

SURVEILLANCE NO. 2

DNV·GL

# Report for the Gulf of Alaska and Bering Sea and Aleutian Islands Pacific Cod Fisheries

**Alaska Fisheries Development Foundation (AFDF)**

**Authors:** Jodi Bostrom, Giuseppe Scarcella

**Report No.:** NA

**Certificate No.:** 240498-2017-AQ-NOR

**Date:** May 9, 2020



---

---

---

Surveillance audit No.: 2  
Report title: Report for the Gulf of Alaska and Bering Sea and Aleutian Islands Pacific Cod Fisheries  
Customer: Alaska Fisheries Development Foundation (AFDF)  
PO Box 2223  
Wrangell, AK 99929-2223 USA  
Contact person: Julie Decker  
Date of issue: May 9, 2020  
Project No.: PRJC-560941-2017-MSC-NOR  
DNV GL Organization unit: ZNENO418  
Report No.: NA,  
Certificate No: 240498-2017-AQ-NOR

DNV GL - Business Assurance  
DNV GL Business Assurance Norway AS  
Veritasveien 1  
1322 HØVIK, Norway  
Tel: +47 67 57 99 00  
<http://www.dnvgl.com>

---

**Objective:**

The objective of this report is the second surveillance audit of the Alaska Pacific cod fishery against the Responsible Fisheries Management (RFM) standard v1.3.

---

Prepared by:  
Jodi Bostrom  
DNV GL Senior Assessor

Giuseppe Scarcella  
Stock Assessment and Management system expert

---

- 
- Unrestricted distribution (internal and external)    Keywords:  
 Unrestricted distribution within DNV GL                      RFM, Alaska, Pacific cod  
 Limited distribution within DNV GL after 3 years  
 No distribution (confidential)  
 Secret
- 

Reference to part of this report which may lead to misinterpretation is not permissible.



Rev. No.	Date	Reason for Issue	Prepared by
0	May 9, 2020	First Issue	Jodi Bostrom, Giuseppe Scarcella



## TABLE OF CONTENTS

GLOSSARY .....	1
Abbreviations and Acronyms .....	1
1 SUMMARY AND RECOMMENDATION .....	2
1.1 Fundamental Clauses Summary .....	2
1.2 Audit Conclusion .....	6
2 GENERAL INFORMATION.....	6
3 ASSESSMENT TEAM DETAILS .....	7
4 BACKGROUND TO THE FISHERY .....	8
4.1 Fishery Description .....	8
4.2 Original Assessment and Previous Surveillance Audits .....	9
5 THE ASSESSMENT PROCESS .....	9
5.1 Meetings Attended .....	9
5.2 Stakeholder Input .....	9
6 ASSESSMENT OUTCOME SUMMARY/FUNDAMENTAL CLAUSES SUMMARIES .....	9
6.1 The Fisheries Management System (A) .....	9
6.2 Science and Stock Assessment Activities (B) .....	18
6.3 The Precautionary Approach (C) .....	23
6.4 Management Measures (D) .....	30
6.5 Implementation, Monitoring and Control (E) .....	37
6.6 Serious impacts of the fishery on the Ecosystem (F) .....	39
REFERENCES.....	49
APPENDICES .....	52
Appendix 1 Stakeholder Submissions .....	52

---

---

---

## GLOSSARY

### Abbreviations and Acronyms

ABC	Allowable Biological Catch
ADFG	Alaska Department of Fish and Game
AFSC	Alaska Fisheries Science Center
AWT	Alaska Wildlife Troopers
BOF	Board of Fisheries
BSAI	Bering Sea and Aleutian Islands
C/P	Catcher/processor
CCRF	Code of Conduct for Responsible Fisheries
CDQ	Community Development Quota
CFEC	Commercial Fisheries Entry Commission
CIE	Center of Independent Experts
CV	Catcher vessel
EBS	Eastern Bering Sea
EIS	Environmental Impact Statement
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
ESA	Endangered Species Act
FAO	Food and Agriculture Organization of the United Nations
FMP	Fishery Management Plan
GHL	Guideline Harvest Level
GOA	Gulf of Alaska
HCR	Harvest Control Rule
LLP	License Limitation Program
MCS	Monitoring, control, and surveillance
MRA	Maximum Retainable Allowance
MSFCMA or MSA	Magnuson-Stevens Fisheries Management and Conservation Act
MSST	Minimum Stock Size Threshold
MSY	Maximum Sustainable Yield
mt or t	Metric ton
NBS	Northern Bering Sea
NEPA	National Environmental Policy Act
nm	Nautical miles
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPFMC (the Council)	North Pacific Fishery Management Council
NPRB	North Pacific Research Board
OFL	Overfishing Level
OLE	Office for Law Enforcement
OY	Optimum Yield
PA	Precautionary Approach
PSC	Prohibited Species Catch
PWS	Prince William Sound
RFM	Responsible Fisheries Management (standard)
SAFE	Stock Assessment and Fishery Evaluation (report)
SSC	Scientific and Statistical Committee
TAC	Total Allowable Catch
TSC	Technical Subcommittee
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
VMS	Vessel monitoring system

# 1 SUMMARY AND RECOMMENDATION

## 1.1 Fundamental Clauses Summary

<b>Fundamental Clause</b>	<b>Evidence adequacy rating:</b>	<b>Justification:</b>
1: Structured and legally mandated management system	High	<p>The Alaskan Pacific cod fisheries are managed by the North Pacific Fishery Management Council (NPFMC; the Council) and the National Oceanic and Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NMFS) in the federal waters (3-200 nautical miles [nm]); and by the Alaska Department for Fish and Game (ADFG) and the Board of Fisheries (BOF) in the state waters (0-3 nm). In federal waters, Alaska Pacific cod fisheries are managed under the Council's Gulf of Alaska (GOA) and Bering Sea and Aleutian Islands (BSAI) Groundfish fishery management plans (FMPs) written and amended subject to the Magnuson-Stevens Fishery Conservation and Management Act (MSA). Within state waters, ADFG and the BOF manage the eight Pacific cod fisheries as "parallel" or state fisheries, conducted under federal total allowable catch (TAC), regulations and management measures. Parallel fisheries occur simultaneously with federal fisheries and state fisheries operate after the federal/parallel fisheries close and are based on guideline harvest levels (GHL) set as percentages of the GOA federal allowable biological catch (ABC). The U.S. Coast Guard (USCG), the NMFS Office of Law Enforcement (OLE) and the Alaska Wildlife Troopers (AWT) and/or deputized ADFG staff, enforce fisheries regulations in federal and state waters, respectively.</p>
2: Coastal area management frameworks	High	<p>The NMFS and the Council participate in coastal area management-related institutional frameworks through the federal National Environmental Policy Act (NEPA) processes. These include decision-making processes and activities relevant to fishery resources and users in support of sustainable and integrated use of living marine resources and avoidance of conflict among users. The NEPA processes provide public information and opportunity for public involvement that are robust and inclusive at both the state and federal levels. With regards to conflict avoidance and resolution between different fisheries, the Council and the BOF tend to avoid conflict by actively involving stakeholders in the process leading up to decision making. Both entities provide information on their websites, including agenda of meetings, discussion papers, and records of decisions. The Council and the BOF actively encourage stakeholder participation, and their deliberations are conducted in open, public sessions. The Community Development Quota (CDQ) Program was created by the Council in 1992 to provide western Alaska communities an opportunity to participate in the BSAI fisheries. There are 65 communities within a 50-mile radius of the BS coastline who participate in the program, which allocates a percentage of the BSAI TACs for several species.</p>

3: Management objectives and plan High

The MSA is the primary domestic legislation governing the management of the U.S. marine fisheries. Under the MSA, the Council is authorized to prepare and submit an FMP to the Secretary of Commerce and any necessary amendments, for each fishery under its authority that requires conservation and management. These include Groundfish FMPs for the GOA and the BSAI that incorporate the Pacific cod fisheries in those regions. Both FMPs present long-term management objectives for the Alaska Pacific cod fishery, reviewed annually by the Council. In state waters, the BOF has identified guiding principles for the development of their groundfish management plans (see 2019-2020 Statewide Commercial Groundfish Fishing Regulations<sup>1</sup>).

4: Fishery data High

The NMFS and the ADFG collect fishery data and conduct fishery independent surveys to assess the Pacific cod fisheries and ecosystems in GOA and BSAI. Stock Assessment and Fishery Evaluation (SAFE) reports provide complete descriptions of data collections and time series. Records of catch and effort are first recorded through the e-landing (electronic fish tickets) catch recording system and secondly, collected by vessel captains in logbooks. Fishery independent data are collected in regular trawl and longline surveys of both the GOA and BSAI regions and additional fishery dependent data are collected by the extensive observer program present in both regions. Other sources of data are also considered during the stock assessment process.

5: Stock assessment High

The NMFS has a well-established institutional framework for research developed within the Alaska Fisheries Science Center (AFSC). Scientists at the AFSC conduct research and stock assessments on Pacific cod in Alaska each year, producing annual SAFE reports for the federally managed Eastern Bering Sea (EBS), GOA, and AI Pacific cod stocks. (Only recently were separate SAFE reports done for the EBS and AI.) ADFG also conducts scientific research and surveys on its state-managed Pacific cod fisheries. These SAFE reports summarize the best-available science, document stock status, significant trends or changes in the resource, marine ecosystems, and fishery over time, assess the relative success of existing state and federal fishery management programs, and produce recommendations for annual quotas and other fishery management measures. The annual stock assessments are peer reviewed by experts and recommendations are made annually to improve the assessments. An additional level of peer review by external experts is conducted periodically (Center of Independent Experts' [CIE] reviews). The most recent stock assessments for GOA and EBS Pacific cod have shown large declines in biomass, and management actions have reduced the ABC and TAC levels. None of the three Pacific cod stocks are determined to have overfishing occurring.

---

<sup>1</sup>[https://www.adfg.alaska.gov/static/regulations/fishregulations/pdfs/commercial/2019\\_2020\\_cf\\_groundfish\\_reqs.pdf](https://www.adfg.alaska.gov/static/regulations/fishregulations/pdfs/commercial/2019_2020_cf_groundfish_reqs.pdf)

6: Biological reference points and harvest control rule

High

The SAFE volume contains a chapter or sub-chapter for each stock and contains estimates of all annual harvest specifications except TAC, all reference points needed to compute such estimates, and all information needed to make annual status determinations with respect to “overfishing” and “overfished”. The Council’s harvest control system is a complex and multi-faceted suite of management measures to address issues related to sustainability, legislative mandates, and quality of information. The tier system specifies the maximum permissible ABC and of the Overfishing Level (OFL) for each stock in the complex. Stocks in tier 3 are further categorized (a), (b), or (c) based on the relationship between Biomass (B) and B40% (Tier 3). The category assigned to a stock determines the method used to calculate ABC and OFL. As specified in the MSA, if stocks decline below the Minimum Stock Size Threshold (MSST) (e.g., B17.5%), a rebuilding plan must be established to bring the biomass back to the BMSY level within a specified timeframe. For Pacific cod and some other stocks, there is an additional threshold, B20%, used as a measure to protect Steller sea lions. Based on the 2019 SAFE report, there is a 73.3% probability that biomass for GOA Pacific cod is below the B20% threshold in 2020, and 27.7% probability that the stock is below B17.5%. Biomass of EBS Pacific cod was estimated to be below B40% in 2020 (Tier 3b) and projected to decline more in 2020 (Tier 3b).

7: Precautionary approach

High

Precautionary approach (PA)-based reference points are used in the management of the Pacific cod stocks, and the scientific information and stock assessments available are at a consistently high level, providing the necessary basis for conservation and management decisions. There are three core components to the application of the PA in Alaskan groundfish fisheries. First, the FMP for each management area sets out an optimum yield (OY) for the groundfish complex in each of BSAI and GOA Regions as a whole, which includes Pacific cod along with the majority of targeted groundfish species. This value has been accepted as 2 million t for the BSAI Region. The second component is the tier system, which assigns each groundfish stock to a tier according to the level of scientific understanding, data available, and uncertainty associated with the fishery. Each tier has an associated set of management guidelines, particularly in relation to calculating the level of catch permitted. The EBS and GOA Pacific cod stocks are categorized as Tier 3 while the AI stock is Tier 5. The third component is the OFL, ABC, and TAC system.

8: Management measures to produce maximum sustainable levels

High

The MSA is the federal legislation that defines how fisheries off the U.S. Exclusive Economic Zone (EEZ) are to be managed. From this legislation and Council objectives, the management system for the Alaska groundfish fisheries has developed into a complex suite of measures comprised of harvest controls (e.g., OY, TAC, ABC, OFL), effort controls (limited access, licenses, cooperatives), time and/or area closures





(habitat protected areas, marine reserves), bycatch controls (prohibited species catch [PSC] limits, maximum retainable allowances [MRAs], gear modifications, retention and utilization requirements), observers, monitoring and enforcement programs, social and economic protections, and rules responding to other constraints (e.g., regulations to protect Steller sea lions). Stocks are measured against metrics defined in the MSA and if they are overfished, approaching an overfished condition, or overfishing is occurring, specific measures must be taken, such as implementing a rebuilding program within specified timeframes. The Council's harvest control system is complex and multi-faceted in order to address issues related to sustainability, legislative mandates, and quality of information.

9: Appropriate standards of fisher's competence High

The State of Alaska enhances the education and skills of fishers through education and training programs and, where appropriate, their professional qualifications. Records of fishers are maintained along with their qualifications via elective and required training for deckhands and licensed crewmembers.

10: Effective legal and administrative framework High

The Alaska Pacific cod fishery uses enforcement measures including vessel monitoring systems (VMSs) on board vessels, USCG boardings and inspection activities. The USCG and NMFS OLE enforce fisheries laws and regulations. OLE special agents and enforcement officers conduct complex criminal and civil investigations, exam and board vessels through dockside and at-sea inspections for safety and fishery regulations, inspect fish processing plants, and conduct patrols on land, in the air and at sea. Observers are required to report infringements, and OLE and USCG officers conduct de-briefing interviews with observers and monitor fishing practices and the conduct of the crew on board vessels. NOAA agents and officers can assess civil penalties directly to the violator in the form of fines or can refer the case to NOAA's Office of General Counsel for Enforcement and Litigation. State regulations are enforced by AWT. Also, USCG and AWT can terminate a vessel's fishing voyage and may require the vessel to return to port to remedy any violation, and USCG has the authority to enforce any federal law.

11: Framework for sanctions High

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

sanctions under the statutes and regulations enforced by NOAA. The AWT enforce state water regulations with a number of statutes that enable the government to fine, imprison, and confiscate equipment for violations and restrict an individual's right to fish if convicted of a violation. The low proportion of violations encountered during at-sea patrols of the Alaska fisheries demonstrates effective deterrence. No recent sanctions have been applied by State of Alaska authorities in the state Pacific cod fisheries, and ADFG considers that sanctions are effective deterrents.

12: Impacts of the fishery on the ecosystem High

The Council, NMFS, and other relevant organizations continue to closely monitor the fisheries and their respective environmental effects. Appropriate significance appears to be allocated to issues of concern (including in response to stakeholder concerns – such as effects on bycatch populations and effects on habitat). FMPs, Environmental Impact Assessments, and other assessments are kept under review. No changes are apparent in the management of the GOA or BSAI fisheries that would detrimentally affect performance against the confidence ratings for any supporting clauses. Full conformance continues against all supporting clauses.

13: Enhanced fisheries NA

NA: Not an enhanced fishery

## 1.2 Audit Conclusion

Fishery	Status of certification	Comment
The <b>Pacific cod</b> commercial fishery employing bottom trawl, longline, pot, and jig gears within Alaska jurisdiction (200 nm U.S. EEZ), and subjected to federal [NMFS and Council] and state [ADFG and BOF] management	<b>Certified</b>	Following the results of the 2nd surveillance audit finalized in April 2020, the assessment team concludes that the RFM Certificate for this fishery shall remain active until the certificate expiry date of 5 December 2022.

## 2 GENERAL INFORMATION

**Table 1 General information**

Fishery name	Alaska Pacific cod Fishery		
Unit(s) of Assessment	Applicant Group:	Alaska Cod Fishery Client Group	
	Product Common Name ( <i>Species</i> ):	Pacific cod ( <i>Gadus macrocephalus</i> )	
	Geographic Location:	GOA and BSAI within Alaska state and federal jurisdiction (200 nm EEZ)	
	Gear Types:	Bottom trawl, longline, pot, and jig gears	
	Principal Management Authority:	Federal (NMFS and the Council) and state (ADFG and BOF)	
Date re-certified	6 December 2017	Date of certificate expiry	5 December 2022
Surveillance type	Off-site surveillance/document review		
Date of surveillance audit	March-April 2020		
Surveillance stage	1st Surveillance		
	<b>2nd Surveillance</b>		<b>X</b>

	3rd Surveillance	
	4th Surveillance	
	Other (expedited, etc.)	
Surveillance team	Lead assessor: Jodi Bostrom Assessor(s): Giuseppe Scarcella	

This report contains the findings of the 2<sup>nd</sup> annual RFM Fisheries surveillance audit conducted for the Alaska Pacific cod fishery during March-April 2020.

The Alaska RFM program is a voluntary program that has been developed by the Alaska Seafood Marketing Institute to provide an independent, third-party certification that can be used to verify that these fisheries are responsibly managed according to the Alaska RFM standard.

This assessment is based on the fundamental clauses specified in the Alaska RFM Conformance Criteria v1.3. It is based on six major components of responsible management derived from the Food and Agriculture Organization of the United Nations (FAO) Code of Conduct for Responsible Fisheries (CCRF) in 1995 and Guidelines for the Eco-labeling of products from marine capture fisheries in 2009. The fundamental clauses are:

- 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

The purpose of this annual Surveillance Report is:

1. To establish and report on any material changes to the circumstances and practices affecting the original complying assessment of the fishery;
2. To monitor any actions taken in response to non-conformances raised in the original assessment of the fisheries;
3. To re-score any clauses where practice or circumstances have materially changed since the last audit.

### 3 ASSESSMENT TEAM DETAILS

**Name**

**Jodi Bostrom**

DNV GL Lead Assessor and main area of responsibility  
Fundamental clause F (Serious Impacts of the Fishery on the Ecosystem):

**Qualifications summary**

Jodi Bostrom is a senior assessor and team leader for MSC Fisheries and RFM Fisheries at DNV GL Business Assurance. She earned an M.Sc. in Environmental Science from American University and a B.Sc. in Zoology from the University of Wisconsin. She has over four years of experience in MSC fisheries assessment services. Prior to that, she worked for five years at the MSC as a Senior Fisheries Assessment Manager. Among other things, she developed the MSC's benthic habitats policy and the Consequence Spatial Analysis (a risk-based framework for assessing habitat impacts in data-deficient situations) as part of the MSC Standard revision. Prior to the MSC, Jodi spent 11 years with the U.S. National Academy of Sciences' Ocean Studies Board where she worked on various projects from fisheries management and policy to bycatch and dredging impacts to eutrophication and sea level rise.

**Giuseppe Scarcella**

Main areas of responsibility

Giuseppe Scarcella is an experienced fishery scientist and population analyst and modeller, with wide knowledge and experience in the assessment of

Fundamental clause A (The Fisheries Management System), B (Science and Stock Assessment activities), C (The precautionary approach), D (Management measures), and E (Implementation monitoring and control):

demersal stocks. He holds a first degree in Marine Biology and Oceanography (110/110) from the Università Politecnica delle Marche, and a Ph.D. in marine Ecology and Biology from the same university, based on a thesis "Age and growth of two rockfish in the Adriatic Sea". After his degree he was offered a job as project scientist in several research programs about the structure and composition of fish assemblage in artificial reefs, off-shore platform and other artificial habitats in the Italian Research Council – Institute of Marine Science of Ancona (CNR-ISMAR) now Institute for Biological Resources and Marine Biotechnologies (CNR-IRBIM). During the years of employment, he has gained experience in benthic ecology, statistical analyses of fish assemblages, evolution in artificial habitats, fisheries ecology and impacts of fishing activities, stock assessment, otolith analysis, population dynamic and fisheries management. During the same years he attended courses of uni-multivariate statistics and stock assessment. He is also actively participating in the scientific advice process of FAO GFCM in the Mediterranean Sea and Scientific, Technical and Economic Committee for Fisheries for the European Commission (STECF). He is author and co-author of more than 50 scientific paper peer reviewed journals and more than 200 national and international technical reports, most of them focused on the evolution of fish assemblages in artificial habitats and stock assessment and fishery management.

## 4 BACKGROUND TO THE FISHERY

### 4.1 Fishery Description

No material changes occurred within this fishery since the recertification's first surveillance carried out in January 2019. All information on this fishery could be obtained from the original full assessment report, subsequent surveillance reports, and re-assessment report available for the download at: <http://www.alaskaseafood.org/rfm-certification/certified-fisheries/alaska-cod/>.

Catch data are similar to the previous years, and recent data are presented below:

#### BSAI

Species	Latin name	2019 ABC (metric ton; mt)	2019 Total Catch (mt)
Pacific cod in EBS	<i>Gadus macrocephalus</i>	181,000	149,213
Pacific cod in AI	<i>Gadus macrocephalus</i>	20,600	18,899

#### GOA

Species	Latin name	2019 ABC (mt)	2019 Total Catch (mt)
Pacific cod	<i>Gadus macrocephalus</i>	17,000	13,373

## 4.2 Original Assessment and Previous Surveillance Audits

The Alaska BSAI and GOA Pacific cod fisheries were first certified under the requirements of the Alaska RFM standard v1.2 on 17 April 2013. The initial certification and three annual surveillance audits were carried out by the certification body Global Trust.

On 15 April 2017, the certificate for this fishery was transferred from Global Trust to the DNV GL. The certificate transfer and the fourth surveillance audit were carried out by the DNV GL. During June-December 2017, the fishery went through the full re-assessment against a newer version of the standard, v1.3. This re-assessment did not result in any changes in the compliance of the fishery with the RFM standard, and no non-conformities were raised. The new certificate was therefore issued with the validity date until 5 December 2022.

In January 2019, the first surveillance of the recertification took place via an off-site surveillance/document review, and the surveillance report was issued on 25 February 2019. Following the results of the first surveillance audit, the assessment team concluded that the RFM certificate for this fishery shall remain active until the certificate expiry date of 5 December 2022, pending the outcomes of future surveillances.

## 5 THE ASSESSMENT PROCESS

### 5.1 Meetings Attended

No on-site stakeholder consultancy was carried out during the second surveillance audit. DNV GL has carefully reviewed the full-assessment report, all subsequent surveillance reports and re-assessment report and has concluded that the low risk nature of the fishery, absence of conditions and history of excellent compliance with the rules and regulations in the client operations do allow for the remote surveillance audit with the desk review of new information only.

### 5.2 Stakeholder Input

The second annual surveillance audit for this fishery was publicly announced on 27 March 2020. The assessment team received an update from the client covering changes since the last surveillance, but no external stakeholder input was received.

## 6 ASSESSMENT OUTCOME SUMMARY/FUNDAMENTAL CLAUSES SUMMARIES

### 6.1 The Fisheries Management System (A)

#### Fundamental Clause 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.

No. supporting clauses	13
Applicable supporting clauses	6
Non-applicable supporting clauses	7 (1.3, 1.3.1, 1.4, 1.4.1, 1.5, 1.6.1, 1.9)
Overall level of conformity	High
Non-conformances	None

**Evidence of continuous compliance with the fundamental clause:**

Considerable resources in the form of stock assessment, ecosystem monitoring and management expertise and capacity; management organizations and structures (e.g., NMFS Alaska region, the Council, OLE, USCG, Observer Program) are dedicated to fisheries, including Pacific cod, in Alaskan federal waters. National legislation and the regulatory process by which the Council and NMFS are directed and follow, enable the management of the resource at regional and localized levels. The adaptive and consultative management approach adopted by the Council actively promotes stakeholder participation. The NOAA Office of General Council reviews any proposed management action to assure compliance with the MSA. International obligations (e.g., combating IUU illegal, unreported, and unregulated fishing) and the enforcement of federal regulations are upheld by the federal departments such as USCG and OLE.

Within state waters, the eight Pacific cod fisheries (Kodiak, Chignik, South Alaska Peninsula, Aleutian Islands, Southeast Alaska, Prince William Sound [PWS], Cook Inlet, and Dutch Harbor) are supported by area specific stock assessment surveys as well as shared information from federal assessments. The ADFG and the BOF manage the state Pacific cod fishery as "parallel" or state fisheries. Parallel fisheries are conducted under federal TACs, regulations and management measures. State fisheries operate after the federal/parallel fisheries close and are based on GHM which, for Pacific cod, are based on 15-25% of Pacific cod ABC (27% of AI ABC for the Aleutian Islands fishery). Technical expertise is available in-house (ADFG) and supported through the participation in and with groups established by the Council. The BOF provides a consultative management approach that offers and takes account of stakeholder input. The AWT input into the development of regulations and are responsible for their enforcement at-sea and ashore.

The assessment models used take into account all sources of fishing mortality and are based on complete catch reporting systems including extensive observer data. Catches from fisheries occurring in state-managed waters are included in the appropriate assessments. All retained catch and discards of Pacific cod are included in the total catch amounts input into the models. The assessments take into account various relevant aspects of Pacific cod biology and distribution. The assessments of EBS and GOA Pacific cod are age-structured, use a Bayesian approach, consider sources of uncertainty where possible, and evaluate stock status relative to reference points in a probabilistic way. Both EBS and GOA SAFE reports give extensive histories of the models used in the assessments (Thompson and Thorson 2019; Barbeau et al. 2019). The AI Pacific cod assessment relies on survey biomass estimates and a simpler random effects model, although various age-structured models were examined and reported in the recent SAFE report (Thompson et al. 2019). It is important to clarify that EBS and AI have only recently been evaluated separately.

The Council's FMPs (NPFMC 2018a, 2019) explicitly describe the Council's commitment to review management issues and this is reflected in the numerous Council meetings that take place each year. Similarly, the BOF websites have dedicated pages to their public meetings and agendas and outcomes reflect a commitment to review previously agreed management measures.

There is an agreed system to finance the fishery management organizations and arrangements. In general, the costs of fisheries management and conservation are funded through Congressional and state appropriations that follow the federal and state budget cycles. Cost recovery from certain fleet sectors is also in operation. The MSA authorizes and requires the collection of cost recovery fees for limited access privilege programs, such as the CDQ Program. Cost recovery fees recover the actual costs directly related to the management, data collection, and enforcement of the programs. The current groundfish observer program is a further example of management being financially supported through cost recovery. Estimates of the costs for federal and state management, research, and enforcement of the groundfish stocks in the BSAI and GOA are reported in the BSAI and GOA Groundfish FMPs.

There are procedures at multiple levels to review management measures, and the MSA is reviewed by Congress every five years and is periodically revised and reauthorized. The adaptive management approach taken in the Alaska Pacific cod fisheries requires regular and periodic review. Component parts of the FMPs are regularly reviewed, including outcome indicators, and various levels of Environmental Impact Statements (EISs) are undertaken when the FMPs are amended in order to review the environmental and socio-economic consequences, as well as assess the effectiveness of the changes. Stakeholders are actively encouraged to participate in Council and BOF meetings and, in so doing, opportunity to review management measures is provided. Stock status is reviewed and updated annually, producing SAFE reports for the federally managed GOA, EBS, and AI Pacific cod stocks. ADFG also conducts scientific research and surveys on its 8 state-managed Pacific cod fisheries. The SAFE reports document stock status and significant trends or changes in the resource, marine ecosystems and fishery over time. The reports also assess the relative success of existing state and Federal fishery

management programs and, based on stock status indicators, provide recommendations for annual quotas and other fishery management measures.

The Council (and NMFS) as well as the BOF (and ADFG) provide substantial amounts of information on their websites, including agenda of meetings, discussion papers, and records of decisions. The Council and the BOF actively encourage stakeholder participation, and all Council and BOF deliberations are conducted in open, public sessions. Anyone may submit regulatory proposals, and all such proposals are given due consideration by both the Council and the BOF.

The current RFM assessment/certification document states that Pacific cod stocks in Alaska are not considered to be transboundary, straddling, highly migratory, or high seas stocks. Thus, several sub-clauses in this fundamental clause have not been scored in that certification report, and subsequently in this surveillance audit. Research conducted in 2018 indicates that the genetic samples from the NBS survey in 2017 are very similar to those from the EBS survey area and quite distinct from samples collected in the AI and the GOA (Spies et al. 2020). In addition, analyses indicated that the Northern Bering Sea (NBS) samples were unlikely to be from a population that was not sampled, such as Russia". During discussion of the EBS stock assessment in the Council process, it was pointed out that the current distribution of Pacific cod within the Bering Sea was unprecedented, and that there was uncertainty regarding the migration of Pacific cod between NBS, EBS, GOA, and areas outside the U.S. EEZ.

The October 2019 Scientific and Statistical Committee (SSC) meeting pointed out that genetic information shows the NBS and EBS to be a single stock. Additionally, the 2019 trawl survey showed evidence of younger fish in the NBS and EBS, and recent trawl surveys have consistently shown higher aggregations on northern edge of the EBS. Tagging information will further help inform the relationship of the cod stock between the EBS and NBS. In the EBS Pacific cod SAFE report an attempt to reconcile these parts was carried out, models associated with Hypothesis 1 were included in the ensemble but given very little weight. The EBS Pacific cod SAFE report clearly pointed out the need to understand the spawning contribution of NBS fish to the overall stock. Additional surveys of the NBS are strongly encouraged, as are genetic analyses and tagging studies. This is an issue to monitor in future surveillance audits.

In 2019, a climate-enhanced multi-species stock assessment was conducted for pollock, Pacific cod, and arrowtooth flounder in the EBS (Holsman et al. 2019). Results are presented from models estimated and projected without trophic interactions (single-species mode) and with trophic interactions (multi-species mode; see <https://www.fisheries.noaa.gov/resource/data/2019-climate-enhanced-multi-species-stock-assessment-walleye-pollock-pacific-cod-and>).

The assessments of the Pacific cod stocks in the AI, BS, and GOA are conducted routinely with the most recent done in November 2019 (Thompson and Thorson 2019; Barbeaux et al. 2019; Thompson et al. 2019).

### **Evidence of continuous compliance with the supporting clauses**

There is no material change in compliance with any of the following supporting clauses. The Pacific cod stocks in Alaska are not considered to be transboundary, straddling, highly migratory, or high seas stocks and so clauses 1.3, 1.3.1, 1.4, 1.4.1, 1.5, 1.6.1, and 1.9 are not applicable.

1.1 There shall be an effective legal and administrative framework established at local and national level appropriate for fishery resource conservation and management. The management system and the fishery operate in compliance with the requirements of local, national and international laws and regulations, including the requirements of any regional fisheries management agreement.

1.2 Management measures shall consider 1) the whole stock biological unit (i.e. structure and composition contributing to its resilience) over its entire area of distribution, 2) the area through which the species migrates during its life cycle and 3) other biological characteristics of the stock.

1.2.1 Previously agreed management measures established and applied in the same region shall be taken into account by management.

1.3 Where trans-boundary, straddling or highly migratory fish stocks and high seas fish stocks are exploited by two or more States, the Applicant Management Organizations concerned shall cooperate and take part in formal fishery commission or arrangements that have been appointed to ensure



effective conservation and management of the stock/s in question.

1.3.1 Conservation and management measures established for such stock within the jurisdiction of the relevant States for shared, straddling, high seas and highly migratory stocks, shall be compatible. Compatibility shall be achieved in a manner consistent with the rights, competences and interests of the States concerned.

1.4 A State not member/participant of a sub-regional or regional fisheries management organization shall cooperate, in accordance with relevant international agreements and law, in the conservation and management of the relevant fisheries resources by giving effect to any relevant measures adopted by such organization/arrangement.

1.4.1 States seeking to take any action through a non-fishery organization which may affect the conservation and management measures taken by a competent sub-regional or regional fisheries management organization or arrangement shall consult with the latter, in advance to the extent practicable, and take its views into account.

1.5 The Applicant fishery's management system shall actively foster cooperation between States with regard to 1) information gathering and exchange, 2) fisheries research, 3) fisheries management, and 4) fisheries development.

1.6 States and sub-regional or regional fisheries management organizations and arrangements, as appropriate, shall agree on the means by which the activities of such organizations and arrangements will be financed, bearing in mind, inter alia, the relative benefits derived from the fishery and the differing capacities of countries to provide financial and other contributions. Where appropriate, and when possible, such organizations and arrangements shall aim to recover the costs of fisheries conservation, management and research.

1.6.1 Without prejudice to relevant international agreements, States shall encourage banks and financial institutions not to require, as a condition of a loan or mortgage, fishing vessels or fishing support vessels to be flagged in a jurisdiction other than that of the State of beneficial ownership where such a requirement would have the effect of increasing the likelihood of non-compliance with international conservation and management measures.

1.7 Procedures shall be in place to keep the efficacy of current conservation and management measures and their possible interactions under continuous review to revise or abolish them in the light of new information.

- Review procedures shall be established within the management system.
- A mechanism for revision of management measures shall exist.

1.8 The management arrangements and decision-making processes for the fishery shall be organized in a transparent manner.

- Management arrangements
- Decision-making

1.9 Management organizations not party to the Agreement to promote compliance with international conservation and management measures by vessels fishing in the high seas shall be encouraged to accept the Agreement and to adopt laws and regulations consistent with the provisions of the Agreement.

**Changes to Fundamental Clause Confidence Ratings.**

There are no changes in the management of fisheries that would detrimentally affect performance against the confidence ratings for the fundamental clauses and any supporting clauses.

**Conformance:**

Conformance level: High. Non-conformance: None

**Fundamental Clause 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.

No. supporting clauses	10
Applicable supporting clauses	8
Non-applicable supporting clauses	2 (2.1.1, 2.7)
Overall level of conformity	High
Non-conformances	None

**Evidence of continuous compliance with the fundamental clause:**

In managing the Alaska Pacific cod fisheries, NMFS, in conjunction with the Council and ADFG, participate in coastal area management-related issues through processes established by the NEPA, which requires that all federal agencies' funding or permitting decisions be made with full consideration of the impact to the natural and human environment. An environmental review process is required that includes a risk evaluation and evaluation of alternatives including a, "no action" alternative. The Council and the BOF system were designed so that fisheries management decisions were made at the regional level to allow input from affected stakeholders. Council meetings are open, and public testimony is taken on issues prior to deliberations and final decisions. In so doing, the management organizations within Alaska and their management processes take into account the rights of coastal fishing communities and their customary practices to the extent compatible with sustainable development.

The Council and BOF websites actively encourage and demonstrate participation by stakeholders at their respective public meetings and cover a wide range of topics regarding the use, development and management of coastal resources. Potential conflict between fishermen and other coastal users at the federal level are usually discussed and resolved through the NEPA process and, at the state level, through the BOF public meeting process or regional committee established as part of the state's land use and access planning processes.

The technical capacities of the federal and state agencies involved in the management of Alaska Pacific cod are significant, and include internationally recognized scientists, experienced fishery managers and policy makers and highly professional and trained enforcement officers. Appropriate technical and financial resources are in place. A joint protocol is in place between the Council and ADFG which provides the intent to provide long term cooperative, compatible management systems that maintain the sustainability of the fisheries resources in federal and state waters.

Canada abuts the U.S. border to the south and shares certain fisheries resources, however the Pacific cod stock is not considered to be transboundary. The United States and Canada have a very strong working relationship at both the national and regional levels. In cases involving boundary disputes and treaties governing fishery access, the USCG, NOAA, and Canadian Department of Fisheries and Oceans along with Canadian Coast Guard counterparts have effectively coordinated living marine resource enforcement efforts despite occasional related political and economic tensions. There are established agreements and shared management and working practice (e.g., International Pacific Halibut Commission, Pacific Salmon Treaty, an Agreement between the U.S. and Canada on enforcement).

The MSA requires the Council and other groups (BOF, ADGF, etc.) to hold public meetings within their respective regions to discuss the development and amendment of FMPs. These meetings are publicized by the Council and stakeholders actively encouraged to participate changes and allow input from stakeholders. The BOF website publishes information on forth-coming BOF meetings including the "Proposal Book" which details proposed ADFG or stakeholder-requested changes that might lead to regulatory change. Stakeholders are actively encouraged to participate at the meetings and submit proposal prior to the meetings. The OLE and AWT put an emphasis on educating and informing stakeholders of new regulatory changes and other important fishery related matters.

The CDQ program was created by the Council in 1992 to provide western Alaska communities an opportunity to participate in the BSAI fisheries that had been foreclosed to them because of the high capital investment needed to enter the fishery. The program involves eligible communities who have formed six regional organizations, referred to as CDQ groups. There are 65 communities within a 50-

mile radius of the BS coastline who participate in the program. The CDQ program allocates a percentage of the BSAI quotas to CDQ groups, including pollock, halibut, Pacific cod (10% of total BSAI quota), crab and bycatch species (<https://alaskafisheries.noaa.gov/sites/default/files/reports/annualmatrix2018.pdf>). 2019 CDQ allocations are reported in tables available at the following links:

<https://www.federalregister.gov/documents/2019/03/13/2019-04539/fisheries-of-the-exclusive-economic-zone-off-alaska-bering-sea-and-aleutian-islands-final-2019-and#p-24>

<https://www.federalregister.gov/documents/2019/03/14/2019-04538/fisheries-of-the-exclusive-economic-zone-off-alaska-gulf-of-alaska-final-2019-and-2020-harvest-p-36>

The program is reviewed every 10 years, with the last review occurring in 2012. Analysis by the State of Alaska in 2013 determined that each CDQ entity had maintained or improved performance against its objectives. The CDQ program provides an example of how the management system takes account of the allocation and use of coastal resources with respect to their economic, social and cultural value.

A considerable amount of monitoring of the coastal environment in Alaska is conducted and supported by multiple federal and state agencies (e.g., NMFS, AFSC, ADFG, universities such as the University of Alaska Fairbanks' Institute of Marine Science, and organizations that support and facilitate marine research such as the North Pacific Research Board [NPRB]). The NPRB have helped fund two major projects in the Alaska region: The Bering Sea Project and the Gulf of Alaska Ecosystem Study. AFSC has established the Ecosystem Monitoring and Assessment Program with an overall goal to improve and reduce uncertainty in stock assessment models of commercially important fish species through the collection of observations of fish and oceanography.

The State of Alaska is represented in the Oil Spill Task Force by the Department of Environmental Conservation. Its Division of Spill Prevention and Response prevents spills of oil and hazardous substances, prepares for when a spill occurs and responds rapidly to protect human health and the environment. The Oil Spill Recovery Institute located in PWS conducts research into oil spills and their effects on the Alaskan environment, particularly the natural resources in PWS.

### **Evidence of continuous compliance with the supporting clauses**

There is no material change in compliance with any of the following supporting clauses. Clause 2.7 is not applicable.

2.1 An appropriate policy, legal and institutional framework shall be adopted in order to achieve sustainable and integrated use of living marine resources, taking into account 1) the fragility of coastal ecosystems and finite nature of their natural resources; 2) allowing for determination of the possible uses of coastal resources and govern access to them, 3) taking into account the rights and needs of coastal communities and their customary practices to the extent compatible with sustainable development. In setting policies for the management of coastal areas, 4) States shall take due account of the risks and uncertainties involved.

2.1.1 States shall establish mechanisms for cooperation and coordination among national authorities involved in planning, development, conservation and management of coastal areas.

2.1.2 States shall ensure that the authority or authorities representing the fisheries sector in the coastal management process have the appropriate technical capacities and financial resources.

2.2 Representatives of the fisheries sector and fishing communities shall be consulted in the decision-making processes involved in other activities related to coastal area management planning and development. The public shall also be kept aware on the need for the protection and management of coastal resources and the participation in the management process by those affected.

2.3 Fisheries practices that avoid conflict among fishers and other users of the coastal area (e.g. aquaculture, tourism, energy) shall be adopted and fishing shall be regulated in such a way as to avoid risk of conflict among fishers using different vessels, gear and fishing methods. Procedures and mechanisms shall be established at the appropriate administrative level to settle conflicts which arise within the fisheries sector and between fisheries resource users and other coastal users.

2.4 States and sub-regional or regional fisheries management organizations and arrangements shall give due publicity to conservation and management measures and ensure that laws, regulations and other legal rules governing their implementation are effectively disseminated. The bases and purposes of such measures shall be explained to users of the resource in order to facilitate their application and thus gain increased support in the implementation of such measures.

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

2.6 States shall cooperate at the sub-regional level in order to improve coastal area management, and in accordance with capacities, measures shall be taken to establish or promote systems for research and monitoring of the coastal environment, in order to improve coastal area management, and promote multidisciplinary research in support and improvement of coastal area management using physical, chemical, biological, economic, social, legal and institutional aspects.

2.7 States shall, within the framework of coastal area management plan, establish management systems for artificial reefs and fish aggregation devices. Such management systems shall require approval for the construction and deployment of such reefs and devices and shall take into account the interests of fishers, including artisanal and subsistence fishers.

2.8 In the case of activities that may have an adverse transboundary environmental effect on coastal areas, States shall:

- a) Provide timely information and if possible, prior notification to potentially affected States.
- b) Consult with those States as early as possible.

**Changes to Fundamental Clause Confidence Ratings.**

There are no changes in the management of fisheries that would detrimentally affect performance against the confidence ratings for the fundamental clauses and any supporting clauses.

**Conformance:**

Conformance level: High. Non-conformance: None

**Fundamental Clause 3.**

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

No. supporting clauses	8
Applicable supporting clauses	8
Non-applicable supporting clauses	0
Overall level of conformity	High
Non-conformances	None

**Evidence of continuous compliance with the fundamental clause:**

The Council has in place groundfish FMPs (NPFMC 2018a, 2019) in the BSAI and GOA that include the Pacific cod fisheries. Within these FMPs there are nine management and policy objectives, that are reviewed annually. These include preventing overfishing, preserving the food web, and reducing bycatch and waste. The BOF, when developing their initial groundfish management identified guiding principles for the development of these plans, which are considered to be similar to the Council objectives.

The Alaska License Limitation Program (LLP) has been in place since 2000. The intent of the program has been to use fishing track records to rationalize the Alaska groundfish and crab fleet by limiting the number, size and specific operation of vessels as well as eliminating latent licenses. The Restricted Access Management Program has prepared lists of LLP groundfish and crab licenses. LLP licenses are initially issued to persons, based on the activities of original qualifying vessels.

Groundfish licenses are currently required to participate in the BSAI groundfish fisheries in Federal waters of Alaska. Licenses may contain endorsements for both areas (EBS and AI), or one of the two areas. Gear endorsements define what type of gear may be used: non-trawl, trawl, or both. The GOA groundfish fisheries are among the few remaining limited access (not rationalized) fisheries in Alaska. Of these fisheries, Pacific cod is the predominant groundfish species targeted by the fixed gear sectors. In 2009, the Council took action to add gear-specific Pacific cod endorsements to GOA fixed gear licenses that met a minimum catch threshold during 2002-2008. This action reduced the number of fixed gear licenses eligible to access the GOA Pacific cod fisheries by 75%. As a result, the number of participants in the directed GOA Pacific cod fisheries will be permanently capped at the number of available licenses and new entrants will have to purchase an existing license if they wish to fish in federal waters.

ADFG annually issues an emergency order creating parallel Pacific cod seasons inside state waters (0-3 nm) of the Kodiak, Chignik, and South Alaska Peninsula management areas. Vessels participating in parallel Pacific cod fisheries are not required to possess an LLP permit. General state-wide groundfish regulations include a vessel registration requirement, legal gear definitions, bycatch allowances, and requirements for seabird avoidance measures to be used when fishing with longline gear. The state fisheries for Pacific cod are not closed access fisheries.

The MSA requires that conservation and fisheries management measures prevent overfishing while achieving OY on a continuing basis. NMFS and the Council follow a multi-faceted PA (OFL, ABC, TAC, OY) to manage the federal Pacific cod fisheries, based on targets, limits, and pre-defined harvest control rules (HCRs), as well as overall ecosystem considerations (e.g., the OY limits). The fisheries management system is supported by high level science, and management measures have been generally effective in avoiding overfishing and promoting responsible fishing. Objectives for the BSAI and GOA are set out in the FMPs and include the need to take into account socio-economic considerations. Estimates of ex-vessel value by area, gear, type of vessel, and species, are included in the annual Economic Status SAFE report (Fissel et al. 2019), and each stock assessment SAFE also contains extensive economic data.

In the 2017 assessment of GOA Pacific cod, large declines in stock size were noted, believed to be related to increased natural mortality in 2014-2016 brought on by very warm oceanographic conditions (Barbeaux et al. 2017). Pacific cod catches in 2017 in GOA were well below the TAC, and the 2017 assessment established the basis for steep declines in ABC and OFL, and subsequently the TAC, for the 2018 fishery. Each of these values declined by about 80% from 2017 to 2018. This decline was not observed in the EBS and AI assessments, although substantial declines in survey abundance estimates were observed in EBS after 2014. The 2018 stock assessment of GOA Pacific cod (Barbeaux et al. 2018) confirmed the decline, and projected an increase in total Pacific cod biomass, but essentially no increase in female spawner biomass, in 2019 and 2020. Estimated end of year catch in 2018 for GOA Pacific cod was 13,096 t, compared to 64,442 t in 2017 (Table 2.3, Barbeaux et al. 2018). As was done in the previous year, a value of 17,000 t was recommended for ABC in 2019, down from the maximum ABC calculation of 19,665 t, to maintain the GOA stock in 2020 above B20%, which is the threshold for closure of directed fishing to protect Steller sea lions (Barbeaux et al. 2018; NPFMC 2018a). The SSC noted that reductions from the maximum ABC are made in response to factors not included in the Tier system.

The 2019 assessment of GOA Pacific cod indicates that the stock has been lower in abundance than previously thought. It shows that the stock was likely below B20% since 2018 and will remain below until 2021. Model 19.14.48c is nearly identical to last year's model, the biggest influences in the model were the drop in the AFSC longline survey index value and the lower than predicted value for the AFSC trawl survey. Although the AFSC bottom trawl survey index value did increase, the increase was not as high as last year's model had predicted. To accommodate these new data the model estimated the spawning biomass to have been lower than what was estimated last year relative to the unfished biomass. This not only drove 2018-2019 to be below B20%, but also, despite an increasing trend, predicted that the stock would remain below B20% in 2020. For 2020, the stock is estimated to be at B17.6%, above, but very near the overfished determination level. The beginning of the year 2020 spawning biomass level is projected to be the lowest of the time series and with the 2017 and 2018 year classes should see an increase above B20% at the start of 2021.

The GOA and BSAI FMPs describe management measures designed to take into account the interests of subsistence, small-scale, and artisanal fisheries. Specific FMP management objectives include: the promotion of sustainable fisheries and communities, the promotion of equitable and efficient use of fishery resources and increase Alaska native consultation. Actions have been taken to minimize the bycatch of halibut and salmon, given its importance for subsistence and artisanal fisheries. The fishery

dependence of coastal and western Alaska communities was addressed through the creation of the CDQ programs for the BSAI in the early to mid-1990s and the expansion of those programs into the multispecies CDQ program by 1999.

FMPs, protected species management plans, and biological opinion reviews are all supported by well-designed data-gathering programs and analyses, widely available through NMFS and Council websites. These are, in relation to the complexity of factors which may affect species dynamics, comprehensive and rigorous in their analysis.

There are mechanisms developed to identify significant effects on essential fish habitat (EFH) and for identifying habitat areas of particular concern and are considered consistent with achieving management objectives for avoidance, minimization or mitigation of impacts 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. This is further supported by habitat ecosystem indicators considered as part of the SAFE process. There are processes in place – primarily through FMPs, endangered species management plans and Biological Opinions and EISs of the various plans - that allow for direct and indirect impacts that are likely to have significant (not only serious) consequences to be addressed. There is extensive evidence setting out the evaluation of effects and implementation of management response; this includes SAFE reports, FMPs, Endangered species Conservation Plans, supporting EIS and biological opinions. These are all publicly available through NMFS and Council websites.

Effects on ecosystem aspects are considered more fully under Fundamental Clause 12, addressed below. Essentially, there are several processes in place which demonstrably address actual or potential impacts identified through the monitoring of the groundfish fishery and the ecosystem supporting the fishery. The primary mechanism is the annual SAFE report. There are specific processes through NMFS and U.S. Fish and Wildlife Service (USFWS) to review potential impacts (generally indirect effects through changes in prey availability) on endangered species (through the Endangered Species Act, ESA) and marine mammals (Marine Mammal Protection Act).

### **Evidence of continuous compliance with the supporting clauses**

There is no material change in compliance with any of the following supporting clauses.

3.1 Long-term management objectives shall be translated into a plan or other management document (taking into account uncertainty and imprecision) and be subscribed to by all interested parties.

3.2 Management measures shall provide inter alia that:

3.2.1 Excess fishing capacity shall be avoided and exploitation of the stocks remains economically viable.

3.2.2 The economic conditions under which fishing industries operate shall promote responsible fisheries.

3.2.3 The interests of fishers, including those engaged in subsistence, small-scale and artisanal fisheries shall be taken into account.

3.2.4 Biodiversity of aquatic habitats and ecosystems shall be conserved and endangered species shall be protected. Where relevant, there shall be pertinent objectives, and as necessary, management measures.

3.2.5 There shall be management objectives seeking to avoid, minimize or mitigate 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.

3.2.6 There shall be 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.

### **Changes to Fundamental Clause Confidence Ratings.**

There are no changes in the management of fisheries that would detrimentally affect performance against the confidence ratings for the fundamental clauses and any supporting clauses.

**Conformance:**

Conformance level: High. Non-conformance: None

**6.2 Science and Stock Assessment Activities (B)****Fundamental Clause 4.**

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

No. Supporting clauses	13
Supporting clauses applicable	10
Supporting clauses not applicable	3 (4.9, 4.10, 4.11)
Overall level of conformity	High
Non-Conformances	None

**Evidence of continuous compliance with the fundamental clause:**

NMFS and ADFG collect fishery data and conduct fishery independent surveys to assess the Pacific cod fisheries and ecosystems in GOA and BSAI areas. SAFE reports (Thompson et al. 2019; Thompson and Thorson 2019; Barbeaux et al. 2019) provide complete descriptions of the data collected and used in the annual assessments, used to determine stock status and harvest recommendations for the Alaskan Pacific cod stocks. For these fisheries, there is a well-established system that allows for the production, maintenance, regular update, and verification of statistical data. Reporting of commercial catch from both state and federally managed fisheries is done through the Catch Accounting System, a multi-agency (NMFS, International Pacific Halibut Commission, and ADFG) system that centrally collates landings data from shore-based processing and landings operations as well as retained catch observations from individual vessels. Catch reports for previous years can be found on the NMFS and ADFG websites. The Alaska Fisheries Information Network maintains an analytic database of both state and federal commercial fisheries data in Alaska and provides that data in usable formats.

All data from the state and federally managed Pacific cod fisheries are included in the stock assessments. Relative to commercial catch, there is minimal recreational, personal use, or subsistence fishing for Pacific cod in Alaskan waters, and all estimates of such catches compiled by ADFG are included in the assessment catch data. Smaller scale fisheries managed by ADFG and BOF are controlled with specified GHL and other regulations, such as closed areas around Steller sea lion rookeries.

Amendment 86 to the FMP of the BSAI and Amendment 76 to the FMP of the GOA established the new North Pacific Groundfish and Halibut Observer Program, and all vessels fishing for groundfish in federal Alaskan waters are required to carry observers, at their own expense, for at least a portion of their fishing time. Data gathered in the Observer Program cover all biological information from commercial fisheries, including catch weights (landings and discards), catch demographics (species composition, length, sex and age) and interactions with species such as sharks, rays, seabirds, marine mammals and other species with limited or no commercial value. NMFS and the Council have developed at-sea electronic monitoring to integrate video monitoring into the Observer Program to improve data collection. On August 8, 2017, NMFS published a final rule to integrate electronic monitoring into the Observer Program (Ganz et al. 2018). Observer coverage in the EBS Pacific cod fishery has been at or near 100% for the past several years, while in the GOA, lower coverage rates exist. Detailed annual reports (e.g., Alaska Fisheries Science Center and Alaska Regional Office 2019; Ganz et al. 2018) from the Observer Program can be found on NMFS website, and provide extensive information on the Observer Program, including observer deployments, coverage rates, data collections, etc.



Vessels less than 40 ft. are in the no-selection pool for observer coverage. However, in Pacific cod fisheries, the amount of Pacific cod taken by vessels <40 ft. LOA was less than 1% of the total catch in recent years.

NMFS and ADFG have extensive scientific databases which include Pacific cod, and the Council has substantial information on management of Pacific cod in Alaskan waters. These data are made widely available through the agency websites, publications and at various publicly attended meetings. Data on certain aspects of commercial fishing are considered to be confidential, such as individuals or individual vessels in the analysis of fishery catch-per-unit-effort data, depending on the number of individuals or entities involved. Annual economic SAFE reports (e.g., Fissel et al. 2019) on social/cultural/economic value of the Alaskan fisheries resources are produced, which include extensive information on the Alaskan Pacific cod fisheries. Individual Pacific cod assessment SAFE reports have extensive sections on the economic performance of the fisheries.

Alaska supports both the Alaska Seafood Marketing Institute and the Kodiak Seafood and Marine Science Center to stimulate research and to support and distribute the benefits of seafood in human diets.

**Evidence of continuous compliance with the supporting clauses:**

There is no material change in compliance with any of the following supporting clauses. Clauses 4.7, 4.8, 4.9, 4.10, and 4.11 are not applicable.

4.1. All fishery removals and mortality of the target stock(s) shall be considered by management. Specifically, reliable and accurate data required for assessing the status of fishery/ies and ecosystems - including data on retained catch, bycatch, discards and waste shall be collected. Data can include relevant traditional, fisher or community knowledge, provided their validity can objectively be verified. These data shall be collected, at an appropriate time and level of aggregation, by relevant management organizations connected with the fishery, and provided to relevant States and sub-regional, regional and global fisheries organizations.

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

4.1.2 In the absence of specific information on the "stock under consideration", generic evidence based on similar stocks can be used for fisheries with low risk to that "stock under consideration". However, the greater the risk of overfishing, the more specific evidence is necessary to ascertain the sustainability of intensive fisheries.

4.2. An observer scheme designed to collect accurate data for research and support compliance with applicable fishery management measures shall be established.

4.3. Sub-regional or regional fisheries management organizations or arrangements shall compile data and make them available, in a manner consistent with any applicable confidentiality requirements, in a timely manner and in an agreed format to all members of these organizations and other interested parties in accordance with agreed procedures.

4.4. States shall stimulate the research required to support national policies related to fish as food.

4.5. States shall ensure that a sufficient knowledge of the economic, social, marketing and institutional aspects of fisheries is collected through data gathering, analysis and research and that comparable data are generated for ongoing monitoring, analysis and policy formulation.

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.

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.

4.8 States shall promote the adoption of uniform guidelines governing fisheries research conducted on the high seas and shall, where appropriate, support the establishment of mechanisms, including, inter alia, the adoption of uniform guidelines, to facilitate research at the sub-regional or regional level and shall encourage the sharing of such research results with other regions.

4.9 States and relevant international organizations shall promote and enhance the research capacities of developing countries, inter alia, in the areas of data collection and analysis, information, science and technology, human resource development and provision of research facilities, in order for them to participate effectively in the conservation, management and sustainable use of living aquatic resources.

4.10 Competent national organizations shall, where appropriate, render technical and financial support to States upon request and when engaged in research investigations aimed at evaluating stocks which have been previously unfished or very lightly fished.

4.11 Relevant technical and financial international organizations shall, upon request, support States in their research efforts, devoting special attention to developing countries, in particular the least developed among them and small island developing countries.

**Changes to Fundamental Clause Confidence Ratings.**

There are no changes in the management of fisheries that would detrimentally affect performance against the confidence ratings for the fundamental clauses and any supporting clauses.

**Conformance:**

Conformance level: High. Non-conformance: None

**Fundamental Clause 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.

No. Supporting clauses	7
Supporting clauses applicable	7
Supporting clauses not applicable	0
Overall level of conformity	High
Non-Conformances	None

**Evidence of continuous compliance with the fundamental clause:**

NMFS has a well-established institutional framework for research developed within the AFSC, which operates several laboratories and Divisions, including the Auke Bay Laboratories in Alaska which conduct scientific research on fish stocks, fish habitats, and the chemistry of marine environments. Peer reviewed stock assessments are done annually and used as the scientific basis to set catch quotas, taking into account uncertainty and evaluating stock status relative to reference points in a probabilistic way. The SAFE reports are compiled annually by the Council and include a volume on Ecosystem Considerations. The SAFE report provides information on the historical catch trend, estimates of the maximum sustainable yield (MSY) of the groundfish complex as well as its component species groups, assessments on the stock condition of individual species groups; assessments of the impacts on the ecosystem of harvesting the groundfish complex at the current levels given the assessed condition of stocks, including



consideration of rebuilding depressed stocks; and alternative harvest strategies and related effects on the component species groups.

The SAFE documents are reviewed first by the Council's Groundfish Plan Team, then by the SSC and Advisory Panel, and finally by the full Council. Upon review and acceptance by the SSC, the SAFE report and any associated SSC comments constitute the best scientific information available for purposes of the MSA. The AFSC periodically requests a more comprehensive external review of groundfish stock assessments by the CIE.

The assessments receive peer review at three levels. The first is internal, in that the Plan Team meets with the assessment staff before, possibly during, and after the assessment is prepared. The first meeting is to scope the options and scenarios that should be explored in the annual assessment, based on the assessment of the previous year(s) and feedback about how the previous year's fishery has unfolded. Meetings between the assessment staff and the Plan Team occur in a somewhat ad hoc manner, depending on what issues may arise during preparation of the assessment. The number of such meetings can vary between years, depending on the number and type of issues that arise in developing the annual assessment, but in recent years have rarely been fewer than five and sometimes as many as nine. As the assessment nears completion, a meeting with the Plan Team is held to review results and presentation material, to be sure that the assessment is ready for presentation to the Council's SSC. In a narrow sense only the final meeting of the NOAA Plan Team and assessment staff might be considered "peer review" of the assessment; but in fact just as "assessment" is both a process and a product, in a slightly broader sense all the meetings between the Plan Team and the assessment staff can be considered part of an internal peer review process, since all of the meetings have the coverage and quality of the assessment as their primary concern. Once the assessment document is complete, each one receives a thorough and largely external review by the SSC. All technical aspects of the assessment and the coverage of issues by alternative model formulations and scenarios are reviewed by the SSC, which can request re-runs or deletion or addition of analyses, as they consider necessary, to have a sound assessment as a basis for subsequent consultation and decision-making. The make-up of the SSC includes both employees of NMFS and independent experts in ecological, economic, and social sciences. However, none has a direct involvement in preparation of the assessment, and all participants are expected to act in their expert capacities rather than as institutional representatives. Thus, the SSC review can be considered an external review of the assessment.

Finally, the CIE routinely conducts stock assessment reviews using leading international experts in stock assessments for Alaska fisheries. The GOA cod stock assessment was reviewed by three CIE reviewers in 2018 (<https://www.st.nmfs.noaa.gov/science-quality-assurance/cie-peer-reviews/cie-review-2018>). Similarly, the EBS Pacific cod assessment was reviewed by three external reviewers from the CIE during February 2016, and their reports, also available on-line, were considered in subsequent EBS cod assessments.

Data collected by scientists from the many surveys and Pacific cod fisheries are analyzed and presented in peer reviewed meetings and/or in primary literature, following rigorous scientific protocols. Results of these analyses are disseminated in a timely fashion through numerous methods, including scientific publications, and as information on NMFS, ADFG, and Council websites, in order to contribute to fisheries conservation and management. Confidentiality of individuals or individual vessels (e.g., in the analysis of fishery catch-per-unit-effort data) is fully respected where necessary.

The Council receives comprehensive presentations on the status of the EBS, AI, and GOA marine ecosystems (Zador and Ortiz 2018; Siddon and Zador 2019; Zador et al. 2019) at its SSC and Advisory Panel meetings as part of its annual management process for Alaskan groundfish. These are prepared and presented by NMFS scientists and contain report cards which look at a wide range of environmental and ecosystem variables, such as physical and environmental trends, zooplankton biomass, predator and forage species biomass, and seabird and marine mammal data. EFH is identified for managed fish species, including Pacific cod. NPRB and the National Science Foundation identifies research priorities and funds studies about the BS 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. An integrated GOA Ecosystem project, also funded by the NPRB, is examining recruitment processes of major groundfish species.

The Oil Spill Recovery Institute was established by U.S. Congress in response to the 1989 Exxon Valdez oil spill and is administered through and housed at the Prince William Sound Science Center, a non-

profit research and education organization located in Cordova, AK. The Center facilitates and encourages ecosystem studies in the greater PWS region.

U.S. cooperates through relevant international organizations, such as the North Pacific Marine Science Organization, to encourage research in order to ensure optimum utilization of all fishery resources. Although the fishery for Pacific cod is conducted entirely within the U.S. EEZ, there is also scientific cooperation with neighboring countries such as Canada who fish for Pacific cod from adjacent stocks. The Technical Subcommittee (TSC) of the Canada-U.S. Groundfish Committee (<http://www.psmfc.org/tsc2>) was formed in 1960 to coordinate fishery and scientific information resulting from the implementation of commercial groundfish fisheries operating in U.S. and Canadian waters off the West Coast. Representatives from Canadian and American state/provincial and federal agencies continue to meet annually to exchange information and to identify data gaps and information needs for groundfish stocks of mutual concern from California to Alaska. Not all of these are transboundary stocks (e.g., Pacific halibut is, but Pacific cod is not). Each agency prepares a comprehensive annual report highlighting survey and research activities, including stock assessments. These reports are compiled into an annual TSC report that is published online.

### **Evidence of continuous compliance with the supporting clauses**

There is no material change in compliance with any of the following supporting clauses. Clause 5.4 is not applicable.

5.1. An appropriate institutional framework shall be established to determine the applied research which is required and its proper use (i.e. assess/evaluate stock assessment model/practices) for fishery management purposes.

5.1.1 With the use of less elaborate methods for stock assessment frequently used for small scale or low value capture fisheries resulting in greater uncertainty about the state of the stock under consideration, more precautionary approaches to managing fisheries on such resources shall be required, including where appropriate, lower level of utilization of resources. A record of good management performance may be considered as supporting evidence of the adequacy and the management system.

5.1.2 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. Results of analyses shall be distributed in a timely and readily understandable fashion in order that the best scientific evidence is made available as a contribution to fisheries conservation, management and development. 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.

5.2. There shall be established research capacity necessary to assess and monitor 1) the effects of climate or environment change on fish stocks and aquatic ecosystems, 2) the state of the stock under State jurisdiction, and for 3) the impacts of ecosystem changes resulting from fishing pressure, pollution or habitat alteration.

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

5.4 The fishery management organizations shall directly, or in conjunction with other States, develop collaborative technical and research programs to improve understanding of the biology, environment and status of transboundary aquatic stocks.

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

### **Changes to Fundamental Clause Confidence Ratings:**

There are no changes in the management of fisheries that would detrimentally affect performance against the confidence ratings for the fundamental clauses and any supporting clauses.

### **Conformance:**

Conformance level: High. Non-conformance: None

### 6.3 The Precautionary Approach (C)

#### Fundamental Clause 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.

No. Supporting clauses	4
Supporting clauses applicable	4
Supporting clauses not applicable	0
Overall level of conformity	High
Non-Conformances	None

#### Evidence of continuous compliance with the fundamental clause:

The Council's groundfish FMPs for BSAI and GOA contain the details on the Council's precautionary approach, including the tier system, HCRs, and reference points. Extensive analysis (e.g., a series of standard projections) is conducted in each stock assessment to determine the current and projected biomass level relative to the target reference points. Based on the information in the 2019 SAFE documents, none of the three Pacific cod stocks had overfishing occurring, as per the standard definitions applied to each stock.

The 2019 SAFE documents (referenced in Fundamental Clause 4 above) provide the status of Pacific cod stocks relative to all available reference points. Extensive analysis is conducted in each stock assessment to determine the current and projected biomass level relative to the reference points, and to advise on the various catch levels appropriate to the HCRs. Comprehensive annual Ecosystem Reports for BSAI and GOA that look at numerous elements of the Alaskan ecosystems (e.g., Zador and Ortiz 2018; Siddon and Zador 2019; Zador et al. 2019) are presented to the Council.

The following section provides updates on stock assessment and status for each of the three Pacific cod stocks, based on the 2019 SAFE documents and excerpts from Plan Team and SSC minutes from the December 2019 meetings.:

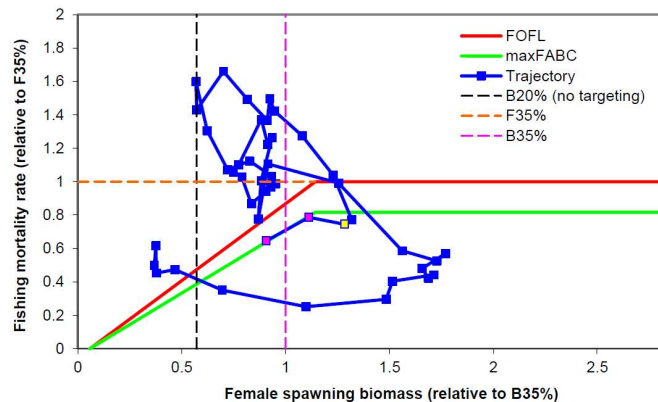
*EBS (Thompson and Thorson 2019):* The principle results of the present assessment, based on the ensemble weighted average, are listed in the table below (biomass and catch figures are in units of t) and compared with the corresponding quantities from last year's assessment as specified by the SSC (note that the 2020 OFL of 183,000 t specified last year was an error; it should have been 164,000 t, as estimated in last year's assessment):

Quantity	As estimated or specified last year for:		As estimated or recommended this year for:	
	2019	2020	2020*	2021*
<i>M</i> (natural mortality rate)	0.34	0.34	0.35	0.35
Tier	3a	3b	3b	3b
Projected total (age 0+) biomass (t)	824,000	683,000	751,708	716,581
Projected female spawning biomass (t)	290,000	246,000	259,509	211,410
<i>B</i> <sub>100%</sub>	658,000	658,000	666,506	666,506
<i>B</i> <sub>40%</sub>	263,000	263,000	266,602	266,602
<i>B</i> <sub>35%</sub>	230,000	230,000	233,277	233,277
<i>F</i> <sub>OFL</sub>	0.38	0.35	0.41	0.34
<i>maxF</i> <sub>ABC</sub>	0.31	0.29	0.34	0.28
<i>F</i> <sub>ABC</sub>	0.31	0.29	0.34	0.28
OFL (t)	216,000	183,000	185,650	123,331
maxABC (t)	181,000	137,000	155,873	102,975
ABC (t)	181,000	137,000	155,873	102,975
Status	As determined last year for:		As determined this year for:	
	2017	2018	2018	2019
Overfishing	No	n/a	No	n/a
Overfished	n/a	No	n/a	No
Approaching overfished	n/a	No	n/a	No

\*Projections are based on assumed catches of 176,847 t, and 155,873 t in 2019 and 2020, respectively.

Although Pacific cod in the EBS and AI were managed on a BSAI-wide basis through 2013, the stock assessment model has always been configured for the EBS stock only. Since 1992, the assessment model has always been developed under some version of the SS modeling framework (technical details given in Methot and Wetzel 2013; see especially Appendix A to that paper). Beginning with the 2005 assessment, the EBS Pacific cod models have all used versions of stock synthesis models based on the Automatic Differentiation Model Builder software package (Fournier et al. 2012). Stock synthesis V3.30.12.00 (beta release, including various minor incremental upgrades through August 3, 2018) was used to run the base model in last year's assessment, and V3.30.14.00 was used to run all models in this final assessment, except that V3.30.12.00 was used to run the projections for Scenario 3 in the standard harvest scenarios.

The figure below plots the estimated/projected trajectory of relative fishing mortality (*F*/*F*<sub>35%</sub>) and relative female spawning biomass (*B*/*B*<sub>35%</sub>) from 1977 through 2021 based on full-selection fishing mortality, overlaid with the current harvest control rules. In 2016, the base model changed, the new model generally gave lower estimates of relative spawning biomass than either previous models. In 2018, the base model changed again, which likewise gives lower estimates than 2016 model, to the extent that, in hindsight, the stock was being subjected to fishing mortality rates in excess of the retroactively calculated *F*<sub>OFL</sub> values (but not the official *F*<sub>OFL</sub> values that were calculated at the time) in all years from the early 1990s through 2017, a conclusion which continues to hold in 2019 assessment.



Amendment 56 to the BSAI Groundfish FMP defines the OFL, the fishing mortality rate used to set OFL (FOFL), the maximum permissible ABC, and the fishing mortality rate used to set the maximum

permissible ABC. The fishing mortality rate used to set ABC (fishing mortality at ABC,  $F_{ABC}$ ) may be less than this maximum permissible level, but not greater. Because reliable estimates of reference points related to MSY are currently not available but reliable estimates of reference points related to spawning per recruit are available, Pacific cod in the EBS have generally been managed under Tier 3 of Amendment 56. Tier 3 uses the following reference points: B40%, equal to 40% of the equilibrium spawning biomass that would be obtained in the absence of fishing; F35%, equal to the fishing mortality rate that reduces the equilibrium level of spawning per recruit to 35% of the level that would be obtained in the absence of fishing; and F40%, equal to the fishing mortality rate that reduces the equilibrium level of spawning per recruit to 40% of the level that would be obtained in the absence of fishing. The following formulae apply under Tier 3:

3a) Stock status:  $B/B40\% > 1$   
 FOFL = F35%  
 FABC < F40%

3b) Stock status:  $0.05 < B/B40\% < 1$   
 FOFL = F35%  $\times$  (B/B40% - 0.05)  $\times$  1/0.95  
 FABC < F40%  $\times$  (B/B40% - 0.05)  $\times$  1/0.95

3c) Stock status:  $B/B40\% < 0.05$   
 FOFL = 0  
 FABC = 0

The ensemble weighted average estimates of F35% and F40% are 0.43 and 0.35, respectively. The ensemble weighted average estimates of B100%, B40%, and B35% are 666,506 t, 266,602 t, and 233,277 t, respectively.

AI (Thompson et al. 2019): The principal results of the present assessment, based on the authors' recommended model, are listed in the table below (biomass and catch figures are in units of t) and compared with the corresponding quantities from last year's assessment as specified by the SSC:

Quantity	As estimated or specified last year for:		As estimated or recommended this year for:	
	2019	2020	2020	2021
$M$ (natural mortality rate)	0.34	0.34	0.34	0.34
Tier	5	5	5	5
Biomass (t)	80,700	80,700	80,700	80,700
$F_{OFL}$	0.34	0.34	0.34	0.34
$maxF_{ABC}$	0.255	0.255	0.255	0.255
$F_{ABC}$	0.255	0.255	0.255	0.255
OFL (t)	27,400	27,400	27,400	27,400
maxABC (t)	20,600	20,600	20,600	20,600
ABC (t)	20,600	20,600	20,600	20,600
<b>Status</b>	As determined <i>this year</i> for:		As determined <i>this year</i> for:	
	2017	2018	2018	2019
Overfishing	No	n/a	No	n/a

Total biomass declined from approximately 190,000 t in 1990 to a low of 89,787 t in 2013. Female spawning biomass has followed a similar trajectory, with a peak of more than 75,000 t in 1992, declining to around 27,000 t in 2011, and then increasing to its current level of t in 2019. A phase plane plot (Figure 2A.4.24 in the 2019 SAFE) shows that spawning biomass was above B40% from 1990 until approximately 2009. From 2007-2010, fishing was above  $F_{ABC}$  and declined starting in 2011. Spawning biomass fell below B35% from 2009-2015. Since 2016, biomass has been above B35% but it is projected to be below B35% in 2020 and 2021.

This stock been assessed using Tier 5 methodology since 2013. The standard Tier 5 random effects model fits the survey data quite well. Appendix 2A.4 of 2019 SAFE report presents a new age-structured model that is very similar to some of the age-structured models for the AI stock of Pacific cod that were developed between 2012 and 2016. One feature of that model is a positive retrospective pattern ( $\rho = 0.206$ ), meaning that, on average over the past 10 assessment years, the model's estimates of female spawning biomass in the terminal year would have exceeded the model's current estimate of female spawning biomass in that year by about 20%. This may suggest that the model

could benefit from further development, although it should also be noted that Hurtado-Ferro et al. (2015) determined that this level of retrospective bias does not rise to the level that should be cause for concern. Assessment considerations were rated as level 1 (normal).

*GOA (Barbeaux et al. 2019)*: The data as interpreted through Model 19.14.48c indicates that the stock has been lower in abundance than previously thought. It shows that the stock was likely below B20% since 2018 and will remain below until 2021. Model 19.14.48c is nearly identical to last year’s model, the biggest influences in the model were the drop in the AFSC longline survey index value and the lower than predicted value for the AFSC trawl survey. Although the AFSC bottom trawl survey index value did increase, the increase was not as high as last year’s model had predicted. To accommodate these new data the model estimated the spawning biomass to have been lower than what was estimated last year relative to the unfished biomass. This not only drove 2018-2019 to be below B20%, but also, despite an increasing trend, predicted that the stock would remain below B20% in 2020. For 2020 the stock is estimated to be at B17.6%, above, but very near the overfished determination level. The beginning of the year 2020 spawning biomass level is projected to be the lowest of the time series and with the 2017 and 2018 year classes should see an increase above B20% at the start of 2021. Key results are tabulated below:

Quantity	As estimated or specified last year for:		As estimated or specified this year for:	
	2019	2020	2020	2021
<i>M</i> (natural mortality rate)	0.50	0.50	0.49	0.49
Tier	3b	3b	3b	3b
Projected total (age 0+) biomass (t)	207,198	266,066	203,373	261,484
Female spawning biomass (t)				
Projected	34,701	34,774	32,958	42,026
<i>B</i> <sub>100%</sub>	172,240	172,240	187,780	187,780
<i>B</i> <sub>40%</sub>	68,896	68,896	75,112	75,112
<i>B</i> <sub>35%</sub>	60,284	60,284	65,723	65,723
<i>F</i> <sub>OEL</sub>	0.36	0.36	0.27	0.36
<i>maxF</i> <sub>ABC</sub>	0.29	0.29	0.22	0.29
<i>F</i> <sub>ABC</sub>	0.25	0.29	0.22	0.29
OFL (t)	23,669	26,078	17,794	30,099
maxABC (t)	19,665	21,592	14,621	24,820
ABC (t)	*17,000	21,592	**14,621	**24,820
<b>Status</b>	2017	2018	2018	2019
Overfishing	No	n/a	No	n/a
Overfished	n/a	No	n/a	No
Approaching overfished	n/a	No	n/a	No

\*Reduction from max to 17,000t to maintain stock above B<sub>35%</sub> in 2020 based on estimated end of year catch in 2018 of 13,096 t.

\*\* Assumes 15,000 t catch in 2019 and no directed fishery in 2020 as reference level is below B<sub>35%</sub>. For 2021 projections the 2020 catch was assumed to be 3,300 from state fisheries and 3,000 t from non-directed fishery bycatch.

Estimates of total biomass were on average 107% higher than the NMFS bottom trawl survey total biomass estimates. Total biomass estimates show a long decline from their peak of 778,122 t in 1988 to 264,538 in 2006 and then an increase to another peak in 2014 of 498,565 t then decrease continuously through 2018. With improved recruitment in 2017 and 2018 total biomass began to increase again in 2019. Spawning biomass shows a similar trend of decline since the late 1980s with a peak in 1990 at 248,915 t to a low in 2008 of 61,215 t. There was then a short increase in spawning biomass coincident with the maturation of the 2005-2008 year classes through 2014 to 113,830 t, after which the decline continued to lowest level of 32,957 t projected for 2020. Projections of Model 19.14.48c indicate that the stock has been below B20% since the beginning of the year 2018 and will be projected to below B20% until the beginning of the year 2021.

From 2008-2017, the GOA Plan Team and SSC recommended setting the ABC at the maximum permissible level under Tier 3. For 2018 and 2019 an ABC was recommended below the maximum ABC in an attempt to ensure the 2019 and 2020 standing stock biomass would remain above B20%.

For 2020, the stock is expected to be below B20%, because of the rules in place to protect forage for Steller sea lions the directed fishery will be required to remain closed if any of the models presented in this assessment are accepted. The ABC recommendation will be for non-directed fisheries that encounter Pacific cod as bycatch. The 2019 SAFE report recommends a maximum ABC of 14,621 t for



2020 and with the expectation of a 6,300 t catch the maximum ABC for 2021 is recommended at 24,820 t.

A standard series of projections is carried out annually on the GOA and EBS Pacific cod stocks, as required under the Council's FMPs, NEPA, and MSA. Based on the projections in the 2019 SAFE reports, these Tier 3 stocks are not overfished, are not being subjected to overfishing, and are not approaching an overfished condition, based on the MSA criteria and definitions. The AI stock (Tier 5) is not being subjected to overfishing (the two "overfished" criteria cannot be evaluated for a Tier 5 stock).

The concerns expressed with apparent high levels of fishing mortality apply to the EBS and GOA Pacific cod stocks. In both cases, the SAFE authors note it appears that in hindsight the fishing mortality rate (F) may have been higher than the retroactively calculated reference points, although F was not above the reference points as calculated at the time. With the recent and current reductions in ABC and TAC, measures have been taken to reduce F to below the reference points. Future surveillance reports should monitor the effectiveness of these management actions.

The following text on stock rebuilding is directly from the FMP for BSAI Groundfish (NPFMC 2018a):  
Within two years of such time as a stock or stock complex is determined to be overfished, an FMP amendment or regulations will be designed and implemented to rebuild the stock or stock complex to the MSY level within a time period specified at Section 304(e)(4) of the Magnuson-Stevens Act. If a stock is determined to be in an overfished condition, a rebuilding plan would be developed and implemented for the stock, including the determination of an FOFL and FMSY that will rebuild the stock within an appropriate time frame.

**Evidence of continuous compliance with the supporting clauses:**

There is no material change in compliance with any of the following supporting clauses.

6.1. States shall establish safe target reference point(s) for management.

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

6.3 Data and assessment procedures shall be installed measuring the position of the fishery in relation to the reference points. Accordingly, the stock under consideration shall not be overfished (i.e. above limit reference point or proxy) and the level of fishing permitted shall be commensurate with the current state of the fishery resources, maintaining its future availability, taking into account that long term changes in productivity can occur due to natural variability and/or impacts other than fishing.

6.4 Management actions shall be agreed to in the eventuality that data sources and analyses indicate that these reference points have been exceeded.

**Changes to Fundamental Clause Confidence Ratings:**

There are no changes in the management of fisheries that would detrimentally affect performance against the confidence ratings for the fundamental clauses and any supporting clauses.

**Conformance:**

Conformance level: High. Non-conformance: None

**Fundamental Clause 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.

No. Supporting clauses	5
------------------------	---

Supporting clauses applicable	4
Supporting clauses not applicable	1 (7.2)
Overall level of conformity	High
Non-Conformances	None

**Evidence of continuous compliance with the fundamental clause:**

The status of U.S. fish stocks is determined by two metrics. The first is the relationship between the actual exploitation level and the OFL. If the exploitation level (or fishing mortality) exceeds the FOFL, the stock is considered to be subject to overfishing. The second is the relationship between the stock size and the MSST. This is considered to be one half of B35% (i.e., B17.5%) for the Pacific cod stocks. If the stock size is below the MSST it is considered to be overfished. A stock is considered to be approaching an overfished condition when it is projected that there is more than a 50% chance that the biomass of the stock or stock complex will decline below the MSST within two years.

Harvest specifications for each of the Pacific cod stocks are made annually by the Council and include the OFL, ABC, and TAC. Links to these documents from the December 2019 Council meeting, with harvest specifications adopted for 2020 and 2021, are as follows: <https://www.npfmc.org/goa-specs-2/> and <https://www.npfmc.org/bsai-specs-2/>.

The Council’s management plans classify each stock based on a tier system (Tiers 1-6) with Tier 1 having the greatest level of information on stock status and fishing mortality relative to MSY considerations. The Tier system specifies the maximum permissible ABC and the OFL for each stock in the complex (usually individual species but sometimes species groups). GOA and EBS Pacific cod are classified in Tier 3. The BSAI and GOA groundfish FMPs have pre-defined HCRs that define a series reference points for groundfish covered by these plans. The overall objectives of the management plans are to prevent overfishing and to optimize the yield from the fishery through the promotion of conservative harvest levels while considering differing levels of uncertainty.

The PA reference points are established by the Council’s PA documented in their FMPs, and stock status is evaluated against these calculated reference points in the annual stock assessment SAFE reports. Where possible, projections are carried out as part of the stock assessments to determine future trajectories of biomass, and related risks of overfishing. There are numerous references and examples of how uncertainty is dealt with in the stock assessment of Pacific cod in the annual SAFE reports. Also, the FMPs for groundfish in GOA and BSAI regions are explicit in how different levels of uncertainty are accounted for in the management process. Environmental data and socioeconomic data are also well documented through annual SAFE reports. The SAFE reports and FMPs have been referenced in previous sections.

The FMPs also have another reference point, B20%, defined as follows: “For groundfish species identified as key prey of Steller sea lions (i.e., walleye pollock, Pacific cod, and Atka mackerel), directed fishing is prohibited in the event that the spawning biomass of such a species is projected in the stock assessment to fall below B20% in the coming year. However, this does not change the specification of ABC or OFL.” For GOA Pacific cod, analyses from the 2018 SAFE (Barbeaux et al. 2018) show a 20.7% probability of the spawning stock biomass being below B20% and a 1.1% probability of being below B17.5% at the start of 2019.

In 2019, the GOA Pacific cod stock continues to be at a low biomass level. According to the 2019 update of the Pacific cod stock assessment, the spawning biomass is projected to reach an all-time low in 2020, just above the OFL of B<sub>17.5%</sub>. As the stock is below the B<sub>20%</sub> threshold, federal regulations at CFR 679.20 require the directed fishery for Pacific cod to be closed for 2020-2021 due to Steller sea lion conservation measures. The 2020 GOA Pacific cod TAC is for incidental catch in other fisheries and accounts for the state GHL.

As the GOA Pacific cod stock is close to crucial management and biological thresholds (B20% and B17.5%), improved estimates of the probability of being above or below these thresholds in the future could better inform Council decisions. The SSC requested the authors compare results using different assumptions about natural mortality and recruitment due to the considerable uncertainty about future recruitment and potential effects of the impending marine heat wave on cod mortality. For these



reasons, the SSC set the 2021 ABC to be the same as the 2020 ABC until next year's assessment provides more clarity about future trends.

The sum of the ABCs for all GOA groundfish stocks in 2020 is 465,956 mt, which is a reduction of 8.5% compared to the 2019 (509,507 mt) aggregate ABC. Maximum permissible ABCs were set for all stocks in the GOA in 2019, except for pollock, sablefish, and demersal shelf rockfish. An ABC less than the maximum permissible is recommended when there are additional conservation considerations that are not accounted for in the stock assessment, tier system, or HCRs. The GOA Groundfish Plan Team and the Council's SSC will continue to explore use of the species-specific risk tables for appropriate reductions from maxABC in future harvest specification exercises.

Stock assessments are comprehensive and reviewed on a number of levels, including externally by CIE. Where data gaps have been identified, and these are outlined in the SAFE reports, the NMFS/AFSC has ongoing research programs capable of addressing these needs. Organizations such as NPRB enable scientists from a number of disciplines and agencies to work collaboratively on a variety of fishery related studies in Alaskan waters, including some on Pacific cod. Research is also conducted by ADFG on the state-managed Pacific cod.

There are pre-agreed Council HCRs in place to ensure overfishing does not occur on the Pacific cod stocks and to reduce fishing mortality if reference points are approached or exceeded, as outlined in the Tiered PA system described previously. Extensive provisions exist in the NMFS fishery regulations for in-season adjustments (e.g., gear modifications, fishery closures) where necessary to protect the resource from biological harm. FMPs contain the following specific clause: "In the event that a stock or stock complex is determined to be approaching a condition of being overfished, an in-season action, an FMP amendment, a regulatory amendment or a combination of these actions will be implemented to prevent overfishing from occurring."

Regarding the distribution of fishing mortality, for the past several years, the ABC for GOA Pacific cod has been allocated among regulatory areas on the basis of the biomass distribution in the trawl surveys. The current apportionment, given in the 2018 SAFE, is 44.9% Western GOA, 45.1% Central, and 10% Eastern. The state-managed cod fisheries have GHs based on a percentage of the apportioned ABCs, for example, the cod fishery in state waters in PWS has a GH set at 25% of the Eastern GOA ABC. GOA Pacific cod is also allocated on the basis of processor component (inshore/offshore) and season. For AI Pacific cod, Steller sea lion protection measures require an estimate of the proportion of the AI Pacific cod stock residing in Area 543, which will be used to set the harvest limit in 543 after subtraction of the state GH from the overall AI ABC. Based on the analyses shown in the SAFE documentation, this percentage is currently around 25%.

In June 2018, the Council (NPFMC 2018b) initiated an analysis of alternatives to modify the existing four-season structure of the Western and Central GOA pollock fishery and the relative allocation of the trawl catcher vessel (CV) sector's annual Pacific cod TAC across A and B seasons. Given the many existing challenges in managing and prosecuting these limited access trawl fisheries, the Council is seeking small changes that improve fishery outcomes without causing unintended redistribution of fishing opportunities across management areas or gear sectors. The Council recognized that the existing seasonal allocations were implemented as Steller sea lion protection measures, and that modification requires analysis of potential effects on Steller sea lions and consultation with NMFS Protected Resources division once a preferred action has been recommended.

Clause 7.2 is not applicable, as fisheries for Pacific cod in Alaska are well established. There are no concerns with the use of introduced or translocated species.

#### **Evidence of continuous compliance with the supporting clauses:**

There is no material change in compliance with any of the following supporting clauses. Clause 7.2 is not applicable.

7.1 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. This should take due account of stock enhancement procedures, where appropriate. Absence of scientific information shall not be used as a reason for postponing or failing to take conservation and management measures. Relevant uncertainties shall be taken into account through a suitable method of risk assessment, including those associated with the use of introduced or translocated species.

7.1.1 In implementing the precautionary approach, States shall take into account, inter alia, of uncertainties relating to the size and productivity of the stocks, reference points, stock condition in relation to such reference points, levels and distribution of fishing mortality and the impact of fishing activities, including discards, on non-target and associated or dependent species as well as environmental and socio-economic conditions.

7.1.2 In the absence of adequate scientific information, appropriate research shall be initiated in a timely fashion.

7.2 In the case of new or exploratory fisheries, States shall adopt as soon as possible cautious conservation and management measures, including, inter alia, catch limits and effort limits. Such measures should remain in force until there are sufficient data to allow assessment of the impact of the fisheries on the long-term sustainability of the stocks, whereupon conservation and management measures based on that assessment should be implemented. The latter measures should, if appropriate, allow for the gradual development of the fisheries.

7.3 Contingency plans shall be agreed in advance for the appropriate management response to serious threats to the resource as a result of overfishing or adverse environmental changes or other phenomena adversely affecting the fishery resource. Such measures may be temporary and shall be based on best scientific evidence available.

**Changes to Fundamental Clause Confidence Ratings:**

There are no changes in the management of fisheries that would detrimentally affect performance against the confidence ratings for the fundamental clauses and any supporting clauses.

**Conformance:**

Conformance level: High. Non-conformance: None

## 6.4 Management Measures (D)

**Fundamental Clause 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.

No. Supporting clauses	17
Supporting clauses applicable	15
Supporting clauses not applicable	2 (8.11, 8.14)
Overall level of conformity	High
Non-Conformances	None

**Evidence of continuous compliance with the fundamental clause:**

The MSA requires that conservation and fisheries management measures prevent overfishing while achieving optimum yield on a continuing basis and sets out the standards (e.g., optimal use and avoiding overfishing) which are followed in managing the Pacific cod fisheries in Alaska. The Council uses a multi-tier PA, which includes OY and MSY reference points. NMFS and the Council follow a multi-faceted PA (OFL, ABC, TAC, OY) to manage the federal Pacific cod fisheries, based on targets, limits, and pre-defined HCRs, as well as overall ecosystem considerations. These systems are described extensively in Fundamental Clauses 6 and 7 above. The objectives are spelled out clearly in FMPs for BSAI and GOA regions, and both FMPs contain long-term management objectives for the Alaskan Pacific cod fisheries. The state Pacific cod fisheries are managed by ADFG and BOF using an annual GHL set

as a percentage of the federal ABC for GOA Pacific cod, and regulations are spelled out by BOF. Extensive cooperation exists between federal and state authorities in assessing and managing the Pacific cod stocks. Using the AI stock as an example, during the period in which a state fishery has existed: 1) TAC has been reduced so that the sum of the TAC and GHL would not exceed the ABC, 2) catch in the Federal fishery has been kept below TAC, and 3) total catch (federal plus state) has been kept below ABC (Thompson et al. 2019).

OY is given (in the FMPs) as a range for the groundfish complexes in the BSAI and the GOA, and the sum of the TACs of all groundfish species (except Pacific halibut) is required to fall within the range. The range for BSAI is 1.4 to 2.0 million tons while the range for GOA is 116 to 800 thousand tons. To prevent overfishing, the Council's management objectives include the following measures specific to OY:

1. Adopt conservative harvest levels for multi-species and single species fisheries and specify OY
2. Continue to use the 2 million mt optimum yield cap for the BSAI groundfish fisheries
3. Provide for adaptive management by continuing to specify optimum yield as a range

AFSC runs the Economic and Social Sciences Research Program in Alaska. The aim of the Program is to provide economic and sociocultural information to assist NMFS in meeting its stewardship responsibilities with activities being conducted in support of this mission. The Council has established the Social Science Planning Team to improve the quality and application of social science data that informs management decision-making and program evaluation. The FMPs include a substantial section on the economic and socioeconomic characteristics of the fisheries and communities in Alaska. There is a detailed annual SAFE report on economic status of Alaskan fisheries, including Pacific cod (Fissel et al. 2019) and a section on economics in the SAFE reports. Harvest levels for each groundfish species or species group that are set by the Council for a new fishing year are based on the best biological, ecological, and socioeconomic information available, and follow a rigorous and public peer-reviewed process. The 2019-2020 harvest levels are specified by the Council (see links given in Fundamental Clause 7 above).

As listed in the FMPs and in NMFS regulations, the only legal gears for taking Pacific cod in the Alaskan fisheries are pelagic trawl, bottom trawl, jig, longline, and pot. Regulations pertaining to vessel and gear markings in the Pacific cod fishery are established in NMFS and ADFG regulations as prescribed in the annual management measures published in the Federal Register. There was no evidence that indicated the marking of gear is not being followed or is not effective. No destructive gears such as dynamite or poison are permitted, nor is there any evidence that such methods are being used illegally. There is no evidence that regulations involving gear selectivity in the Pacific cod fisheries are being circumvented either by omission, or through the illegal use of gear technology. Evidence provided by fishing fleets indicates that lost fishing gear is minimal. A NOAA (2015) study shows ghost fishing mortality and gear loss for derelict trawl (and other gears such as longline) are likely to be lower in comparison to gillnets and trap gears, although less is known of the effects of derelict trawls and longlines.

The Council and BOF have extensive processes in place to allow for identifying and consulting with domestic parties having interest in the Alaskan Pacific cod fisheries. The Council is responsible for allocation of the Pacific cod resource among user groups in Alaskan waters, and the BOF public meeting process provides a regularly scheduled public forum for all interested individuals, fishermen, fishing organizations, environmental organizations, Alaskan Native organizations and other governmental and non-governmental entities that catch Pacific cod off Alaska to participate in the development of legal regulations for fisheries. Organizations and individuals involved in the fishery and management process have been identified. The Alaska Pacific cod management process has many stakeholders, including license holders, processors, fishermen's organizations, cooperatives, coalitions, the states of Alaska, Washington, and Oregon, CDQ groups, and environmental groups. The Council's process is the primary means for soliciting stakeholder information important to the fisheries, and this is fully transparent and open to the public. Proposals for management measures may come from the public, state and federal agencies, advisory groups, or Council members. Fishing industry stakeholders work extensively with fishery scientists, managers, and other industry members on various initiatives to ensure sustainability of the Pacific cod fisheries.

The Council established a Rural Outreach Committee in 2009 to improve outreach and communications with rural communities and Alaska Native entities and develop a method for systematic documentation of Alaska Native and community participation in the development of fishery management actions. The

Western Alaska CDQ Program, established by the Council in 1992, allocates a percentage of all BSAI quotas for groundfish, prohibited species, halibut, and crab to eligible communities. There are approximately 65 communities within a 50-mile radius of the BS coastline who participate in the program.

Mechanisms have been established to reduce capacity to levels commensurate with sustainable use of the Pacific cod resource in Alaska. These include harvest control rules re catch and effort management, an overall OY cap in GOA and BSAI regions, a license limitation and restricted access program, and reduction of the number of vessels through industry-based initiatives. The industry-based measures have been taken to rationalize effort, eliminate derby-style fisheries, improve retention and utilization and reduce bycatch, and include the formation of groundfish cooperatives under Amendment 80, aimed at reduction of bycatch and further rationalization of the fishery. Fleet capacity and regularly updated data on all Pacific cod fishing operations are presented in the annual SAFE documents, as well as in various cooperative reports. Each cooperative is responsible for its own target catch and bycatch, and when any allocation is reached, the cooperative must stop fishing. This provides a strong incentive for cooperatives to keep bycatch rates low and to fish efficiently.

The Amendment 80 program was implemented in 2008 for certain groundfish catcher/processors C/Ps) in the BSAI and provides an allocation of six groundfish species including Pacific cod. As well, the freezer longline fleet in the BSAI Region formed a voluntary cooperative (the Freezer Longline Conservation Cooperative) in 2010, in an attempt to maximize the value of their allocation of Pacific cod. The number of active vessels in this fleet was stable between 2003 and 2009 at an average of approximately 39 vessels, but after the formation of the Freezer Longline Conservation Cooperative, only approximately 29-30 vessels continued to fish in 2011-2014. However, the number of fishing days utilized increased, as the race for fish was eliminated (Fissel et al. 2019). Amendment 83 to the GOA FMP allocates the Pacific cod TAC in the Western and Central regulatory areas of the GOA among various gear and operational sectors and eliminates inshore and offshore allocations in these two regulatory areas. The Council regularly reviews the effectiveness of measures such as Amendment 80, and a detailed five-year review was prepared for the Council in 2014.

There have been numerous regulations, as well as technological developments, aimed at reducing waste and discards in the Pacific cod fisheries, and to ensure that the resources are harvested sustainably. These include various measures to address fish size, discards, and closed seasons and areas. Specific examples include development of excluder devices for trawl gear to reduce these bycatches, and closures of large areas to protect numerous endangered species (including salmon, crab, and marine mammals). Since 1998, full retention of Pacific cod is required in all Alaskan fisheries under the Improved Retention/Improved Utilization Program. In addition, some vessels have made various gear modifications to avoid retention of smaller fish, and/or to minimize bottom contact. MRAs are put in place to help manage bycatches in groundfish fisheries. Fishing industry groups such as cooperatives and coalitions have undertaken numerous conservation-oriented measures in relation to fish size, bycatch avoidance, and product utilization.

NMFS has a full suite of fishery regulations for Alaskan waters which cover all aspects of fishing, including seasons, gear limitations, and numerous area closures. There are specific rules laid out for Pacific cod, permitting the use of trawl gear in certain areas only, as well as regulations on seabird avoidance for vessels fishing with hook-and-line gear. The gear regulations also contain details on mesh sizes permitted, biodegradable panels in pot gears, types of hook and line gear allowed, etc. The use of bottom contact gear is prohibited in the Gulf of Alaska Coral and Alaska Seamount Habitat Protection Areas year-round. Fishing with trawl vessels is not permitted year-round in the Crab and Halibut Protection Zone and the Pribilof Island Habitat Conservation Area. As well, a number of closure zones for trawl gears are described in the FMPs for GOA and BSAI. A suite of measures specific to seabird avoidance in hook and line fisheries in Alaskan waters also exists, and data on seabirds are collected by observers, and included in the SAFE documents. Various measures to reduce bycatches of PSC species (e.g., crabs, halibut, Chinook) in BSAI and GOA, including gear modifications and closed areas and seasons, have been adopted in recent years. Other industry-driven measures taken to reduce halibut catch include use of excluder devices, improved communication and data sharing among vessels to avoid halibut, and enhanced deck sorting to reduce mortality of halibut returned to the sea (Gauvin 2013). In 2016, NMFS reduced the MRA of skates using groundfish and halibut as basis species in the GOA from 20% to 5%, as a necessary measure to limit the incidental catch and discards of skates in GOA groundfish and halibut fisheries.

The FMPs for BSAI and GOA groundfish state that “For groundfish species identified as key prey of Steller sea lions (i.e., walleye pollock, Pacific cod, and Atka mackerel), directed fishing is prohibited in the event that the spawning biomass of such a species is projected in the stock assessment to fall below B20% in the coming year” (NPFMC 2018a, 2019). In the 2018 SAFE for GOA Pacific cod, a recommendation was made to reduce the maxABC to 17,000 t to prevent the stock spawner biomass from declining below B20% in 2020 (Barbeaux et al. 2018), which has been adopted by the Council in its harvest specifications. There are a number of other Steller sea lion protection measures in place in various locations throughout BSAI and GOA, implemented by NMFS, including areas closed to Pacific cod fishing for trawl and non-trawl gears. The Council has acted in a precautionary manner to place protections around Steller sea lion rookeries and haulouts and close areas where fishing may impact Steller sea lion prey such as Pacific cod. ADFG has also implemented areas closed to fishing in PWS around SSL rookeries. ADFG notes that co-management agreements have been established between the NMFS and the Aleut Marine Mammal Commission, the Traditional Council of St. George Island, and the Traditional Council of St. Paul Island.

None of the Pacific cod stocks in Alaska are classified as overfished or undergoing overfishing and no destructive fishing practices are allowed in GOA or BSAI which would adversely impact habitat. With regard to other resources taken in the Pacific cod fishery, considerable work has been done to reduce catches of species such as halibut and Chinook salmon in trawl catches, as there are concerns with the status of Chinook in many rivers. Extensive work on deck sorting (Gauvin 2013) has occurred in recent years in certain trawl fisheries to improve the survival rates of halibut discarded at sea (required under regulation). Exempted fishing permits have been issued for deck sorting on Amendment 80 C/Ps to reduce halibut mortality. Numerous measures to protect Steller sea lion populations and habitat affect are implemented in the FMPs for GOA and BSAI groundfish, and some are specific to the Pacific cod fisheries. NMFS and the Council must describe and identify EFH in 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. Further details on this are described under Fundamental Clause 12 below.

Amendment 97 established annual Chinook salmon PSC limits for the groundfish trawl fisheries, except for pollock trawl fisheries, in the Western and Central GOA. This action established annual Chinook salmon PSC limits for various fleet sectors and also established incentives for reducing Chinook salmon PSC for the trawl C/P and Non-Rockfish Program CV sectors and established seasonal Chinook salmon PSC limits for the trawl C/P sector. The majority of chinook by-catch in GOA is from the pollock fishery, and a recent supplementary Biological Opinion concluded that groundfish fisheries in the GOA were not likely to jeopardize the continued existence of threatened Chinook stocks. Amendment 103 to the GOA FMP, passed in September 2016, allows NMFS to reapportion unused Chinook salmon PSC within and among specific trawl sectors in the Central and Western GOA, based on specific criteria and within specified limits. This rule does not increase the current combined annual PSC limit of Chinook salmon that applies to Central and Western GOA trawl sectors and promotes more flexible management of GOA trawl Chinook salmon PSC.

FMPs outline the allowable fishing gears allowed in the Alaskan Pacific cod fisheries, and no gillnetting is permitted. Evidence provided by fishing fleets indicates that lost fishing gear is minimal. Use of longline gear in the Pacific cod fisheries substantially reduces the impact on bottom habitats and bycatch of many bottom dwelling species. Longline is typically not associated with as much ghost fishing as some other fishing gears, such as gillnets and some types of traps (NOAA 2015a). There are no formal estimates of lost pot gear in the Pacific cod fishery; however, it has been reported that in some locations there were periodic lost pot recovery programs. NMFS regulations require that each pot be equipped with a biodegradable panel and escape rings to reduce the ability of lost pots to ghost-fish. Advancements or developments in fishing gear are made widely available to fishers through websites of the Council, NOAA/NMFS, and ADFG, and public meetings and other forms of communication. Use of excluder devices is generally thought not to negatively impact the selectivity of the trawls toward Pacific cod and are designed not to impede escaping fish.

The fishery for Pacific cod in Alaska is conducted by U.S. vessels only. In adjacent waters of the GOA cooperation on Pacific cod research and management between Canada and the United States occurs as part of the science and management process. One such avenue for cooperation is the TSC of the Canada-U.S. Groundfish Committee, formed in 1960 to coordinate fishery and scientific information resulting from the implementation of commercial groundfish fisheries operating in U.S. and Canadian waters off the West Coast. The TSC meets annually, reviews the effectiveness of existing regulations,

and allows exchange of information on the status of groundfish stocks of mutual concern and to coordinate wherever possible programs of research, including surveys, age reading, and gear research.

There are numerous measures implemented in Alaskan fisheries to minimize non-utilized catches, such as use prohibition of discarding (Improved Retention/Improved Utilization Program), use of salmon and halibut excluder devices in trawl nets, and use of streamers on longline gear to reduce seabird bycatch. Many of the studies and subsequent implementation have involved cooperative efforts between researchers at institutions in NMFS, ADFG, universities, and industry, and are introduced into regulations only after extensive testing has occurred. Key studies include research on excluder devices, deck sorting of halibut, and research on pots to reduce Tanner crab bycatch. Additional information on bycatch is presented in Fundamental Clause 12 below.

#### **Evidence of continuous compliance with the supporting clauses**

There is no material change in compliance with any of the following supporting clauses. Clauses 8.11 and 8.14 are not applicable.

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, fisher or community sources.

8.1.1 Management targets are consistent with achieving maximum sustainable yield (MSY) (or a suitable proxy) on average, or a lesser fishing mortality if that is optimal in the circumstances of the fishery (e.g. multispecies fisheries) or to avoid severe adverse impacts on dependent predators.

8.1.2 In the evaluation of alternative conservation and management measures, their cost-effectiveness and social impact shall be considered.

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

8.2 States shall prohibit dynamiting, poisoning and other comparable destructive fishing practices.

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

8.4 Mechanisms shall be established where excess capacity exists, to reduce capacity to levels commensurate with sustainable use of the resource. Fleet capacity operating in the fishery shall be measured and monitored. 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.

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

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

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.

8.8 States and relevant groups from the fishing industry shall measure performance and encourage the development, implementation and use of selective, environmentally safe and cost effective gear, technologies and techniques that sufficiently selective as to minimize catch, waste and discards of non-target species - both fish and non-fish species and impacts on associated or dependent species. The use of fishing gear and practices that lead to the discarding of catch shall be discouraged and the use of fishing gear and practices that increase survival rates of escaping fish shall be promoted. Inconsistent methods, practices and gears shall be phased out accordingly.

8.9 Technologies, materials and operational methods or measures including, to the extent practicable, the development and use of selective, environmentally safe and cost effective fishing gear and techniques shall be applied to minimize the loss of fishing gear, the ghost fishing effects of lost or abandoned fishing gear, pollution and waste.

8.10 The intent of fishing selectivity and fishing impacts related regulations shall not be circumvented by technical devices and information on new developments and requirements shall be made available to all fishers.

8.11 Assessment and scientific evaluation shall be carried out on the implications of habitat disturbance impact on the fisheries and ecosystems prior to the introduction on a commercial scale of new fishing gear, methods and operations. Accordingly, the effects of such introductions shall be monitored.

8.12 International cooperation shall be encouraged with respect to research programs for fishing gear selectivity and fishing methods and strategies, dissemination of the results of such research programs and the transfer of technology.

8.13 States and relevant institutions involved in the fishery shall collaborate in developing standard methodologies for research into fishing gear selectivity, fishing methods and strategies, and on the behavior of target and non-target species in relation to such fishing gear as an aid for management decisions and with a view to minimizing non utilized catches.

8.14 Policies shall be developed for increasing stock populations and enhancing fishing opportunities through the use of artificial structures. States shall ensure that, when selecting the materials to be used in the creation of artificial reefs as well as when selecting the geographical location of such artificial reefs, the provisions of relevant international conventions concerning the environment and the safety of navigation are observed.

**Changes to Fundamental Clause Confidence Ratings:**

There are no changes in the management of fisheries that would detrimentally affect performance against the confidence ratings for the fundamental clauses and any supporting clause.

**Conformance:**

Conformance level: High. Non-conformance: None

**Fundamental Clause 9.**

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

No. Supporting clauses	3
Supporting clauses applicable	3
Supporting clauses not applicable	0

Overall level of conformity	High
Non-Conformances	None

**Evidence of continuous compliance with the fundamental clause:**

The North Pacific Fishing Vessel Owners Association provides a large and diverse training program that many of the professional crew members must pass, and the Sitka-based Alaska Marine Safety Education Association has trained more than 10,000 fishermen in marine safety and survival. Captains and some officers on certain larger vessels in Alaska require particular levels of navigational certification. Alaska’s Department of Labor and Workforce Development includes Alaska’s Institute of Technology (formerly called Alaska Vocational Training and Education Center). One of the Institute’s main divisions is the Alaska Maritime Training Center, which promotes safe marine operations by effectively preparing captains and crew members for employment in the Alaskan maritime industry. Also, the University of Alaska Sea Grant Marine Advisory Program provides education and training in several sectors, including fisheries management, in the forms of seminars and workshops. Additional education is provided by the Fishery Industrial Technology Center, in Kodiak, Alaska.

All rules and regulations governing Alaskan Pacific cod fisheries, including those dealing with responsible fishing methods, are readily available on NMFS, Council, and ADFG websites. A summary of the Council management measures that govern the GOA and BSAI groundfish fisheries are contained in the FMPs for those two regions. These also cover legal definitions such as quota shares, individual fishing quotas, etc. To increase communications and understanding between the regulated users and enforcement personnel, NOAA OLE strives to maintain a positive and productive relationship with all harvesters and industry personnel, by providing current regulatory information and guidance to promote compliance and responsible fisheries.

Data on the number and location of Alaskan fishers, permits issued, etc. can be found in the annual SAFE documentation, such as Fissel et al. (2017). Information on Alaska sport fish and crew license holders has been compiled through the Alaska Fisheries Information Network. Data on fishing in Alaskan state-managed fisheries can be found in the State of Alaska’s Commercial Fisheries Entry Commission (CFEC) website. Fishermen in the state-managed fisheries must register prior to fishing and are required to keep a logbook during the fishery. Completed logbook pages must be attached to the ADFG copy of the fish ticket at the time of delivery. USCG also maintains records and issues credentials on licenses for crewmembers, including engineers, captains, mates, deckhands, etc. The State of Alaska issues commercial fishing licenses for all crew.

**Evidence of continuous compliance with the supporting clauses:**

There is no material change in compliance with any of the following supporting clauses.

9.1. States shall enhance through education and training programs the education and skills of fishers and, where appropriate, their professional qualifications. Such programs shall take into account agreed international standards and guidelines.

9.2 States, with the assistance of relevant international organizations, shall endeavor to ensure through education and training that all those engaged in fishing operations be given information on the most important provisions of the FAO CCRF (1995), as well as provisions of relevant international conventions and applicable environmental and other standards that are essential to ensure responsible fishing operations.

9.3 States shall, as appropriate, maintain records of fishers which shall, whenever possible, contain information on their service and qualifications, including certificates of competency, in accordance with their national laws.

**Changes to Fundamental Clause Confidence Ratings:**

There are no changes in the management of fisheries that would detrimentally affect performance against the confidence ratings for the fundamental clauses and any supporting clause.

**Conformance:**



Conformance level: High. Non-conformance: None

## 6.5 Implementation, Monitoring and Control (E)

### Fundamental Clause 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.

No. Supporting clauses	6
Supporting clauses applicable	2
Supporting clauses not applicable	4 (10.3, 10.3.1, 10.4, 10.4.1)
Overall level of conformity	High
Non-Conformances	None

### Evidence of continuous compliance with the fundamental clause:

The USCG, NMFS OLE, and AWT conduct at-sea and shore-based inspections. At-sea, dockside monitoring, aerial surveillance, and satellite VMS are in operation within the fisheries and developmental of electronic monitoring is ongoing. Monitoring, control, and surveillance (MCS) is carried out at-sea and shore-side for the federal fisheries by the OLE and the USCG. The AWT fulfils the MCS function for the state water fisheries. The AWT also liaise with the OLE and may also request the assistance of the USCG vessels and aircraft to help in their surveillance and enforcement activities.

The Observer Program is the main data gathering program for all biological and fishery data for Pacific cod stock assessment and management. An annual report is produced on the Alaskan observer program, which covers fisheries in the BSAI and GOA regions. Although observers are not directly part of the federal MCS program, they are required to report infringements, and OLE and USCG officers conduct de-briefing interviews with observers to check on vessels' fishing practices and the conduct of the crew.

The CFEC helps to conserve and maintain the economic health of Alaska's commercial fisheries by limiting the number of participating fishers. CFEC issues permits and vessel licenses and provides due process hearings and appeals as and when needed. OLE, USCG and AWT staff have on-line access to information related to permits and licenses and are therefore able to confirm whether a vessel or individual has the correct credentials to be operating in a fishery.

The OLE publishes a national annual report and the Alaska region submits six monthly reports to the Council. The USCG publishes an annual report to the Council on resources applied to fishery enforcement in the previous year, the number of boardings/inspections, the number of violations, lives lost at sea, safety issues, and any changes in regulations. The Pacific cod fishery is considered to be a relatively low risk fishery, with the potential for PSC bycatch, in particular halibut and salmon, at certain times of the year being the main issue. The December 2019 report from OLE to the Council, covering the period April to September 2019 (<https://meetings.npfmc.org/CommentReview/DownloadFile?p=716f04bb-d739-4f2c-b8b1-e194d9ddb734.pdf&fileName=B4%20NOAA%20Enforcement%20Report.pdf>), did not note any specific issues with regard to the Pacific cod fisheries. The low occurrence of serious offences indicates that the Pacific cod fishery is generally very compliant with regulations and the sanctions are considered to be an effective deterrent.

### Evidence of continuous compliance with the supporting clauses:

There is no material change in compliance with any of the following supporting clauses. Clauses 10.3, 10.3.1, 10.4, and 10.4.1 are not applicable.

10.1 Effective mechanisms shall be established for fisheries monitoring, surveillance, control and enforcement measures including, where appropriate, observer programs, inspection schemes and

vessel monitoring systems, to ensure compliance with the conservation and management measures for the fishery in question. This could include relevant traditional, fisher or community approaches, provided their performance could be objectively verified.

10.2 Fishing vessels shall not be allowed to operate on the resource in question without specific authorization.

10.3 States involved in the fishery shall, in accordance with international law, within the framework of sub-regional or regional fisheries management organizations or arrangements, cooperate to establish systems for monitoring, control, surveillance and enforcement of applicable measures with respect to fishing operations and related activities in waters outside their national jurisdiction.

10.3.1 States which are members of or participants in sub-regional or regional fisheries management organizations or arrangements shall implement internationally agreed measures adopted in the framework of such organizations or arrangements and consistent with international law to deter the activities of vessels flying the flag of non-members or non-participants which engage in activities which undermine the effectiveness of conservation and management measures established by such organizations or arrangements. In that respect, Port States shall also proceed, as necessary, to assist other States in achieving the objectives of the FAO CCRF (1995), and should make known to other States details of regulations and measures they have established for this purpose without discrimination for any vessel of any other State.

10.4 Flag States shall ensure that no fishing vessels entitled to fly their flag fish on the high seas or in waters under the jurisdiction of other States unless such vessels have been issued with a Certificate of Registry and have been authorized to fish by the competent authorities. Such vessels shall carry on board the Certificate of Registry and their authorization to fish.

10.4.1 Fishing vessels authorized to fish on the high seas or in waters under the jurisdiction of a State other than the flag State shall be marked in accordance with uniform and internationally recognizable vessel marking systems such as the FAO Standard Specifications and Guidelines for Marking and Identification of Fishing Vessels.

**Changes to Fundamental Clause Confidence Ratings:**

There are no changes in the management of fisheries that would detrimentally affect performance against the confidence ratings for the fundamental clauses and any supporting clauses.

**Conformance:**

Conformance level: High. Non-conformance: None

**Fundamental Clause 11.**

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

No. supporting clauses	3
Applicable supporting clauses	2
Non-applicable supporting clauses	1 (11.3)
Overall level of conformity	High
Non-conformances	None

**Evidence of continuous compliance with the fundamental clause:**

The MSA provides four options for penalizing violations, listed in ascending order of severity:  
 1) Issuance of a citation (a type of warning), usually at the scene of the offence

- 2) Assessment by the Administrator of a civil money penalty,
- 3) For certain violations, judicial forfeiture action against the vessel and its catch.
- 4) Criminal prosecution of the owner or operator for some offences.

The policy of NMFS is to enforce the provisions of the MSA by utilizing the authorized remedies best suited in a particular case. OLE agents and officers can assess civil penalties directly to the violator in the form of a summary settlement or can refer the case to NOAA's Office of General Counsel for Enforcement and Litigation who can impose a sanction on the vessels permit or further refer the case to the U.S. Attorney's Office for criminal proceedings. The low proportion of violations encountered during at-sea patrols of the Alaska fisheries demonstrates effective deterrence. No recent sanctions have been applied by State of Alaska authorities in the state Pacific cod fisheries and ADFG staff consider that sanctions are effective deterrents.

NOAA Alaska region has available a "Summary Settlement and Fix-it Schedule", which describes the violation and penalties associated with them. It also includes an increasing scale of penalty for repeat offences. Alaska state law describes the penalties for violating a BOF regulation. Fines, up to a maximum of \$15,000 or imprisonment for not more than 1 year are stipulated, along with forfeiture of any fish, its market value, forfeiture of vessel and any fishing gear. The option of pursuing criminal action is also available to the state.

**Evidence of continuous compliance with the supporting clauses:**

There is no material change in compliance with any of the following supporting clauses. Clause 11.3 is not applicable.

11.1 National laws of adequate severity shall be in place that provide for effective sanctions.

11.2 Sanctions applicable in respect of violations and illegal activities shall be adequate in severity to be effective in securing compliance and discouraging violations wherever they occur. Sanctions shall also be in force that affects authorization to fish and/or to serve as masters or officers of a fishing vessel, in the event of non-compliance with conservation and management measures.

11.3 Flag States shall take enforcement measures in respect of fishing vessels entitled to fly their flag which have been found by them to have contravened applicable conservation and management measures, including, where appropriate, making the contravention of such measures an offence under national legislation.

**Changes to Fundamental Clause Confidence Ratings:**

There are no changes in the management of fisheries that would detrimentally affect performance against the confidence ratings for the fundamental clauses and any supporting clauses.

**Conformance:**

Conformance level: High. Non-conformance: None

## 6.6 Serious impacts of the fishery on the Ecosystem (F)

**Fundamental Clause 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.

No. supporting clauses	16
Applicable supporting clauses	16
Non-applicable supporting clauses	0

Overall level of conformity	High
Non-conformances	None

**Evidence of continuous compliance with the fundamental and supporting clause:**

There are no material changes (since the last assessment activity) in compliance with the supporting clauses, evidence of compliance is therefore provided in a summarized format.

**GOA**

**Assessment of environmental and social effects and management consideration (Supporting clauses: 12.1, 12.2, 12.3, 12.4, 12.10)**

12.1 States shall assess the impacts of environmental factors on target stocks and species belonging to the same ecosystem or associated with or dependent upon the target stocks and assess the relationship among the populations in the ecosystem.

12.2 Adverse environmental impacts on the resources from human activities shall be assessed and, where appropriate, corrected.

12.3 The most probable adverse impacts of the fishery on the ecosystem/environment shall be considered, taking into account available scientific information, and local knowledge. In the absence of specific information on the ecosystem impacts of fishing for the unit of certification, generic evidence based on similar fishery situations can be used for fisheries with low risk of severe adverse impact. However, the greater the risk the more specific evidence shall be necessary to ascertain the adequacy of mitigation measures.

12.4 Impacts that are likely to have serious consequences shall be addressed. This may take the form of an immediate management response or a further analysis of the identified risk. In this context, full recognition should be given to the special circumstances and requirements in developing countries and countries in transition, including financial and technical assistance, technology transfer, training and scientific cooperation.

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.

Programs of monitoring, evaluation and management response continue at the level when the fishery was re-certified, supported by wide-ranging evaluations such as the Final Alaska Groundfish Fisheries Programmatic Supplemental Environmental Impact Statement (NOAA 2004; updated via NOAA 2015b). This is reflected in the updated Pacific cod SAFE report (including evaluation of ecosystem considerations) and specific GOA Ecosystem Status Report (Barbeaux et al. 2019; Zador et al. 2019). Also carried out was an updated evaluation of the economic status of the groundfish fisheries off Alaska (Fissel et al. 2019). Included in the environmental analyses are considerations of the effects of ecosystem variation (notably the warming of 2014-2016) on production.

No changes that would affect the existing confidence ratings are evident.

**Monitoring and management regarding non-target catches (Supporting clauses 12.5, 12.6, 12.11)**

12.5 Appropriate measures shall be applied to minimize:

- catch, waste and discards of non-target species (both fish and non-fish species).
- impacts on associated, dependent or endangered species

12.6 Non target catches, including discards, of stocks other than the "stock under consideration" shall be monitored and shall not threaten these non-target stocks with serious risk of extinction, recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible; if such impacts arise, effective remedial action shall be taken.

12.11 There shall be outcome indicator(s) consistent with achieving management objectives for non-target stocks (i.e. avoiding overfishing and other impacts that are likely to be irreversible or very slowly reversible).

Monitoring is carried out through the Observer Program operated by the NMFS. In 2018, 100% of the catch of RFM-certified Pacific cod fisheries in the GOA was observed. CVs were observed at a level of 15% for longline 14% for trawl, and 12% for pot gear (Alaska Fisheries Science Center and Alaska Regional Office 2019). There was an overall decrease in the catches of retained FMP species in for all gear types, which is likely due to the overall decrease in GOA Pacific cod catch from 2017 to 2018. The only significant increase from 2017 to 2018 was pot gear's catch of Bairdi tanner crab (4,079 individuals to 18,139 individuals), which is has a PSC limit. However, this catch amount is still well within the limit.

No changes that would affect the existing confidence ratings are evident.

**Monitoring and management regarding endangered species and dependent predators (Supporting clauses 12.5, 12.5.1, 12.12, 12.14)**

12.5 Appropriate measures shall be applied to minimize:

- catch, waste and discards of non-target species (both fish and non-fish species).
- impacts on associated, dependent or endangered species

12.5.1 There shall be management objectives that seek to ensure that endangered species are protected from adverse impacts resulting from interactions with the unit of certification and any associated culture or enhancement activity, including recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible.

12.12 There shall be outcome indicator(s) consistent with achieving management objectives that seek to ensure that endangered species are protected from adverse impacts resulting from interactions with the unit of certification and any associated culture or enhancement activity, including recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible.

12.14 There shall be outcome indicator(s) consistent with achieving management objectives that seek to avoid severe adverse impacts on dependent predators resulting from the unit of certification fishing on a stock under consideration that is a key prey species.

*Mammals*

According to NOAA's List of Fisheries, the GOA Pacific cod fishery continues to be listed as Category III (remote likelihood or no known interaction with marine mammals) fishery. The latest Alaska marine mammal stock assessment report updated the stock status and provided new estimates of potential biological removals for several species (Muto et al. 2019). It also summarized the incidental mortality and injury due to commercial fisheries using the latest available data. The one relevant species listed on the ESA list is the Steller sea lion (western U.S. stock). According to observer data, in recent years (2013-2017), the fishery has caused only one Steller sea lion mortality, which occurred via trawl gear in 2016 (Delean et al. 2020). There has been a sustained increase in the Steller sea lion population size in all areas of the GOA since 2003.

*Seabirds*

Interactions with fishing gear are recorded through the NMFS Observer Program (summarized in Eich et al. 2018), and population trends are monitored by the USFWS (summarized in Dragoo et al. 2019). Overall, there has been an increase in recent years. The longline fishery has interacted with northern fulmar, black-footed albatross, and gulls and the pot fishery with northern fulmar. The one relevant species on the ESA list is the short-tailed albatross, and none have been taken in the GOA Pacific cod fishery (Eich et al. 2018). In 2016, NOAA Fisheries formed the Alaska Groundfish and Halibut Seabird Working Group to serve as an advisory body to NOAA Fisheries and the USFWS to promote further reduction in the bycatch of short-tailed albatross and other seabirds as prescribed in the USFWS 2015 and 2018 Biological Opinions (USFWS 2015, 2018). Monitoring and management of effects continue at an appropriate level, and as part of ongoing management review, a Seabird Cable Strike Mitigation Workshop was held in 2017. The goal of the workshop was to identify effective, practical mitigation measures to reduce seabird cable strike mortality in the catcher-processor west coast hake and Alaska trawl fisheries (Jannot et al. 2018).

No changes that would affect the existing confidence ratings are evident.

**Monitoring and management regarding aquatic ecosystems (Supporting clauses 12.7, 12.8, 12.15)**

12.7 The role of the “stock under consideration” in the food web shall be considered, and if it is a key prey species in the ecosystem, management objectives and measures shall be in place to avoid severe adverse impacts on dependent predators.

12.8 States shall introduce and enforce laws and regulations based on the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78).

12.15 There shall be outcome indicator(s) consistent with achieving 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. Any modifications to the habitat for enhancing the stock under consideration must be reversible and not cause serious or irreversible harm to the natural ecosystem’s structure, processes and function.

The GOA’s food web is driven by climate and corresponding circulation and water temperature changes, “which can impact the distribution of key predators in the system and mediate trophic interactions” (Barbeaux et al. 2019). The predator-prey relationship is a key component within the GOA ecosystem. There is spatial variance of the Pacific cod’s prey composition, which is also affected by changing environmental conditions, and “major trends in the most important prey or predator species can be expected to affect the dynamics of Pacific cod (Gaichas et al. 2015)” (Barbeaux et al. 2019).

The northeast Pacific’s 2014-2016 marine heat wave was more intense, longer lasting, and spatially vast than any other warming event in history (Bond et al. 2015). Research continues to be done to determine how, why, and to what level this heat wave has impacted the Pacific cod stock in the GOA since there was a dramatic decline in biomass and abundance starting in 2015. The main theory is that a decrease in potential prey led to low Pacific cod weights and growth (Zador and Yasumiishi 2017). Additionally, seabirds and marine mammals that share prey resources with GOA Pacific cod have experienced similar population declines starting in 2015 due to starvation (Barbeaux et al. 2019). The Council’s SSC has requested that research continue to further evaluate potential factors influencing Pacific cod survival.

The GOA Ecosystem Status Report includes continuing monitoring of a range of ecosystem indicators, all considered by the Council in the decision-making process (Zador et al. 2019). Further developments in management include creation of the Alaska Marine Ecosystem Forum to promote coordination between the agencies on issues of shared responsibilities related to the marine ecosystems off Alaska’s coast and an Ecosystem Research Workshop, which was held in 2018 to discuss the integration of ecosystem knowledge into the Council process.

No changes that would affect the existing confidence ratings are evident.

**Monitoring and management regarding essential habitats (Supporting clauses 12.9, 12.13)**

12.9 There shall be knowledge of the essential habitats for the “stock under consideration” and potential fishery impacts on them. Impacts on essential habitats and on habitats that are highly vulnerable to damage by the fishing gear involved shall be avoided, minimized or mitigated. In assessing fishery impacts, the full spatial range of the relevant habitat shall be considered, not just that part of the spatial range that is potentially affected by fishing.

12.13 There shall be outcome indicator(s) consistent with achieving 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.

In the GOA, fishing effort was also dispersed over a wide area along the shelf, though with some areas of more concentrated activity. The most recent five-year review of EFH took place in 2016 (Simpson et al. 2017). The average percentage impact by the Pacific cod fishery for 2003-2016 was 1.8% of the

Pacific cod EFH in the GOA (<https://www.npfmc.org/habitat-protections/essential-fish-habitat-efh/>). The final environmental assessment for EFH Omnibus Amendments was published in June 2018. Amendment 105 is the relevant omnibus amendment to the FMP for the GOA groundfish fishery (NMFS 2018). Based on the most recent five-year review of EFH, the Council determined that new habitat and life history information is available to revise many of the EFH descriptions and maps. These amendments (105 for the GOA) to the EFH provisions in the Council's FMPs would not substantively change the impacts of EFH as analyzed in the 2005 EFH environmental impact statement. The 2015 EFH five-year review concluded that no change to the conclusions of the evaluation of fishing effects on EFH is warranted based on new information. None of the FMP amendments require regulatory action.

No changes that would affect the existing confidence ratings are evident.

### **BSAI**

#### **Assessment of environmental and social effects and management consideration (Supporting clauses: 12.1, 12.2, 12.3, 12.4, 12.10)**

12.1 States shall assess the impacts of environmental factors on target stocks and species belonging to the same ecosystem or associated with or dependent upon the target stocks and assess the relationship among the populations in the ecosystem.

12.2 Adverse environmental impacts on the resources from human activities shall be assessed and, where appropriate, corrected.

12.3 The most probable adverse impacts of the fishery on the ecosystem/environment shall be considered, taking into account available scientific information, and local knowledge. In the absence of specific information on the ecosystem impacts of fishing for the unit of certification, generic evidence based on similar fishery situations can be used for fisheries with low risk of severe adverse impact. However, the greater the risk the more specific evidence shall be necessary to ascertain the adequacy of mitigation measures.

12.4 Impacts that are likely to have serious consequences shall be addressed. This may take the form of an immediate management response or a further analysis of the identified risk. In this context, full recognition should be given to the special circumstances and requirements in developing countries and countries in transition, including financial and technical assistance, technology transfer, training and scientific cooperation.

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.

Programs of monitoring, evaluation and management response continue at the level when the fishery was re-certified, supported by wide-ranging evaluations such as the Programmatic Supplemental Environmental Impact Statement (NOAA 2004; updated via NOAA 2015b). This is reflected in the updated Pacific cod SAFE report (including evaluation of ecosystem considerations) and specifically for the EBS (Thompson and Thorson 2019) and the AI (Thompson et al. 2019) Ecosystem Status Reports. Also carried out was an updated evaluation of the economic status of the groundfish fisheries off Alaska (Fissel et al. 2019). Included in the environmental analyses are considerations of the effects of ecosystem variation (notably the warming of 2014-2016) on production.

No changes that would affect the existing confidence ratings are evident.

#### **Monitoring and management regarding non-target catches (Supporting clauses 12.5, 12.6, 12.11)**

12.5 Appropriate measures shall be applied to minimize:

- catch, waste and discards of non-target species (both fish and non-fish species).
- impacts on associated, dependent or endangered species

12.6 Non target catches, including discards, of stocks other than the "stock under consideration" shall be monitored and shall not threaten these non-target stocks with serious risk of extinction, recruitment



overfishing or other impacts that are likely to be irreversible or very slowly reversible; if such impacts arise, effective remedial action shall be taken.

12.11 There shall be outcome indicator(s) consistent with achieving management objectives for non-target stocks (i.e. avoiding overfishing and other impacts that are likely to be irreversible or very slowly reversible).

Monitoring is carried out through the NGHOP operated by the NMFS. In 2018, 100% of catches taken by all motherships and C/Ps were observed. For CVs, 14% of longline, 60% of trawl, and 18% of pot gear (Alaska Fisheries Science Center and Alaska Regional Office 2019). The catches of retained FMP species (e.g., pollock, arrowtooth flounder, flathead sole, rock sole, yellowfin sole) were similar to previous years. Most catches, including retained, prohibited, and non-target species, were broadly similar in composition to that previously observed. With regard to species with PSC limits, in most cases, there was a decrease in catch from 2017 to 2018. However, there was an increase in red king crab in the EBS pot and AI pot fisheries, causing the limit to be exceeded. Given that this is only a one-year increase and they do not appear to be overfished, the confidence rating will remain the same, but this will be reviewed at the next surveillance.

No changes that would affect the existing confidence ratings are evident.

**Monitoring and management regarding endangered species and dependent predators (Supporting clauses 12.5, 12.5.1, 12.12, 12.14)**

12.5 Appropriate measures shall be applied to minimize:

- catch, waste and discards of non-target species (both fish and non-fish species).
- impacts on associated, dependent or endangered species

12.5.1 There shall be management objectives that seek to ensure that endangered species are protected from adverse impacts resulting from interactions with the unit of certification and any associated culture or enhancement activity, including recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible.

12.12 There shall be outcome indicator(s) consistent with achieving management objectives that seek to ensure that endangered species are protected from adverse impacts resulting from interactions with the unit of certification and any associated culture or enhancement activity, including recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible.

12.14 There shall be outcome indicator(s) consistent with achieving management objectives that seek to avoid severe adverse impacts on dependent predators resulting from the unit of certification fishing on a stock under consideration that is a key prey species.

*Mammals*

According to NOAA's List of Fisheries, the BSAI Pacific cod longline fishery continues to be classified as Category II (occasional interactions) and the trawl and pot fisheries as Category III (remote likelihood or no known interaction). The latest Alaska marine mammal stock assessment report updated the stock status and provided new estimates of potential biological removals for several species (Muto et al. 2019). It also summarized the incidental mortality and injury due to commercial fisheries using the latest available data. The one relevant species listed on the ESA list is the Steller sea lion (western U.S. stock). According to observer data, in recent years (2013-2017), the longline fishery caused six Steller sea lion mortalities, and the trawl fishery caused two mortalities (Delean et al. 2020). Overall, there has been a sustained increase in the Steller sea lion population size in the Bering Sea with some decreasing in the Aleutian Islands.

In 2002-2005, AFSC conducted research to determine the effectiveness of management measures, which were designed to mitigate Pacific cod fisheries' (among others) impacts on Steller sea lions. One study showed that local concentrations of Pacific cod in the Unimak Pass were highly dynamic, meaning that the fishery's removals were unlikely to cause a measurable decline in fish abundance (Connors and Munro 2008). A tagging-feasibility study "showed some cod remaining in the vicinity of the release area in the southeast Bering Sea for several months, while other fish moved distances of 150 km or more



north-northwest along the shelf, some within a matter of two weeks (Rand et al. 2015)” (Thompson and Thorson 2019).

#### *Seabirds*

Interactions with fishing gear are recorded through the NMFS Observer Program (summarized in Eich et al. 2018), and population trends are monitored by the USFWS (summarized in Dragoo et al. 2019). The longline component of the Pacific cod fishery accounts for most of the seabirds taken in the BSAI, interacting with northern fulmar, short-tailed albatross, Laysan albatross, shearwaters, kittiwakes, murre, puffins, auklets, and gulls in recent years (2012-2017). The trawl fishery interacted with northern fulmar and the pot fishery with northern fulmar, murre, and auklets (Eich et al. 2018). Generally, seabird bycatch in BSAI Pacific cod fisheries has declined since 2002 and the introduction of seabird mitigation devices. The one relevant species on the ESA list is the short-tailed albatross, and none have been taken in the BSAI Pacific cod fishery (Eich et al. 2018). Within the longline fishery, there was an increase in total seabird bycatch in 2015 and 2016, mainly due to increased catches of northern fulmar and shearwaters. However, the total catch decreased again in 2017, and given that neither northern fulmar nor shearwaters is a conservation concern and that research and monitoring continue to investigate trends and contributing factors, the confidence rating will remain the same, but this will be reviewed at the next surveillance.

In 2016, NMFS formed the Alaska Groundfish and Halibut Seabird Working Group to serve as an advisory body to NMFS and the USFWS to promote further reduction in the bycatch of short-tailed albatross and other seabirds as prescribed in the USFWS 2015 and 2018 Biological Opinions (USFWS 2015, 2018). Monitoring and management of effects continue at an appropriate level, and as part of ongoing management review, a Seabird Cable Strike Mitigation Workshop was held in 2017. The goal of the workshop was to identify effective, practical mitigation measures to reduce seabird cable strike mortality in the catcher-processor west coast hake and Alaska trawl fisheries (Jannot et al. 2018).

No changes that would affect the existing confidence ratings are evident.

#### **Monitoring and management regarding aquatic ecosystems (Supporting clauses 12.7, 12.8, 12.15)**

12.7 The role of the “stock under consideration” in the food web shall be considered, and if it is a key prey species in the ecosystem, management objectives and measures shall be in place to avoid severe adverse impacts on dependent predators.

12.8 States shall introduce and enforce laws and regulations based on the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78).

12.15 There shall be outcome indicator(s) consistent with achieving 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. Any modifications to the habitat for enhancing the stock under consideration must be reversible and not cause serious or irreversible harm to the natural ecosystem’s structure, processes and function.

The EBS and AI Ecosystem Status Reports include continuing monitoring of a range of ecosystem indicators, all considered by the Council in the decision-making process (Zador and Ortiz 2018; Siddon and Zador 2019). Further developments in management include creation of the Alaska Marine Ecosystem Forum to promote coordination between the agencies on issues of shared responsibilities related to the marine ecosystems off Alaska’s coast and an Ecosystem Research Workshop, which was held in 2018 to discuss the integration of ecosystem knowledge into the Council process.

No changes that would affect the existing confidence ratings are evident.

#### **Monitoring and management regarding essential habitats (Supporting clauses 12.9, 12.13)**

12.9 There shall be knowledge of the essential habitats for the “stock under consideration” and potential fishery impacts on them. Impacts on essential habitats and on habitats that are highly vulnerable to

damage by the fishing gear involved shall be avoided, minimized or mitigated. In assessing fishery impacts, the full spatial range of the relevant habitat shall be considered, not just that part of the spatial range that is potentially affected by fishing.

12.13 There shall be outcome indicator(s) consistent with achieving 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 most recent five-year review of EFH took place in 2016 using a new Fishing Effects model to assess the impacts of fishing activities on EFH (Simpson et al. 2017). It is estimated that 4.9% of Pacific cod EFH in the BS is impacted by the Pacific cod fishery and that 1.9% of Pacific cod EFH in the Aleutian Islands is impacted by the Pacific cod fishery (<https://www.npfmc.org/habitat-protections/essential-fish-habitat-efh/>). On this basis, the Council agreed that the effects of fishing on EFH do not currently meet the threshold of more than minimal and not temporary, and mitigation action is not needed at this time. In addition, the final environmental assessment for EFH Omnibus Amendments was published in June 2018. Amendment 115 is the relevant omnibus amendment to the Fishery Management Plan for the groundfish fishery of the BSAI (NMFS 2018). Based on the most recent five-year review of EFH, the Council determined that new habitat and life history information is available to revise many of the EFH descriptions and maps. These amendments (115 for the BSAI) to the EFH provisions in the Council's FMPs would not substantively change the impacts of EFH as analyzed in the 2005 EFH environmental impact statement. The 2015 EFH five-year review concluded that no change to the conclusions of the evaluation of fishing effects on EFH is warranted based on new information. None of the FMP amendments require regulatory action.

No changes that would affect the existing confidence ratings are evident.

**Changes to Fundamental Clause Confidence Ratings:**

There are no changes in the management of fisheries that would detrimentally affect performance against the confidence ratings for the fundamental clauses and any supporting clauses.

**Conformance:**

Conformance level: High. Non-conformance: None

**Fundamental Clause 13 – NOT APPLICABLE**

Where fisheries enhancement is utilized, environmental assessment and monitoring shall consider genetic diversity and ecosystem integrity.

No. supporting clauses	19
Applicable supporting clauses	0
Non-applicable supporting clauses	19
Overall level of conformity	NA
Non-conformances	NA

**Evidence of continuous compliance with the fundamental clause: NA**

**Evidence of continuous compliance with the supporting clauses: NA**

13.1 State shall promote responsible development and management of aquaculture, including an advanced evaluation of the effects of aquaculture development on genetic diversity and ecosystem integrity, based on the best available scientific information (and/or traditional, fisher or community objective and verifiable knowledge). Significant uncertainty is to be expected in assessing possible

adverse ecosystem impacts of fisheries, including culture and enhancement activities. This issue can be addressed by taking a risk assessment/risk management approach.

13.1.1 In the case of enhanced fisheries, the fishery management system should take due regard of the natural production processes and be appropriate for the conservation of genetic diversity, biodiversity, protection of endangered species, maintenance of integrity of aquatic communities and ecosystems, minimizing adverse impacts on ecosystem structure and function.

13.2 State shall produce and regularly update aquaculture development strategies and plans, as required, to ensure that aquaculture development is ecologically sustainable and to allow the rational use of resources shared by aquaculture and other activities.

13.2.1 State shall ensure that the livelihoods of local communities, and their access to fishing grounds, are not negatively affected by aquaculture developments.

13.3 Effective procedures specific to aquaculture of fisheries enhancement shall be established to undertake appropriate environmental assessment and monitoring with the aim of minimizing adverse ecological changes such as those caused by inputs from enhancement activities and related economic and social consequences.

13.4 With due regard to the assessment approach employed, stock assessment of fisheries that are enhanced through aquaculture inputs shall consider the separate contributions from aquaculture and natural production.

13.5 Any modification to the habitat for enhancing the stock under consideration is reversible and do not cause serious or irreversible harm to the natural ecosystem's structure and function.

13.5.1 Efforts shall be undertaken to minimize the harmful effects of introducing non-native species or genetically altered stocks used for aquaculture including culture-based fisheries into waters.

13.5.2 Steps shall be taken to minimize adverse genetic disease and other effects of escaped farmed fish on wild stocks.

13.5.3 Research shall be promoted to develop culture techniques for endangered species to protect, rehabilitate and enhance their stocks, taking into account the critical need to conserve genetic diversity of endangered species.

13.6 State shall protect transboundary aquatic ecosystems by supporting responsible aquaculture practices within their national jurisdiction and by cooperation in the promotion of sustainable aquaculture practices.

13.7 State shall, with due respect to their neighboring States and in accordance with international law, ensure responsible choice of species, siting and management of aquaculture activities which could affect trans boundary aquatic ecosystems.

13.8 State shall consult with their neighboring States, as appropriate, before introducing non-indigenous species into trans-boundary aquatic ecosystems.

13.9 State shall establish appropriate mechanisms, such as databases and information networks to collect, share and disseminate data related to their aquaculture activities to facilitate cooperation on planning for aquaculture development at the national, subregional, regional and global level.

13.10 State shall cooperate in the elaboration, adoption and implementation of international codes of practice and procedures for introductions and transfers of aquatic organisms.

13.11 States shall, in order to minimize risks of disease transfer and other adverse effects on wild and cultured stocks, encourage adoption and promote the use of appropriate practices/procedures in the selection and genetic improvement of broodstocks, the introduction of non-native species, and in the production, sale and transport of eggs, larvae, fry, broodstock or other live materials. States shall facilitate the preparation and implementation of appropriate national codes of practice and procedures to this effect.

13.12 Enhanced fisheries may be supported in part by stocking of organisms produced in aquaculture facilities or removed from wild stocks other than the "stock under consideration". Aquaculture production for stocking purposes should be managed and developed according to the above provisions, especially in relation to maintaining the integrity of the environment, the conservation of genetic diversity, disease control, and quality of stocking material.

13.13 Regarding the enhanced components of the "stock under consideration", provided that a natural reproductive stock component is maintained and fishery production is based primarily on natural biological production within the ecosystem of which the "stock under consideration" forms a part, enhanced fisheries shall meet the following criteria:

- the species shall be native to the fishery's geographic area or introduced historically and have subsequently become established as part of the "natural" ecosystem;
- there shall be natural reproductive components of the "stock under consideration";
- the growth during the post-release phase shall be based upon food supply from the natural environment and the production system shall operate without supplemental feeding.

13.14 In the case of enhanced fisheries, "stock under consideration" may comprise naturally reproductive components and components maintained by stocking. In the context of avoiding significant negative impacts of enhancement activities on the natural reproductive components of "stock under consideration":

- naturally reproductive components of enhanced stocks shall not be overfished;
- naturally reproductive components of enhanced stocks shall not be substantially displaced by stocked components.

In particular, displacement shall not result in a reduction of the natural reproductive stock component below abundance-based target reference points (or their proxies) defined for the regulation of harvest.

**Changes to Fundamental Clause Confidence Ratings:**

NA

**Conformance:**

NA

## REFERENCES

- Alaska Fisheries Science Center and Alaska Regional Office. 2019. North Pacific Observer Program 2018 Annual Report. AFSC Processed Rep. 2019-04, 148 p. Alaska Fish. Sci. Cent., NOAA, Natl. Mar. Fish. Serv., 7600 Sand Point Way NE, Seattle WA 98115.
- Barbeaux, S., K. Aydin, B. Fissel, K. Holsman, W. Palsson, K. Shotwell, Q. Yang, and S. Zador. 2017. Chapter 2: Assessment of Pacific Cod Stock in the Gulf of Alaska. NPFMC Gulf of Alaska SAFE. <https://archive.fisheries.noaa.gov/afsc/REFM/Docs/2017/GOApcod.pdf>.
- Barbeaux, S., K. Aydin, B. Fissel, K. Holsman, B. Laurel, W. Palsson, K. Shotwell, Q. Yang, and S. Zador. 2018. Chapter 2: Assessment of the Pacific cod stock in the Gulf of Alaska. NPFMC Gulf of Alaska SAFE. [https://archive.fisheries.noaa.gov/afsc/refm/stocks/plan\\_team/2018/GOApcod.pdf](https://archive.fisheries.noaa.gov/afsc/refm/stocks/plan_team/2018/GOApcod.pdf).
- Barbeaux, S., K. Aydin, B. Fissel, K. Holsman, B. Laurel, W. Palsson, L. Rogers, K. Shotwell, Q. Yang, and S. Zador. 2019. Chapter 2: Assessment of the Pacific cod stock in the Gulf of Alaska. NPFMC Gulf of Alaska SAFE. <https://archive.afsc.noaa.gov/refm/docs/2019/GOApcod.pdf>.
- Bond, N.A., M.F. Cronin, H. Freeland, and N. Mantua. 2015. Causes and impacts of the 2014 warm anomaly in the NE Pacific. *Geophys. Res. Lett.* 42:3414-3420.
- Conners, M.E. and P. Munro. 2008. Effects of commercial fishing on local abundance of Pacific cod (*Gadus macrocephalus*) in the Bering Sea. *Fishery Bulletin* 106(3):259-272.
- Delean, B.J., V.T. Helker, M.M. Muto, K. Savage, S. Teerlink, L.A. Jemison, K. Wilkinson, J. Jannot, and N.C. Young. 2020. Human-Caused Mortality and Injury of NMFS-Managed Alaska Marine Mammal Stocks 2013-2017. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-401 86 p.
- Dragoo, D.E., H.M. Renner, and R.S.A. Kaler. 2019. Breeding status and population trends of seabirds in Alaska, 2018. U.S. Fish and Wildlife Service Report AMNWR 2019/03. Homer, Alaska.
- Eich, A.M., J. Roberts, and S.M. Fitzgerald. 2018. Seabird Bycatch Estimates for Alaska Groundfish Fisheries: 2016 through 2017. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/AKR-18, 32 p. Environmental Assessment, EFH Omnibus Amendments, June 2018 can be found here: <https://alaskafisheries.noaa.gov/sites/default/files/analyses/efh-omnibus-amendments-ea0618.pdf>
- Fissel, B., M. Dalton, B. Garber-Yonts, A. Haynie, S. Kasperski, J. Lee, D. Lew, C. Seung, K. Sparks, M. Szymkowiak, and S. Wise. 2019. Stock Assessment and Fishery Evaluation Report for the Groundfish Fisheries of the Gulf of Alaska and Bering Sea/Aleutian Islands Area: Economic Status of the Groundfish Fisheries off Alaska, 2018. NMFS, Seattle, WA.
- Fournier, D. A., H. J. Skaug, J. Ancheta, J. Ianelli, A. Magnusson, M. N. Maunder, A. Nielsen, and J. Sibert. 2012. AD Model Builder: using automatic differentiation for statistical inference of highly parameterized complex nonlinear models. *Optimization Methods and Software* 27:233-249.
- Gaichas, S., K.Y. Aydin, and R.C. Francis. 2015. Wasp waist or beer belly? Modeling food web structure and energetic control in Alaskan marine ecosystems, with implications for fishing and environmental forcing. *Progress in Oceanography* 138:1-17.
- Ganz, P., S. Barbeaux, J. Cahalan, J. Gasper, S. Lowe, R. Webster, and C. Faunce. 2018. Deployment performance review of the 2017 North Pacific Observer Program. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-379, 68 p. <https://archive.fisheries.noaa.gov/afsc/Publications/AFSC-TM/NOAA-TM-AFSC-379.pdf>.
- Gauvin, J. 2013. Final Report on EFP 12-01: Halibut deck sorting experiment to reduce halibut mortality on Amendment 80 Catcher Processors. Alaska Seafood Cooperative Report.
- Holsman, K.K., J.N. Ianelli, K. Aydin, and I. Spies. 2019. 2019 Climate-Enhanced Multi-Species Stock Assessment for Walleye Pollock, Pacific Cod, Arrowtooth Founder in the Eastern Bering Sea. <https://archive.afsc.noaa.gov/refm/docs/2019/EBSmultispp.pdf>.
- Hurtado-Ferro, F., C.S. Szuwalski, J.L. Valero, S.C. Anderson, C.L. Cunningham, K.F. Johnson, R. Licandeo, C.R. McGilliard, C. C. Monnahan, M.L. Muradian, K. Ono, K.A. Vert-Pre, A.R. Whitten, and A.E. Punt. Looking in the rear-view mirror: bias and retrospective patterns in integrated, age-structured stock assessment models. *ICES Journal of Marine Science* 72:99-110.

- Jannot, J.E., T. Good, V. Tuttle, A.M. Eich, and S. Fitzgerald. 2018. U.S. West Coast and Alaska Trawl Fisheries Seabird Cable Strike Mitigation Workshop, November 2017: Summary Report. [https://www.nwfsc.noaa.gov/assets/25/9298\\_05312018\\_084659\\_TechMemo142.pdf](https://www.nwfsc.noaa.gov/assets/25/9298_05312018_084659_TechMemo142.pdf).
- Methot, R.D. and C.R. Wetzel. 2013. Stock synthesis: A biological and statistical framework for fish stock assessment and fishery management. *Fisheries Research* 142:86-99.
- Muto, M.M., V.T. Helker, R.P. Angliss, P.L. Boveng, J.M. Breiwick, M.F. Cameron, P.J. Clapham, S.P. Dahle, M.E. Dahlheim, B.S. Fadely, M.C. Ferguson, L.W. Fritz, R.C. Hobbs, Y.V. Ivashchenko, A.S. Kennedy, J.M. London, S.A. Mizroch, R.R. Ream, E.L. Richmond, K.E.W. Shelden, K.L. Sweeney, R.G. Towell, P.R. Wade, J.M. Waite, and A.N. Zerbini. 2019. Alaska Marine Mammal Stock Assessments, 2018. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-393, 390 p.
- NMFS. 2018. Final Environmental Assessment for: Amendment 115 to the Fishery Management Plan for the Groundfish Fishery of the Bering Sea and Aleutian Islands Area Amendment 105 to the Fishery Management Plan for Groundfish of the Gulf of Alaska Amendment 49 to the Fishery Management Plan for Bering Sea/Aleutian Islands King and Tanner Crabs Amendment 13 to the Fishery Management Plan for the Salmon Fisheries in the Exclusive Economic Zone off Alaska Amendment 2 to the Fishery Management Plan for Fish Resources of the Arctic Management Area Essential Fish Habitat (EFH) Omnibus Amendments. <https://www.fisheries.noaa.gov/resource/document/environmental-assessment-essential-fish-habitat-efh-omnibus-amendments>.
- NOAA. 2015a. NOAA Marine Debris Program Report: Impact of "Ghost Fishing" via Derelict Fishing Gear. Silver Spring, MD. 25 pp. [https://marinedebris.noaa.gov/sites/default/files/publications-files/Ghostfishing\\_DFG.pdf](https://marinedebris.noaa.gov/sites/default/files/publications-files/Ghostfishing_DFG.pdf).
- NOAA. 2015b. Alaska Groundfish Fisheries Programmatic Supplemental Environmental Impact Statement and Supplemental Information Report. <https://www.fisheries.noaa.gov/resource/document/alaska-groundfish-fisheries-programmatic-supplemental-environmental-impact>.
- NOAA. 2004. Programmatic Supplemental Environmental Impact Statement for the Alaska Groundfish Fisheries Implemented Under the Authority of the Fishery Management Plans for the Groundfish Fishery of the Gulf of Alaska and the Groundfish of the Bering Sea and Aleutian Islands Area. Alaska Regional Office, National Marine Fisheries Service, 709 West 9th Street, Suite 453, P.O. Box 21668, Juneau, Alaska 99802-1668.
- NPFMC. 2019. Fishery Management Plan for Groundfish of the Gulf of Alaska. <https://www.npfmc.org/wp-content/PDFdocuments/fmp/GOA/GOAfmppdf.pdf>.
- NPFMC. 2018a. Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area. <https://www.npfmc.org/wp-content/PDFdocuments/fmp/BSAI/BSAIfmppdf.pdf>.
- NPFMC. 2018b. GOA Pollock and Pacific Cod Season Allocations. <https://www.npfmc.org/goaseasonallocations/>.
- Rand, K.M., P. Munro, S.K. Neidetcher, and D. Nichol. 2015. Observations of seasonal movement of a single tag release group of Pacific cod in the eastern Bering Sea. *Marine and Coastal Fisheries: Dynamics, Management and Ecosystem Science* 6:287-296.
- Siddon, E. and S. Zador (eds.). 2019. Ecosystem Status Report 2019: Eastern Bering Sea. <https://access.afsc.noaa.gov/REFM/REEM/ecoweb/pdf/2019EBSecosys.pdf>.
- Simpson, S.C., M.P. Eagleton, J.V. Olson, G.A. Harrington, and S.R. Kelly. 2017. Final Essential Fish Habitat (EFH) 5-Year Review, Summary Report: 2010 through 2015. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/AKR-15, 115p.
- Spies, I., K. Gruenthal, L. Hauser, A. Hollowed, D. Stevenson, C. Tarpey. 2020. Genetic evidence of a northward range expansion of the eastern Bering Sea stock of Pacific cod. *Evolutionary Applications* 13(2):362-375.
- Thompson, G.G., I.B. Spies, and W.A. Palsson. 2019. 2A. Assessment of the Pacific Cod Stock in the Aleutian Islands. NPFMC Bering Sea and Aleutian Islands SAFE. <https://archive.afsc.noaa.gov/refm/docs/2019/AIpcod.pdf>.

- 
- Thompson, G.G. and J.T. Thorson. 2019. 2. Assessment of the Pacific Cod Stock in the Eastern Bering Sea. NPFMC Bering Sea and Aleutian Islands SAFE.  
<https://archive.afsc.noaa.gov/refm/docs/2019/EBSpcod.pdf>.
- USFWS. 2018. Biological Opinion for the Effects of the Pacific Halibut Fisheries in Waters off Alaska on the Endangered Short-tailed Albatross (*Phoebastria albatrus*).  
[https://www.fws.gov/r7/fisheries/endangered/pdf/NOAA\\_Halibut\\_Biological\\_Opinon\\_2018.pdf](https://www.fws.gov/r7/fisheries/endangered/pdf/NOAA_Halibut_Biological_Opinon_2018.pdf).
- USFWS. 2015. Programmatic Biological Assessment on the Effects of the Fishery Management Plans for the Gulf of Alaska and Bering Sea/Aleutian Islands Groundfish Fisheries and the State of Alaska Parallel Groundfish Fisheries on the Endangered Short-tailed Albatross (*Phoebastria albatrus*) and the Threatened Alaska-breeding Population of the Steller's Eider (*Polysticta stelleri*).  
<https://repository.library.noaa.gov/view/noaa/19214>.
- Zador, S., E. Yasumiishi, and G.A. Whitehouse (eds.). 2019. Ecosystem Status Report 2019: Gulf of Alaska. <https://access.afsc.noaa.gov/REFM/REFM/ecoweb/pdf/2019GOAecosys.pdf>.
- Zador, S. and I. Ortiz (eds.). 2018. Ecosystem Status Report 2018: Aleutian Islands.  
<https://archive.fisheries.noaa.gov/afsc/REFM/Docs/2018/BSAI/ecosysAI.pdf>.
- Zador, S. and E. Yasumiishi (eds.). 2017. Ecosystem Considerations 2017: Status of the Gulf of Alaska Marine Ecosystem. North Pacific Fishery Management Council, Anchorage, AK, pp. 213.



## APPENDICES

### Appendix 1 Stakeholder Submissions

Other than the client's annual update, no stakeholder comments were received during the annual surveillance activities.





## **ABOUT DNV GL**

Driven by our purpose of safeguarding life, property and the environment, DNV GL enables organizations to advance the safety and sustainability of their business. We provide classification and technical assurance along with software and independent expert advisory services to the maritime, oil and gas, and energy industries. We also provide certification services to customers across a wide range of industries. Operating in more than 100 countries, our 16,000 professionals are dedicated to helping our customers make the world safer, smarter and greener.