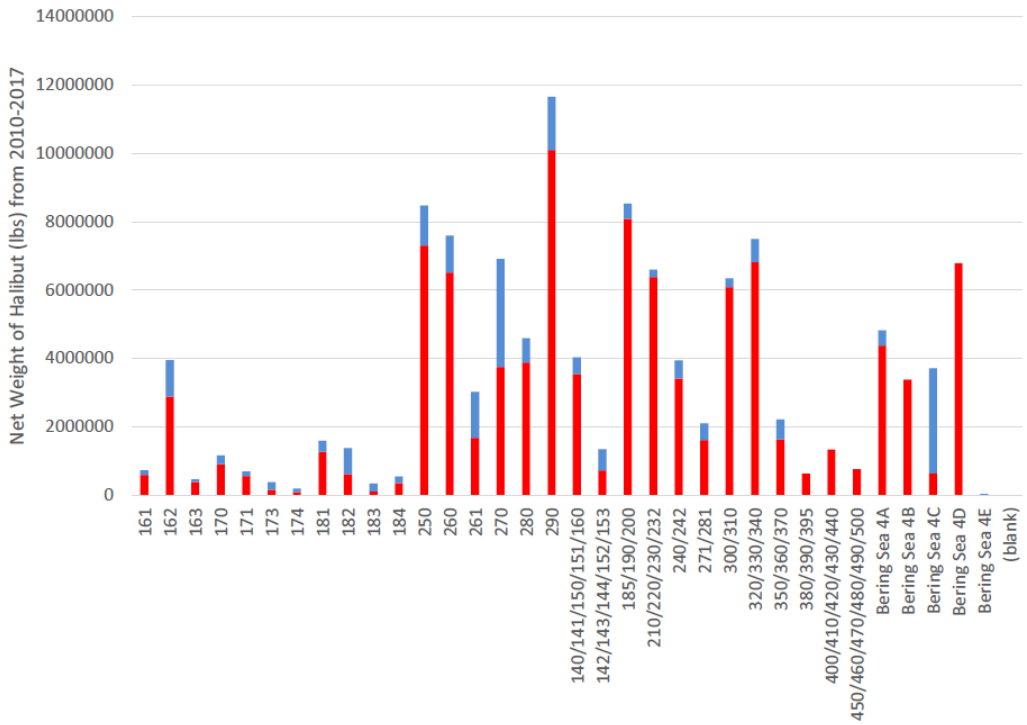

Figure 2. Net weight of halibut catches (lbs) of the <40ft and >40ft fleet of halibut vessels across the IPHC statistical areas from 2010-2017 reported in logbooks. Red bars represent the sum of the catch for the over 40ft fleet (i.e. fleet subject to observer coverage) and the blue bars are the <40ft fleet.

- In the areas where there is substantial <40ft coverage, what is the level of observer coverage in the >40ft fleet?

Effort for vessels <40ft from 2010-2017 was highest in the Bering 4C area, and 270. Besides Bering 4C, there was 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.

- Based on the above results, what is the level of concern that the discarded catch from the <40ft fleet is not adequately captured by the current observer program for the >40ft fleet?

Bering Sea 4C and 270 both had a high proportion of vessels over 40ft subject to observer coverage (over 75% and 50%, respectively). Observer coverage was low across the southeast region, where <40ft vessels comprise roughly 50% of the effort in some regions. However, effort and volume of catch of halibut is comparatively low across this region, and thus 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.

Non-conformance 1 (of1)	
	With the overlap and magnitude analysis presented above, **the team considered that the client has addressed the minor nonconformance**. Catch data and other biological information and research results serve as inputs into the annual stock assessment process and form the basis for the setting of 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). Uncertainty in estimates of mortality create bias in this assessment. However, the analysis demonstrated that the relative volume of catch by the <40ft fleet would not present a risk to main bycatch species, where estimated catches that could be theoretically attributed to the ~20% of landings taken by the <40' fleet and overall Halibut fleet catches are not considered to jeopardize the status of any main bycatch species. The data demonstrates that in terms of effort, the >40ft fleet is dominant in most stat areas and there are few stat areas in which the <40ft fleet has significant effort with little to no effort by the >40ft fleet for the years reviewed. The data is presented as summed for all years, but has also been reviewed by year, with year-over effort generally consistent
Non-conformance status:	Closed – following surveillance audit 4.

8.1.2 New or revised corrective action plans

There are no new corrective action plans or pre-existing plans at the moment.

8.1.3 Proposed surveillance activities

There are no proposed future surveillance activities as this the 4rth surveillance audit.

9 Recommendations for continued certification

Following this surveillance audit, the Audit Team recommends that the fishery Alaska Pacific Halibut Commercial fishery be awarded continuing certification against RFM Certification Program Fisheries Standard Version 1.3.

10 References

1. NOAA Office of General Counsel - Enforcement Section:
Policy for the Assessment of Civil Administrative Penalties and Permit Sanctions:
https://www.gc.noaa.gov/documents/Penalty-Policy-CLEAN-June242019.pdf
2. Alaska Statutes - Title 16 Fish and Game; Chapter 5 Fish and Game Code:
Misdemeanor commercial fisheries penalties:
http://www.touchngo.com/lglcntr/akstats/Statutes/Title16/Chapter05.htm
3. Alaska Statutes - Title 16 Fish and Game; Chapter 5 Fish and Game Code:
Strict liability commercial fishing penalties:
http://www.touchngo.com/lglcntr/akstats/Statutes/Title16/Chapter05/Section722.htm
4. International Pacific Halibut Commission - Meetings:
https://iphc.int/iphc-meetings
5. International Pacific Halibut Commission – Report of the 2nd Performance Review:
https://www.iphc.int/uploads/pdf/priphc/priphc0202/iphc-2019-priphc02-r.pdf
6. Alaska Legislative Affairs Agency:
http://akleg.gov/publications.php
7. Alaska State Constitution:
https://ltgov.alaska.gov/information/alaskas-constitution/
8. Alaska Administrative Code:
http://www.akleg.gov/basis/aac.asp

11 Appendices

11.1 Appendix 1 – Assessment Team Bios

11.1.1 Assessment Team Bios

Based on the technical expertise required to carry out this assessment, an Audit 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 He also has been working as environmental consultant in the Caribbean doing field work and looking at the effects of industrialization on essential fish habitats and for the Environmental Defence Fund developing population dynamics models for data poor stocks in the Gulf of California. Recently Dr. Mateo worked as National Research Council postdoc research associate at the NOAA National Marine Fisheries Services Ted Stevens Marine Research Institute on population dynamic modelling of Alaska sablefish.

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 masters level students working on various state and federally managed fish stocks.

Robert Allain, Assessor 2

Mr. Allain is a graduate of Saint Mary's University in Halifax, Nova Scotia with undergraduate degrees in Commerce (Business Administration) and Science (Chemistry). In 1977, he joined the then Federal Department of Fisheries and Environment as a Fishery Officer (International Surveillance) and carried out inspections of foreign and domestic fishing vessels within and beyond Canada's EEZ. During his 32-year career with the now Department of Fisheries and Oceans (DFO), Mr. Allain served in a variety of fisheries management, strategic planning and policy positions in Nova Scotia, New Brunswick, Prince Edward Island, Newfoundland and Labrador, and at Departmental Headquarters in Ottawa. He served as a senior executive from 1991 to 2008.

Currently, he is the president of the consulting firm OceanIQ Management Services in Dieppe, New Brunswick. He is a Marine Stewardship Council-certified P3 assessor who has participated in approximately 25 assessments and surveillance audits in Canada and the U.S. in respect of demersal, pelagic, invertebrate and crustacean fisheries. He is also fully conversant with the Alaska Responsible Fisheries Management (AK RFM) model through his participation as a technical expert to the ASMI's Fisheries Standard Committee that developed the certification scheme.