



**FAO-BASED RESPONSIBLE FISHERY MANAGEMENT CERTIFICATION  
SURVEILLANCE REPORT**

*For The*

**Alaska Pacific Cod Commercial Fisheries (200 mile EEZ)**

*Facilitated By the*

**Alaska Seafood Marketing Institute (ASMI)**

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## I. Summary and Recommendations

The Alaska Seafood Marketing Institute (ASMI) requested an assessment of the Alaska Pacific cod (*Gadus macrocephalus*) commercial fisheries according to the FAO Based Responsible Fisheries Management (RFM) Certification Program. The application was made in April 2010. After Validation Assessment was completed in March 2012, a full Assessment Team was formed to undertake the assessment and final certification determination was given on the 17th April 2013.

This report is the 1st Surveillance Report (ref: AK/PCOD/001.1/2014) for the Alaska Pacific cod commercial fisheries following Certification award against the FAO-Based RFM Program, on the 17th April 2013. The objective of the Surveillance Report is to monitor for any changes/updates (after 12 months) in the management regime, regulations and their implementation since the previous assessment and to determine whether these changes (if any) and current practices remain consistent with the overall confidence rating scorings of the fishery allocated during initial certification.

In addition to this, any areas reported as “items for surveillance” or corrective action plans (following identified non-conformance) in the previous assessment are reassessed and a new conclusion on consistency of these items with the Conformance Criteria is given accordingly.

Alaska Pacific cod (*Gadus macrocephalus*) is the species of focus in this Assessment and Certification Report. The Pacific cod commercial fisheries employ bottom trawl gear, longline gear, pot gear and jig gear within Alaska jurisdiction (200 nautical miles EEZ) are subjected to federal [National Marine Fisheries Service (NMFS)/North Pacific Fishery Management Council (NPFMC)] and state [Alaska Department of Fish and Game (ADFG) & Board of Fisheries (BOF)] management.

The FAO CCRF was presented to an ISO 65/EN45011 accredited Certification Body, Global Trust Certification, to be used as the Standard for the assessment of Alaska Fisheries. The conformance reference points from the published FAO CCRF (now referred to as Standard) were converted into the audit checklist criteria [FAO-Based RFM Conformance Criteria (Version 1.2, Sept 2011)] by the ISO 65/EN45011 Certification Body to ensure audit ability and feasibility for accreditation.

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

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

The main Key outcomes have been summarized in [Section 5 “Assessment Outcome Summary”](#).

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### III. Acronyms

ABC	Allowable Biological Catch
ACL	Annual Catch Limits
ADFG	Alaska Department of Fish and Game
AFA	American Fisheries Act
AFSC	Alaska Fisheries Science Center
ANILCA	Alaska National Interest Lands Conservation Act
ASMI	Alaska Seafood Marketing Institute
AWT	Alaska Wildlife Troopers
BOEM	Bureau of Ocean Energy Management, Regulation and Enforcement
BOF	Board of Fisheries
BSAI	Bering Sea and Aleutian Islands
CCRF	Code of Conduct for Responsible Fisheries
CDQ	Community Development Quota
CP	Catcher Processor (vessel)
CPUE	Catch per Unit Effort
CV	Catcher Vessel
DEC	Department of Environmental Conservation
DNR	Department of Natural Resources
EIS	Environmental Impact Statement
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
ESA	Endangered Species Act
FAO	Food and Agriculture Organization of the United Nations
FMP	Fishery Management Plan
GOA	Gulf of Alaska
GHL	Guideline Harvest Level
IFQ	Individual Fishing Quota
IPHC	International Pacific Halibut Commission
LLP	License Limitation Program
MFMT	Maximum Fishing Mortality Threshold
MSA	Magnuson-Stevens Act
MSST	Minimum stock size threshold
mt	Metric tons
MSY	Maximum Sustainable Yield
NEPA	National Environmental Policy Act
nm	Nautical miles
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPFMC	North Pacific Fishery Management Council
OFL	Overfishing Level
OLE	Office for Law Enforcement
OPMP	Office of Project Management and Permitting
PSC	Prohibited Species Catch

RACE	Resource Assessment and Conservation Engineering
REEM	Resource Ecology and Ecosystem Modeling
REFM	Resource Ecology and Fisheries Management
RFM	Responsible Fisheries Management
SAFE	Stock Assessment and Fishery Evaluation (Report)
SSC	Scientific and Statistical Committee
TAC	Total Allowable Catch
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service

## 1. Introduction

This Surveillance Report documents the 1<sup>st</sup> Surveillance Assessment (2014) of the Alaska Pacific cod commercial fisheries originally certified on April 17<sup>th</sup> 2013, and presents the recommendation of the Assessment Team and the Certification Committee for continued FAO-Based RFM Certification.

*The Pacific cod commercial fisheries employing bottom trawl gear, longline gear, pot gear and jig gear within Alaska jurisdiction (200 nautical miles EEZ), subjected to federal [National Marine Fisheries Service (NMFS)/North Pacific Fishery Management Council (NPFMC)] and state [Alaska Department of Fish and Game (ADFG) & Board of Fisheries (BOF)] management, underwent their 1<sup>st</sup> surveillance assessment against the requirements of the FAO-Based RFM Conformance Criteria Version 1.2 Fundamental Clauses.*

This 1<sup>st</sup> Surveillance Report documents the assessment result for the continued certification of commercially exploited Pacific cod fisheries to the FAO-Based RFM Certification Program. This is a voluntary program that has been supported by ASMI who wishes to provide an independent, third-party accredited certification that can be used to verify that these fisheries are responsibly managed according to the FAO-Based RFM Program.

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

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

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

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

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

## **1.1. Recommendation of the Assessment Team**

Following this 1<sup>st</sup> Surveillance Assessment, in 2014, the assessment team recommends that continued Certification under the FAO-Based Responsible Fisheries Management Certification Program is maintained for the management system of the applicant fisheries, (Pacific cod (*Gadus macrocephalus*) employing bottom trawl gear, longline gear, pot gear and jig gear within Alaska jurisdiction (200 nautical miles EEZ)), subject to federal [National Marine Fisheries Service (NMFS)/North Pacific Fishery Management Council (NPFMC)] and state [Alaska Department of Fish and Game (ADFG) & Board of Fisheries (BOF)] management.

## 2. Fishery Applicant Details

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### 3. Unit of Certification

<b>Unit of Certification</b>			
<b>U.S. ALASKA Pacific Cod Commercial Fisheries</b>			
<b>Fish Species (Common &amp; Scientific Name)</b>	<b>Geographical Location of Fishery</b>	<b>Gear Type</b>	<b>Principal Management Authority</b>
<i>Pacific cod (Gadus macrocephalus)</i>	<i>Gulf of Alaska and Bering Sea &amp; Aleutian Islands</i>	<i>Bottom trawl, Longline, Pot and Jig gear.</i>	<i>National Marine Fisheries Service (NMFS)  North Pacific Fishery Management Council (NPFMC)  Alaska Department of Fish and Game (ADFG) &amp;  Board of Fisheries (BOF)</i>

### 4. Surveillance Meetings

Date, time	Organization	Representatives	Item discussed
6 <sup>th</sup> of March 2014, 9.00 am	Alaska Department of Fish and Game (ADFG), Juneau, AK, USA.	Forrest Bowers (ADFG) Vito Romito (GTC), Ivan Mateo (GTC)	<ul style="list-style-type: none"> <li>• Updates on management plans and other laws/regulations.</li> <li>• Significant changes in 2013 since 2012 for the seven state managed fisheries (Chignik, Kodiak, Aleutian Islands, Southern Alaska Peninsula, Southeast Alaska, Prince William Sound, and Cook Inlet) in terms of allocation of GHs by regulation, gear restrictions, seasonal restrictions, vessel restrictions that limit and control access to fisheries, permissible bycatch proportions and landing requirements, bycatch avoidance requirements, and reporting requirements.</li> <li>• Effects of the federal restructured observer program on the state managed or parallel Pacific cod fisheries</li> <li>• Changes to the catch accounting system</li> <li>• Updates on the ADFG annual inshore bottom trawl survey. Main findings and relevance to state managed Pacific cod fisheries in terms of cod stocks abundance.</li> <li>• Updates on the development of an NMFS and ADFG combined survey index.</li> <li>• Current estimates of GH/GHR of the 7 state pacific cod (Chignik, Kodiak, Aleutian Islands, Southern Alaska Peninsula, Southeast Alaska, Prince William Sound, and Cook Inlet) fisheries for the 2014 fishing season.</li> <li>• Issues with managing the open access state fisheries for</li> </ul>

			<p>Pacific cod in terms of keeping overall catches within GHL limits</p> <ul style="list-style-type: none"> <li>• The SAFE EBS/AI chapters of Pacific cod was split in two stocks. Comments regarding state cod fisheries management.</li> <li>• Availability of bycatch data for the state fisheries for Pacific cod for 2012/13. Issues with significant bycatch of sharks in state waters.</li> <li>• Bycatch of short tailed albatrosses in the state fisheries in 2013.</li> <li>• State led research programs to determine the effects of the Pacific cod state fisheries on the coastal ecosystems or associated species.</li> </ul>
<p>6<sup>th</sup> March 2014, 1:00 PM</p>	<p>US Coast Guard, Juneau, Alaska, USA</p>	<p>Lt Tony Kenne Vito Romito (GTC), Ivan Mateo (GTC)</p>	<ul style="list-style-type: none"> <li>• Enforcement legislation, rules or proposals. Significant changes and updates over calendar year 2013.</li> <li>• 2013 updates on enforcement of management measures that support reduction of bycatch and discards, and impacts on habitat.</li> <li>• Number of boardings, number of violations detected, types of violations for the species in question. General level of compliance overall. Updates for 2013.</li> <li>• Gear loss concerns. Updates for 2013 mostly related to longline gear.</li> <li>• Relationships and interaction with AWT, updates for 2013. Significant prosecution from NMFS OLE in 2013.</li> <li>• Dixon Entrance: foreign fleet fishing activities. Russian federation line, foreign vessel encroachment.</li> <li>• Donut Hole.</li> </ul>

<p>7<sup>th</sup> March 2014, 1:00 PM</p>	<p>Alaska State Troopers, Juneau, Alaska, USA</p>	<p>Lt Jon Streifel Vito Romito (GTC), Ivan Mateo (GTC)</p>	<ul style="list-style-type: none"> <li>• Enforcement legislation, rules or proposals: Significant changes and updates over 2013 affecting P cod stocks. New regulations for the SEAK area.</li> <li>• Enforcement of management measures that support reduction o bycatch and discards, 2013 updates.</li> <li>• Number of boardings, number of violations detected, types of violations for P cod in the 2013 calendar year.</li> <li>• Gear marking regulations, checking and concern relating the loss of gear.</li> <li>• General level of overall compliance in the P cod fisheries. Updates for 2013.</li> <li>• Relationships with USCG for P cod enforcement. Updates for 2013.</li> <li>• Dixon Entrance: foreign fleet fishing activities</li> </ul>
<p>11<sup>th</sup> March 2014, 2:30 PM</p>	<p>AWT Kodiak, Alaska, USA</p>	<p>Lt Ellis Willard Vito Romito (GTC), Ivan Mateo (GTC)</p>	<ul style="list-style-type: none"> <li>• Enforcement legislation, rules or proposals: Significant changes in regulations or difficulties in regulation enforceability over 2013.</li> <li>• Enforcement of management measures that support reduction of bycatch, discards, ghost fishing of P cod, 2013 updates.</li> <li>• Central GOA trawl sweeps modifications.</li> <li>• Restructured observer program.</li> <li>• Number of boardings and number of violations detected, types of violations for the P cod fisheries. General rate of compliance and type of violations for 2013.</li> <li>• Interaction with USCG and NMFS OLE, updates for 2013</li> </ul>



## 5. Assessment Outcome Summary

1. *There is an effective legal (MSA, FMPs) and administrative framework (NMFS/NPFMC – ADFG/BOF) established at the local and national level (state/federal) appropriate for fishery resource conservation and management.*
2. *An appropriate policy, legal and institutional framework is present to achieve sustainable and integrated use of living marine resources, taking into account the fragility of coastal ecosystems, the finite nature of their natural resources and the needs of coastal communities.*
3. *The BSAI and GOA FMPs present long-term management objectives for the Alaska Pacific cod fisheries. Seven of the eight state-managed Pacific cod fisheries are subject to a published FMP.*
4. *Reliable and accurate data required for assessing the status of fisheries and ecosystems - including data on retained catch of fish, bycatch, discards and waste are collected (BSAI and GOA surveys, catch data, observer data). The NMFS and the ADFG collect fishery data and conduct fishery independent surveys to assess Pacific cod fisheries and ecosystems in GOA and BSAI areas. GOA and BSAI SAFE documents provide complete descriptions of data types and years collected.*
5. *Alaska ensures that appropriate research is conducted into all aspects of fisheries including biology, ecology, technology, environmental science, economics, social science, aquaculture and nutritional science (NMFS, ADFG, ASMI). The research is disseminated accordingly. Alaska also ensures the availability of research facilities and provides appropriate training, staffing and institution building to conduct the research.*
6. *The BSAI and GOA groundfish management plans define target and limit reference points for Pacific cod and other groundfish. Each SAFE report describes the current fishing mortality rate, stock biomass relative to target and limit reference points. Both management plans specify the Overfishing Limits (OFL) and the Fishing mortality rate ( $F_{OFL}$ ) used to set OFL and Acceptable Biological Catch (ABC) and the fishing mortality rate ( $F_{ABC}$ ) used to set ABC; the determination of each is dependent on the knowledge base for each stock. The management plan classifies 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.*
7. *When new uncertainties arise, research recommendations are made and there is accountability in subsequent years to follow up on related action items. However, these uncertainties do not lead to a postponement for providing advice, in all cases precaution is the rule.*
8. *Alaska Pacific cod commercial fisheries are managed according to a modern management plan that attempts to balance long-term sustainability of the resources with optimum utilization. For every change/amendment or new development affecting fisheries management and therefore modifying the FMPs, there is an evaluation of alternative conservation and management measures, including considerations of their cost effectiveness and social impact.*
9. *Measures are introduced to identify and protect depleted resources and those resources threatened with depletion, and to facilitate the sustained recovery of such stocks (MSA). Also, efforts are made to ensure that resources and habitats critical to the wellbeing of such resources (EFH) which have been adversely affected by fishing or other human activities are restored.*
10. *The North Pacific Fishing Vessel Owners association (NPFVO) provides a large and diverse training program that many of the professional Pacific cod crew members must pass. Such programmes take into account agreed international standards and guidelines.*
11. *Management of Alaska Pacific cod fisheries by the NPFMC, BOF and the agencies responsible*

*for implementation and enforcement of regulations ensure that effective mechanisms are in place to assure compliance. Enforcement measures include an observer program, vessel monitoring systems on board vessels, USCG and AWT boardings and inspection activities and dockside landing inspections*

- 12.** *The MSA treats sanctions against the fishing vessel permit to be the carrying out of a purpose separate from that accomplished by civil and criminal penalties against the vessel or its owner or operator. The State of Alaska also has an aggressive marine fisheries compliance program with stiff penalties if a vessel is caught in non-compliance.*
- 13.** *Alaska's fisheries management organizations conduct assessments and research on environmental factors on Pacific cod and associated species and their habitats. Findings and conclusions are published in SAFE document, annual Ecosystem Considerations documents, and other research reports*

## **6. Conformity Statement**

The Assessment Team recommended that continued certification under the FAO Based Responsible Fisheries Management Program is granted to the Pacific cod (*Gadus macrocephalus*) commercial fishery employing bottom trawl gear, longline gear, pot gear and jig gear within Alaska jurisdiction (200 nautical miles EEZ), subjected to federal [National Marine Fisheries Service (NMFS)/North Pacific Fishery Management Council (NPFMC)] and state [Alaska Department of Fish and Game (ADFG) & Board of Fisheries (BOF)] management.

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

### A. The Fisheries Management System

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

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

*FAO Eco 28*

Evidence adequacy rating:

High

Medium

Low

#### Rating determination

*There is an effective legal (MSA, FMPs) and administrative framework (NMFS/NPFMC – ADFG/BOF) established at the local and national level (state/federal) appropriate for fishery resource conservation and management.*

The primary layer of governance for the Alaska Pacific cod fisheries is dictated by the MSA. The main agencies involved in Pacific cod management within Alaska's EEZ (NMFS, NPFMC), and all of their activities and decisions, are subject to the MSA. The MSA, as amended last on January 12th 2007, sets out ten national standards for fishery conservation and management (16 U.S.C. § 1851), with which all Fishery Management Plans (FMP) must be consistent. Under the MSA, the NPFMC is authorized to prepare and submit to the Secretary of Commerce for approval, disapproval or partial approval, an FMP and any necessary amendments, for each fishery under its authority that requires conservation and management actions, i.e. the annual setting of ABC/TAC/ACL. While the State of Alaska mostly adopts complimentary regulations, even imposing an annual State Emergency Order that adopts federal Regulations in most management areas, state regulations are used to manage 0-3 nm & inside waters (areas not subject to MSA).

The federal FMPs, more specifically, 1) the GOA Groundfish FMP, and 2) the BSAI Groundfish FMP govern the management of the Pacific cod federal fisheries. In federal waters (3-200 nm), Alaska Pacific cod fisheries are managed by the NPFMC and the NMFS Alaska Region. The NPFMC is one of eight regional councils established by the MSA to oversee management of the nation's fisheries. With jurisdiction over the million square mile EEZ off Alaska, the NPFMC has primary responsibility for groundfish management in the GOA and BSAI, including Pacific cod, pollock, flatfish, Atka mackerel, sablefish, and (offshore) rockfish. These species are harvested mainly by trawlers, hook and line longliners and pot fishermen. The NPFMC submits their recommendations/plans to the NMFS for review, approval, and implementation. NMFS makes those recommendations available for public review and comment (partly by publication) before taking final action by issuing legally binding Federal regulations. In addition, NMFS Alaska Regional Office conducts biological studies,

stock survey and stock assessment reports. NOAA Fisheries is also charged with carrying out the federal mandates of the U.S. Department of Commerce with regard to commercial fisheries such as approving and implementing FMPs and FMP amendments recommended by the NPFMC. The USCG is responsible for enforcing these FMPs at sea, in conjunction with NMFS enforcement ashore. Also, the USCG enforce laws to protect marine mammals and endangered species, international fisheries agreements (i.e. UN High Seas Driftnet Moratorium in the North Pacific), and foreign encroachment.

In state waters (0-3 nm), Alaska Pacific cod fisheries are managed by the ADFG and the Alaska Board of Fisheries (BOF). There are eight state-managed Pacific cod regions: Kodiak, Chignik, South Alaska Peninsula, Aleutian Islands, Dutch Harbor Subdistrict, Southeast Alaska, Prince William Sound, and Cook Inlet. Each area supports two distinct Pacific cod fisheries. The first fishery is managed concurrent to the federal BSAI or GOA fishery, and is referred to as the parallel fishery. The second fishery in each area is referred to as the state-waters (or state-managed) fishery.

A parallel groundfish fishery occurs where the State allows the federal species total allowable catch (TAC) to be harvested in State waters. Parallel fisheries occur for pollock, Pacific cod, and Atka mackerel species, for some or all gear types. Opening state waters allows the effective harvesting of fishery resources because many fish stocks straddle state and federal jurisdiction and in some cases a significant portion of the overall federal TAC is harvested within State waters. Although the state cannot require vessels fishing inside state waters during the Federal fishery to hold a federal permit, it usually adopts regulations similar to those in place for the federal fishery if those regulations are approved by the Board of Fisheries and meet state statute. The parallel fishery is managed by the state adopting most of the NMFS rules and management actions (5 AAC 28.087), including seasons, and catch in this fishery is counted towards federal quotas. The second fishery in each area is referred to as the state-waters (or state-managed) fishery. The state-waters fishery is managed independently of the federal/parallel fishery by the ADFG under guidelines developed by the BOF (Guiding principles for groundfish fishery regulations 5 AAC 28.089 and BOF groundfish FMP 5 AAC 28.081).

Seven of the eight state-water fisheries are subject to an annual Guideline Harvest Level (GHL) calculated as a percentage of federal fishery quotas. At present, the Kodiak GHL is set at 12.5% of the federal Central Gulf of Alaska (CGOA) ABC; the Chignik GHL is set at 8.75% of the federal CGOA ABC; the South Alaska Peninsula GHL is set at 30% of the federal Western Gulf of Alaska ABC; the Aleutian Islands GHL is set at 3% of the federal BSAI TAC (when BSAI TAC is split in two Subregions, the BS and AI in late 2014, 3% will be set for each subregion); the Prince William Sound GHL is set at 25% of the federal Eastern Gulf of Alaska (EGOA) ABC; the Cook Inlet GHL is set at 3.75% of the total CGOA ABC and the Dutch Harbor District is set at 3% of the combined BSAI Pacific cod ABCs. GHLs are allocated, by regulation, between gear types. The Southeast Alaska state-water fishery has been subject to a Guideline Harvest Range (GHR) of 750,000 – 1,250,000 lb (340 – 567 mt) since 1994.

The vast majority of Alaska Pacific cod is harvested in the federal BSAI and GOA fisheries, and is therefore studied, managed, and enforced under the federal GFMPs. In 2014 federal fisheries quotas

were as follows:

- **GOA TAC:** 63,150mt
- **BSAI TAC:** 260,880 mt
- **Total federal TAC =** 324,030 mt

2014 State fisheries quotas:

- **Kodiak GHL:** 6,636.06 mt
- **Chignik GHL:** 4646.24 mt
- **South Alaska Peninsula GHL:** 9823.49 mt
- **Aleutian Islands GHL:** 8101.16mt
- **Southeast GHR\*:** 567mt
- **Prince William Sound GHL:** 662.24mt
- **Cook Inlet GHL** 1.991.27 mt
- **Dutch Harbor GHL** 8102.99 mt
- **Total state GHL =** 39,963.71mt

\*The value stated here is the upper boundary of the Southeast Guideline Harvest Range.

Thus state fisheries quotas were around 12.4% of the total Pacific cod quota in 2014.

## Evidence

<http://www.nmfs.noaa.gov/sfa/magact/mag1.html#s2>

<http://www.fakr.noaa.gov/npfmc/>

<http://www.adfg.alaska.gov/index.cfm?adfg=CommercialByFisheryGroundfish.main>

<http://www.uscg.mil/hq/cg5/cg531/LMR.asp>

<http://www.fakr.noaa.gov/npfmc/fishery-management-plans/goa-groundfish.html>

<http://www.fakr.noaa.gov/npfmc/fishery-management-plans/bsai-groundfish.html>

<http://www.dps.alaska.gov/awt/Marine.aspx>

<http://www.touchngo.com/iglcnt/akstats/aac/title05/chapter028.htm>

[http://alaskafisheries.noaa.gov/sustainablefisheries/specs13\\_14/bsaitable1.pdf](http://alaskafisheries.noaa.gov/sustainablefisheries/specs13_14/bsaitable1.pdf)

[http://alaskafisheries.noaa.gov/sustainablefisheries/specs13\\_14/goatable2.pdf](http://alaskafisheries.noaa.gov/sustainablefisheries/specs13_14/goatable2.pdf)

<http://www.adfg.alaska.gov/static/applications/dcfnewsrelease/240783172.pdf>

<http://www.adfg.alaska.gov/static/applications/dcfnewsrelease/240540158.pdf>

[http://www.adfg.alaska.gov/static/fishing/PDFs/commercial/2013\\_pcod\\_rockfish\\_harvest\\_westward.pdf](http://www.adfg.alaska.gov/static/fishing/PDFs/commercial/2013_pcod_rockfish_harvest_westward.pdf)

<http://www.adfg.alaska.gov/FedAidPDFs/FMR14-04.pdf>

<http://www.adfg.alaska.gov/FedAidPDFs/FMR14-02.pdf>

<http://www.adfg.alaska.gov/FedAidPDFs/FMR14-01.pdf>

<http://www.adfg.alaska.gov/FedAidPDFs/FMR13-45.pdf>

<http://www.adfg.alaska.gov/FedAidPDFs/FMR13-47.pdf>

[http://alaskafisheries.noaa.gov/sustainablefisheries/specs13\\_14/goatable2.pdf](http://alaskafisheries.noaa.gov/sustainablefisheries/specs13_14/goatable2.pdf)

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

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

**Evidence adequacy rating:**

**High**

**Medium**

**Low**

**Rating determination**

*An appropriate policy, legal and institutional framework is present to achieve sustainable and integrated use of living marine resources, taking into account the fragility of coastal ecosystems, the finite nature of their natural resources and the needs of coastal communities.*

The NPFMC and the BOF are required to manage the Pacific cod trawl, longline, pot and jig fisheries in a sustainable manner, as mandated by the MSA National Standards and the Alaska Constitution respectively.

The NPFMC and the NMFS participate in coastal area management-related institutional frameworks through the federal National Environmental Policy Act (NEPA) processes, a socio-economic and biological/environmental impact assessment of the various scenarios, before a path of action is chosen. This usually happens whenever resources under their management may be affected by other developments. Also, federal agencies, including the NPFMC, are responsible for producing NEPA documents each time they renew or amend regulations. One recent example for this is the restructuring of the observer program, specifically amendments 86 and 76 (BSAI and GOA FMP respectively), which started in January 2013.

Therefore, all of the NPFMC proposed regulations include NEPA considerations. NEPA, therefore, is a comprehensive process to provide checks and balances against changes to the environment that may impact ecosystems and the natural processes, as well as the socio-economic sphere of fisheries. Similarly, the Bureau of Land Management (BLM) actions in Alaska are governed by the NEPA of 1969 and other laws, including the Federal Land Policy and Management Act of 1976 (FLPMA) and the Alaska National Interest Lands Conservation Act of 1980 (ANILCA). When an activity or action is proposed on BLM-administered lands, the BLM must analyze the proposed action to assess how it may affect the quality of the human environment (<http://www.blm.gov/ak/st/en/info/nepa.html>).

Every agency in the executive branch of the Federal Government has a responsibility to implement NEPA. In NEPA, Congress directed that, to the fullest extent possible, the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in NEPA. To implement NEPA’s policies, Congress prescribed a procedure, commonly referred to as “the NEPA process” or “the environmental impact assessment process”. A Citizen Guide to the NEPA process, has been published based on research and consultations undertaken by the Council on Environmental Quality (CEQ). Participants in the NEPA Regional Roundtables held in 2003-2004 clearly voiced the need for a guide to provide an explanation of NEPA, how it is implemented, and how people outside the Federal government — individual citizens, private sector applicants, members of organized groups, or representatives of Tribal, State, or local

government agencies — can better participate in the assessment of environmental impacts conducted by Federal agencies.

[http://ceq.hss.doe.gov/nepa/Citizens\\_Guide\\_Dec07.pdf](http://ceq.hss.doe.gov/nepa/Citizens_Guide_Dec07.pdf)

The NEPA processes provide public information and a robust opportunity for public involvement. Decisions are made through public processes and involvement of fishery managers, fishermen, fishing organizations and fishing communities. Stakeholders are actively invited through publicly advertised and scheduled meetings.

#### **State of Alaska and the NEPA process**

The state is a cooperating agency in the NEPA process for federal actions, so that gives the State of Alaska another seat at the table for federal actions. This includes decision-making processes and activities relevant to the fishery resource and its users in support of sustainable and integrated use of living marine resources and avoidance of conflict among users. The BOF, in conjunction with the ADFG, is responsible for all the Pacific cod management measures. Both ADFG and BOF routinely take into account the risks and uncertainties of fishery management. Any proposed changes to the existing management regime by government, industry, or the public must go through a rigorous regulatory review process. During this process department scientists and biologists prepare detailed reports that include the best scientific data available at the time. These are delivered to the board and the public for their consideration.

<http://www.adfg.alaska.gov/index.cfm?adfg=fisheriesboard.main>.

#### **DEC, ADFG, DNR and the USFWS**

The Department of Environmental Conservation (DEC) implements statutes and regulations affecting air, land and water quality. DEC is the lead state agency for implementing the federal Clean Water Act and its authorities provide considerable opportunity to maintain high quality fish and wildlife habitat through pollution prevention (<http://dec.alaska.gov/>).

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

Endangered

Species

program.

<http://www.adfg.alaska.gov/index.cfm?adfg=specialstatus.akendangered>

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

The U.S. Fish and Wildlife Service (USFWS) is a bureau within the Department of the Interior. Its objectives include: 1) Assisting in the development and application of an environmental stewardship ethic, based on ecological principles, scientific knowledge of fish and wildlife, and a sense of moral responsibility; 2) Guide the conservation, development, and management of the US's fish and wildlife resources. 3) Administer a national program to provide the public opportunities to understand, appreciate, and wisely use fish and wildlife resources. The USFWS functions include enforcement of federal wildlife laws, protection of endangered species, management of migratory birds, restoration of nationally significant fisheries, conservation and restoration of wildlife habitat such as wetlands, help of foreign governments with their international conservation efforts, and distribution of hundreds of millions of dollars, through the Wildlife Sport Fish and Restoration program, in excise taxes on fishing and hunting equipment to State fish and wildlife agencies ([http://www.fws.gov/help/about\\_us.html](http://www.fws.gov/help/about_us.html)).

#### **ANILCA**

The Alaska National Interest Lands Conservation Act (ANILCA) directs federal agencies to consult and coordinate with the state of Alaska. State agencies responsible for natural resources, tourism, and transportation work as a team to provide input throughout federal planning processes (<http://dnr.alaska.gov/commis/opmp/anilca/anilca.htm>).

#### **OPMP**

The Department of Natural Resources (DNR) Office of Project Management and Permitting (OPMP) coordinates the review of larger scale projects in the state. Because of the complexity and potential impact of these projects on multiple divisions or agencies, these projects typically benefit from a single primary point of contact. A project coordinator is assigned to each project in order to facilitate interagency coordination and a cooperative working relationship with the project proponent. The office deals with a diverse mix of projects including transportation, oil and gas, mining, federal grants, ANILCA coordination, and land use planning. Every project is different and involves a different mix of agencies, permitting requirements, statutory responsibilities, and resource management responsibilities (<http://dnr.alaska.gov/commis/opmp/>).

#### **The BOF and NPFMC public meeting processes**

The BOF and the NPFMC have openly public processes. Any individual or group can submit proposals for discussion of management and research for the Pacific cod fisheries in Alaska. The BOF meets in communities throughout coastal Alaska, while the NPFMC meets in communities in Alaska as well as in Washington and Oregon to provide public opportunities. Written comments are accepted when it is not possible to attend in person.

<http://www.fakr.noaa.gov/npfmc/> <http://www.adfg.alaska.gov/index.cfm?adfg=fisheriesboard.main>

#### **Federal and State agencies cooperation**

The assessment team is confident that the NEPA process, existing agencies and processes (e.g. ADFG, ADEC, DNR, USFWS, ANILCA and OPMP), and the existing intimate and routine cooperation between federal and state agencies managing Alaska's coastal resources (living and non-living) is capable of planning and managing coastal developments in a transparent, organized and sustainable way, that minimizes environmental issues while taking into account the socio-economic aspects, needs and interests of the various stakeholders of the coastal zone.

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

*FAO CCRF 7.3.3/7.2.2*

**Evidence adequacy rating:**

**High**

**Medium**

**Low**

**Rating determination**

*The BSAI and GOA FMPs present long-term management objectives for the Alaska Pacific cod fisheries. Seven state-managed Pacific cod fisheries are subject to an annually-published FMP.*

Under the MSA, the NPFMC is authorized to prepare and submit to the Secretary of Commerce for approval, disapproval or partial approval, a FMP and any necessary amendments, for each fishery under its authority that requires conservation and management.

**FMPs for Pacific cod fisheries in the GOA and the BSAI.**

Both FMPs present long-term management objectives for the Alaska Pacific cod fisheries. These include sections that describe a Summary of Management Measures and Management and Policy Objectives.

**National Standards for Fishery Conservation and Management**

The Sustainable Fisheries Act (SFA) substantially amended the MSA in 1996. Among other things, the SFA placed increased emphasis on ending overfishing and rebuilding overfished stocks. The SFA also added three new national standards to the seven existing standards in the MSA to focus attention on specific areas of concern – impacts of management actions on fishing communities, bycatch reduction, and safety at sea. The MSA, as amended, sets out ten national standards for fishery conservation and management (16 U.S.C. § 1851), with which all fishery management plans must be consistent. They are:

1. Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.
2. Conservation and management measures shall be based upon the best scientific information available.
3. To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.
4. Conservation and management measures shall not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be A) fair and equitable to all such fishermen; B) reasonably calculated to promote conservation; and C) carried out in such manner that no particular individual,

corporation, or entity acquires an excessive share of such privileges.

5. Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.

6. Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

7. Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

8. Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to A) provide for the sustained participation of such communities, and B) to the extent practicable, minimize adverse economic impacts on such communities.

9. Conservation and management measures shall, to the extent practicable, A) minimize bycatch and B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

10. Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

### **Management Objectives**

Under the direction of the NPFMC, the GOA and BSAI FMPs define nine management and policy objectives that are reviewed annually. They are:

- Prevent Overfishing
- Promote Sustainable Fisheries and Communities
- Preserve Food Webs
- Manage Incidental Catch and Reduce Bycatch and Waste
- Avoid Impacts to Seabirds and Marine Mammals
- Reduce and Avoid Impacts to Habitat
- Promote Equitable and Efficient Use of Fishery Resources
- Increase Alaska Native Consultation
- Improve Data Quality, Monitoring and Enforcement

The national standards and management objectives defined in GOA and BSAI FMPs provide adequate evidence to demonstrate the existence of long-term objectives clearly stated in management plans.

Management measures detailed in the two FMPs include:

- Quotas, allocated by region and by gear type
- Permit requirements
- Seasonal restrictions and closures
- Geographical restrictions and closed areas
- Gear restrictions
- Prohibited species
- Retention and utilization requirements
- Recordkeeping and reporting requirements
- Observer requirements
- FMP review process

### **The Alaska Groundfish Programmatic Supplemental Environmental Impact Statement**

This Programmatic SEIS has multiple purposes. First, it serves as the central environmental document supporting the FMPs for the groundfish fisheries in the BSAI and GOA. The historical and scientific information and analytical discussions contained are intended to provide a broad, comprehensive analysis of the general environmental consequences of fisheries management in the EEZ off Alaska. This document also provides agency decision-makers and the public with information necessary for making informed decisions in managing the groundfish fisheries, and sets the stage for future management actions. In addition, it describes and analyzes current knowledge about the physical, biological, and human environment in order to assess impacts resulting from past and present fishery activities. Significant changes have occurred in the environment since the original Environmental Impact Statements (EISs) for the GOA and BSAI FMPs were published approximately 25 years ago. While Environmental Assessments (EA) and several EISs have been prepared for FMP amendments over the ensuing years, none have examined the groundfish FMPs at a programmatic level. The NEPA requires preparation of an EIS or Supplemental EIS (SEIS) when significant environmental changes have occurred. Significant changes have certainly occurred in the environment as well as within the fisheries themselves. This Programmatic SEIS is intended to bring both the decision-maker and the public up-to-date on the current state of the environment, while describing the potential environmental consequences of different policy approaches to managing the groundfish fisheries off Alaska. In doing so, it serves as the overarching analytical framework that will be used to define future management policy with a range of potential management actions. ([http://www.fakr.noaa.gov/sustainablefisheries/seis/final062004/Exec\\_sum.pdf](http://www.fakr.noaa.gov/sustainablefisheries/seis/final062004/Exec_sum.pdf))

Seven of the eight state-managed Pacific cod fisheries are subject to an annually-published FMP. These FMPs include details of the following management measures:

- GHs
- Gear restrictions
- Seasonal restrictions
- Vessel restrictions that limit and control access
- Buoy marking, pot storage and landing requirements

- Permissible bycatch proportions
- Reporting requirements

**“5 AAC 28.081. Gulf of Alaska Pacific cod Management Plans”** sets the regulations for the directed state Pacific cod fisheries. This applies to the management plans for Pacific cod as set out for the Prince William Sound Area (5 AAC [28.267](#)), Cook Inlet Area (5 AAC [28.367](#)), Kodiak Area (5 AAC [28.467](#)), Chignik Area (5 AAC [28.537](#)), Aleutian Islands Area (5 AAC 28.647), Dutch Harbor Subdistrict (5 AAC 28.648), the South Alaska Peninsula Area (5 AAC 28.577) .

#### **Prince William Sound and Cook Inlet**

The Prince William Sound and Cook Inlet state fisheries are subject to fixed FMPs which include quota-setting guidelines, season and gear restrictions, and other regulations. Both fisheries are also subject to an annual Fishery Management Report to the BOF, which details additional management measures, annual quotas, landings data, and other management information.

#### **Southeast Alaska (no formal FMP given the small tonnage of this fishery)**

In Southeast Alaska, the Pacific cod harvests occur almost exclusively within inside waters and are not part of the federal TAC. The BOF, with 28 years of landings records, has set an annual GHR for this fishery of 340 to 567 mt (the harvest has never exceeded 408 mt). Gear is limited to hooks and line or pot gear and ADFG conducts inseason management closures to spread fishing effort over the available Pacific cod habitat. Because no stock assessment is conducted on this stock, it is considered to be either tier 5 or 6, and even with extensive landing records, it receives a conservative harvest approach.

#### **Kodiak**

Two distinct Pacific cod *Gadus macrocephalus* fisheries occur within state waters (0–3 nmi) of the Kodiak Management Area. The first fishery is prosecuted concurrent to the federal Central Gulf of Alaska (CGOA) Pacific cod fishery and is referred to as the parallel fishery. The parallel fishery is managed by adopting most National Marine Fisheries Service (NMFS) regulations and management actions. The second Pacific cod fishery is the Kodiak Area state-waters fishery. The state-waters fishery is independent of the federal/parallel fishery and is managed exclusively by the Alaska Department of Fish and Game (ADF&G) under guidelines developed by the Alaska Board of Fisheries (BOF).

The North Pacific Fishery Management Council (NPFMC) recently established sector allocations within the federal/parallel Pacific cod fisheries in the federal CGOA and Western Gulf of Alaska (WGOA) management areas. The NPFMC’s action established unique Pacific cod harvest allocations for pot, jig, trawl, and longline gear sectors. During 2014, the federal Pacific cod season for each gear sector will be prosecuted independently of other Pacific cod gear sectors resulting in staggered federal season closure dates depending on gear type. Prior to federal sector allocations, all gear types competed for Pacific cod during a single derby-style federal/parallel fishery.

As a result of federal Pacific cod sector allocations, the BOF modified aspects of the Kodiak Area Pacific Cod Management Plan (5 AAC 28.467) during fall 2011 to ensure state-waters Pacific cod fisheries continue to provide opportunity for fishery stakeholders.

The Kodiak Area state-waters Pacific cod season for pot gear is scheduled to open 7 days after closure of the Central Gulf of Alaska (CGOA) federal/parallel Pacific cod pot gear sector A-season. The Kodiak Area state-waters Pacific cod season for jig gear is scheduled to open 48 hours after closure of the CGOA federal/parallel Pacific cod jig gear sector A-season; however, if the CGOA jig gear sector has not closed by March 15 the state-waters jig gear season may open pending assessment of effort, harvest rate, and remaining federal quota. Legal gear for the state-waters Pacific cod season is limited to pot, mechanical jigging machine, and hand troll gear. No more than 60 pots or 5 mechanical jigging machines may be operated from a vessel. The 2014 Kodiak Area state-waters season Pacific cod guideline harvest level (GHL) is 14.63 million pounds; pot and jig vessels are each allocated 50 percent of the total GHL or 7.32 million pounds.

#### **Dutch Harbor**

The 2014 Dutch Harbor Subdistrict state-waters Pacific cod season is scheduled to open seven days after closure of the initial Bering Sea and Aleutian Islands federal Pacific cod season for the hook and line/pot catcher vessel less than 60 feet in overall length (OAL) sector. Vessels participating in the state-waters Pacific cod season may not exceed 58 feet OAL, and legal gear is limited to groundfish pot gear. No more than 60 pots may be operated from a vessel. The 2014 Dutch Harbor Subdistrict state-waters season Pacific cod guideline harvest level (GHL) is 17,864,036 whole pounds.

#### **South Alaska Peninsula**

The 2014 South Alaska Peninsula Area state-waters Pacific cod *Gadus macrocephalus* season for pot gear is scheduled to open seven days after closure of the Western Gulf of Alaska (WGOA) federal/parallel Pacific cod pot sector A-season or March 7, whichever is later. The 2014 South Alaska Peninsula Area state-waters Pacific cod season for jig gear is scheduled to open 48 hours after closure of the WGOA federal/parallel Pacific cod jig gear sector A-season; however, if the WGOA jig gear sector has not closed by March 15 the state-waters jig gear season may open pending assessment of federal jig effort, harvest rate, and remaining federal quota. Vessels participating in the state-waters Pacific cod season may not exceed 58 feet in length, and legal gear is limited to pot and jig gear. No more than 60 pots or five mechanical jigging machines may be operated from a vessel. The 2014 South Alaska Peninsula Area state-waters season Pacific cod GHL is 21,657,085 pounds. Pot vessels are allocated 85 percent of the total GHL, or 18,408,522 pounds, and jig vessels are allocated 15 percent of the total GHL, or 3,248,563 pounds.

#### **Chignik Area**

The 2014 Chignik Area state-waters Pacific cod *Gadus macrocephalus* season for pot gear is scheduled to open seven days after closure of the Central Gulf of Alaska (CGOA) federal/parallel Pacific cod pot sector A-season or March 1, whichever is later. The 2014 Chignik Area state-waters Pacific cod season for jig gear is scheduled to open by regulation on March 15. Vessels participating in the Chignik state-waters Pacific cod season may not exceed 58 feet in length, and legal gear is limited to pot and jig gear. No more than 60 pots or 5 mechanical jigging machines may be operated from a vessel. The 2014 Chignik Area state-waters season Pacific cod guideline GHL is 10,243,216 pounds. Pot vessels are allocated 90 percent of the total GHL or 9,218,894 pounds. Jig vessels are

allocated 10 percent of the total GHL or 1,024,322 pounds.

### **The Aleutian Islands**

The Aleutian Islands District state-waters Pacific cod *Gadus macrocephalus* season is prosecuted in state waters of the Aleutian Islands west of 170° W longitude and is managed by the Alaska Department of Fish and Game (ADF&G). The state-waters Pacific cod season guideline harvest level (GHL) is equal to three percent of the federal Bering Sea and Aleutian Islands acceptable biological catch (ABC). The state-waters fishery has an A and B season: A season is allocated 70% of the GHL and B season is allocated 30% of the GHL. Legal gear for the state-waters season includes nonpelagic trawl, groundfish pot, longline, mechanical jig, and hand troll gear. ADF&G also manages a parallel Pacific cod season coincident with the federal Pacific cod seasons adjacent to state waters. Harvest in the parallel season accrues toward the federal Pacific cod total allowable catch (TAC). Effective inseason management is dependent upon timely and accurate communication between fishermen and fish processors with the Alaska Department of Fish and Game (ADF&G). In the absence of reliable inseason harvest information, ADF&G will adopt conservative management measures that may result in lost fishing opportunity.

### **Evidence**

[http://www.adfg.alaska.gov/index.cfm?adfg=fisheriesboard.pastmeetinginfo2011\\_2012](http://www.adfg.alaska.gov/index.cfm?adfg=fisheriesboard.pastmeetinginfo2011_2012)  
<http://www.touchngo.com/lglcntr/akstats/aac/title05/chapter028/section367.htm>  
<http://www.touchngo.com/lglcntr/akstats/aac/title05/chapter028/section267.htm>  
<http://www.touchngo.com/lglcntr/akstats/aac/title05/chapter028/section081.htm>  
<http://www.npfmc.org/wp-content/PDFdocuments/fmp/GOA/GOAfm613.pdf>  
[www.npfmc.org/wp-content/PDFdocuments/fmp/BSAI/BSAIfmp.pdf](http://www.npfmc.org/wp-content/PDFdocuments/fmp/BSAI/BSAIfmp.pdf)  
<http://www.adfg.alaska.gov/FedAidPDFs/FMR13-47.pdf>  
<http://www.adfg.alaska.gov/FedAidPDFs/FMR13-45.pdf>  
<http://www.adfg.alaska.gov/FedAidPDFs/FMR14-01.pdf>  
<http://www.adfg.alaska.gov/FedAidPDFs/FMR14-02.pdf>  
[http://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/2013-2014/pcod/2\\_staffwritten\\_pacificcod\\_2013.pdf](http://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/2013-2014/pcod/2_staffwritten_pacificcod_2013.pdf)  
<http://www.adfg.alaska.gov/FedAidPDFs/FMR14-04.pdf>  
<http://www.adfg.alaska.gov/FedAidPDFs/FMR14-02.pdf>  
<http://www.adfg.alaska.gov/FedAidPDFs/FMR14-01.pdf>  
<http://www.adfg.alaska.gov/FedAidPDFs/FMR13-45.pdf>  
<http://www.adfg.alaska.gov/FedAidPDFs/FMR13-47.pdf>

## B. Science and Stock Assessment Activities

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

FAO CCRF 7.1.9/7.4.4/7.4.5/7.4.6/8.4.3/12.4

ECO 29.1-29.3

Evidence adequacy rating:

High

Medium

Low

### Rating determination

*Reliable and accurate data required for assessing the status of fisheries and ecosystems - including data on retained catch of fish, by catch, discards and waste are collected (BSAI and GOA surveys, catch data, observer data). The NMFS and the ADFG collect fishery data and conduct fishery independent surveys to assess Pacific cod fisheries and ecosystems in GOA and BSAI areas. GOA and BSAI SAFE documents provide complete descriptions of data types and years collected.*

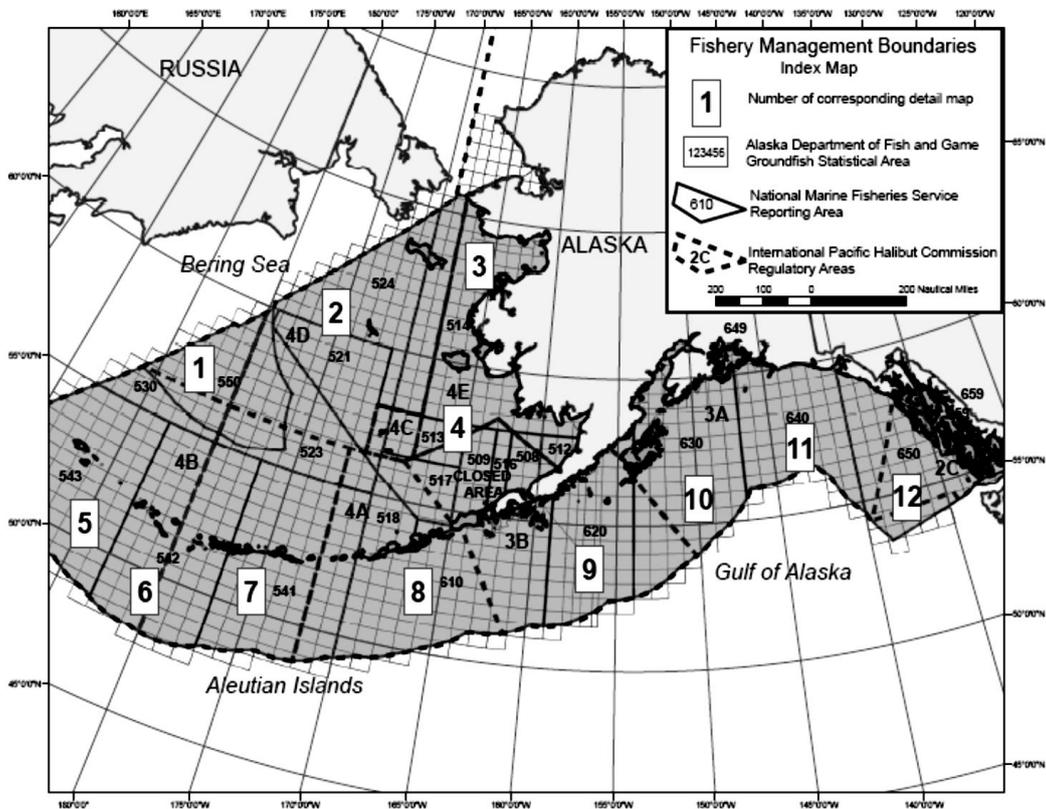
Starting in 2013 Separate stock assessments as well as separate (BS-AI) Total allowable catch AC recommendations were done for the Aleutian Islands and Bering Sea Pacific cod. The annual age-based assessment for Bering Sea and Aleutian Islands regions as well as GOA Pacific cod uses data collected from commercial landings and transshipment reports, port and at-sea observer length sampling and length and age data from fishery independent surveys in the EBS, the AI and the GOA. The RACE division of the AFSC is responsible for federally managed fisheries (3-200 nm) while the ADFG undertake coastal surveys and gather and collect data from state managed fisheries (0-3 nm).

It is noted that the overall data collection program is probably one of the most extensive in the world. At-sea (processor and catcher-processor vessels) are legally required to report commercial and non-commercial catch data on a daily basis, while catch and auxiliary information from a very extensive observer program, transmitted on a daily basis. Landings data from shore based processing facilities are also transmitted on a daily basis and the processing facilities subject to a high level of observer coverage. The size of the groundfish stock area necessitates an extensive survey program [http://www.afsc.noaa.gov/RACE/groundfish/survey\\_data/data.htm](http://www.afsc.noaa.gov/RACE/groundfish/survey_data/data.htm). Many of the commercial groundfish fisheries are managed with limited entry. In-season management monitors TAC uptake on a daily basis to ensure that the TAC is not overshot <http://www.fakr.noaa.gov/2013/2013.htm>.

### Fishery dependent data

Pacific cod are distributed across a wide area in the North Pacific in both federal and state managed waters. The species is fished with a range of gear types, including trawl, lines and traps. Pacific cod are associated with two Federally managed fisheries, the GOA and the BSAI and seven state-managed (within 3 nm) fisheries management areas. Each management area is subject to its own fisheries management plan. For catch reporting purposes, fisheries areas are subdivided into coastal

areas (3 nm) managed under the jurisdiction of ADFG and offshore reporting areas under the jurisdiction of NMFS (Figure 1).



**Figure 1.** State and Federal groundfish reporting areas in the BSAI and the GOA.

Source: [http://www.fakr.noaa.gov/maps/reporting\\_areas/index.pdf](http://www.fakr.noaa.gov/maps/reporting_areas/index.pdf)

The Fisheries Monitoring and Analysis Division (FMA) of the NMFS monitors groundfish fishing activities in the US EEZ. FMA is responsible for the biological sampling of commercial fishery catches, estimation of catch and bycatch mortality, and analysis of fishery-dependent survey data. The Division is responsible for training and oversight of at-sea observers who collect catch data onboard fishing vessels and at onshore processing plants. Data and analysis are provided to the Sustainable Fisheries Division of the Alaska Regional Office for the monitoring of quota uptake and for stock assessment, ecosystem investigations and research programs.

**The newly restructured Pacific Groundfish Observer Program**

Data gathered under the auspices of the North Pacific Groundfish Observer Program (NPGOP) covers all biological information associated with commercial fisheries, including catch weights (landings and discards), catch demographics (species composition, length, sex and age) and interactions with sharks, rays, seabirds, marine mammals and other species with limited or no commercial value. Beginning in 2013, Amendment 86 to the FMP of the BSAI and Amendment 76 to the FMP of the GOA establish the new North Pacific Groundfish and Halibut Observer Program. All vessels fishing for groundfish in federal waters sea are required to carry observers, at their own expense, for at least a

portion of their fishing time.

Observer data is collated and utilized for the following purposes:

- (1) to monitor target catch and bycatch;
- (2) to understand the population status and trends of fish stocks and protected species, as well as the interactions between them;
- (3) to determine the quantity and distribution of net benefits derived from living marine resources;
- (4) to predict the biological, ecological, and economic impacts of existing management actions and proposed management options.

[http://www.afsc.noaa.gov/FMA/Manual\\_pages/MANUAL\\_pdfs/manual2012.pdf](http://www.afsc.noaa.gov/FMA/Manual_pages/MANUAL_pdfs/manual2012.pdf)

As well as providing demographic data for scientific purposes, the observer program data is also used extensively for in-season and post-season management. Daily reports are electronically transmitted via the CAS system. This 'real-time' data is used as the basis to trigger area as well as fisheries closures e.g. if maximum catch allocations of target or Prohibited Species are caught.

Financing of the NPGOP is based on a cost recovery formula where individual vessel operators must pay the daily observer costs as a condition of license. The new program places all vessels and processors in the groundfish and halibut fisheries off Alaska into either full or partial coverage categories. No operations are exempt from the new program. Vessels and processors in the full coverage category will continue to obtain observers by contracting directly with observer providers. Vessels and processors in the partial coverage category will obtain observers through NMFS, paying a fee on landings to cover costs.

Approximately 300 observers are deployed annually. Observers are employed by six NMFS-permitted private companies and training is provided by the Observer Training Center of the University of Alaska Anchorage. The Fisheries Monitoring and Analysis (FMA) division of NOAA provide oversight, quality assurance analysis, briefings and trip de-briefings to the observer training and operational programs. Data collection methods and standardized techniques are described in detail in the NPGOP sampling manual. Data is quality controlled through a rigorous training program with competency checks throughout, standardized collection methods, and one on one debriefing with a NMFS trained debriefer at the end of each deployment. The debriefer presents an error report of the data recorded by the observer and performs data checks. The main purpose of the computer error check is to compare data between form types, search for missing data, and flag questionable entries. This report will be reviewed during the interview and all corrections will be made at that time. In addition, all forms will be checked and compared with the electronic data.

[http://www.afsc.noaa.gov/FMA/Manual\\_pages/MANUAL\\_pdfs/manual2013.pdf](http://www.afsc.noaa.gov/FMA/Manual_pages/MANUAL_pdfs/manual2013.pdf)

The FMA division also deploys staff to monitor landings at shore based facilities and collect demographic biological data (species, length/age, sex etc) which is subsequently provided to the Alaska Fisheries Science Center for stock assessment purposes.

**Annual (observer) Deployment Plan for 2013**

The first (2013) Annual Deployment Plan (ADP) places all vessels and processors into one of two observer coverage categories: (1) a full coverage category, and (2) a partial coverage category.

[http://alaskafisheries.noaa.gov/sustainablefisheries/observers/ADP\\_Final\\_2013.pdf](http://alaskafisheries.noaa.gov/sustainablefisheries/observers/ADP_Final_2013.pdf)

The full-coverage category now includes:

- catcher/processors (CPs) (with two exceptions),
- motherships,
- catcher vessels while participating in American Fisheries Act (AFA) or Community Development Quota (CDQ) pollock fisheries,
- catcher vessels while participating in CDQ groundfish fisheries (except sablefish and pot or jig gear catcher vessels),
- catcher vessels while participating in the Central Gulf of Alaska Rockfish Program (RP), and
- inshore processors when receiving or processing Bering Sea pollock.

The new Observer Program does not affect full observer coverage requirements for vessels > 125 feet or catcher processors and motherships that discard and process fish onboard. Other full coverage vessels include catcher vessels belonging to catch share programs with prohibited species caps, Bering Sea Alaska pollock vessels, and Gulf of Alaska rockfish vessels. They obtain observers using status-quo (pay as you go) methods for all their trips.

Vessels and processors now in the partial coverage category include:

- catcher vessels designated on a Federal Fisheries Permit (FFP) when directed fishing for groundfish in federally managed or parallel fisheries, except those in the full coverage category,
- catcher vessels when fishing for halibut IFQ or CDQ,
- catcher vessels when fishing for sablefish IFQ or fixed gear sablefish CDQ, and
- shoreside or stationary floating processors, except those in the full coverage category.

Vessels in the new partial coverage category have experienced substantial changes in how observers are deployed and paid for. The Partial Coverage category includes vessels whose fishing operations are not required by federal regulation to always carry an observer. This category is divided into two sampling strata depending on the method used to deploy observers: trip-selection and vessel-selection.

The partial observer coverage category is divided into three selection pools:

-No selection: Vessels less than 40 ft LOA or fishing with jig gear are in the “no selection” pool which means that they will not be selected for observer coverage. NMFS did not to deploy observers on these vessels in 2013 due to logistical issues. NMFS will consider expanding coverage to vessels less than 40 ft and/or vessels fishing with jig gear if data collection needs warrant coverage and logistical issues are resolved. Vessel owners or operators in this pool will not be required to take observers for the first year of the program. Landings from vessels with zero coverage will still be assessed the

landing fee.

-Vessel selection: Vessels are in the vessel selection pool if they are fishing hook-and-line or pot gear and are greater than or equal to 40 ft, but less than 57.5 ft in length overall (LOA). NMFS intends to randomly select vessels in the vessel selection pool for mandatory observer coverage approximately 60 days prior to the start of each 2-month selection period. Vessels will be required to carry an observer for all trips taken within a selected 2-month period. Each fall, owners of vessels placed in this pool will receive a letter that lists their vessels assigned to this pool. Vessel owners or operators in this pool will not be required to log trips into ODDS. However, a subset of vessels, randomly selected by NMFS, will be required to take observers for every groundfish or halibut fishing trip that occurs during a specified 2-month period. Owners of selected vessels will be contacted by NMFS at least 30 days in advance of the 2-month period.

-Trip selection: Vessels fishing trawl gear, vessels fishing hook-and-line gear that are also greater than or equal to 57.5 ft LOA, comprise the trip-selection pool. NMFS developed a system, termed the Observer Declare and Deploy System (ODDS), to facilitate the random assignment of observers to trips. Each fall, owners of vessels placed in this pool will receive a letter that lists their vessels assigned to this pool and describes how to access and log trips into and Observer Declare and Deploy System (ODDS). NMFS developed ODDS, to facilitate the random assignment of observers to trips. Vessel owners or operators with vessel/s is in the trip selection pool will be required to log each fishing trip into ODDS and will be immediately informed if the trip has been randomly selected for observer coverage. The observer will be provided by a NMFS contractor. Vessel owners or operators in this pool must log fishing trips at least 72 hours before anticipated departure.

#### **Improved statistical reliability**

These changes are intended to increase the statistical reliability of catch and bycatch data, address cost inequality among fishery participants, and expand observer coverage to previously unobserved fisheries. The sampling methods in the 2013 Annual Deployment Plan (ADP) achieves representative sampling of fishing events for vessels greater than or equal to 40 feet LOA and not fishing jig gear. As a result, the coverage rate is almost the same across all partially observed fisheries and it enables scientists to establish a baseline of unbiased observer data across all sectors. Moreover, the new Observer Program will provide better spatial and temporal distribution of observer coverage across all fisheries. It is intended to improve confidence in catch and bycatch estimation and the overall quality of data collected in all federal fisheries. These changes are intended to reduce bias in observer data, improve catch estimates, and lay the groundwork for cost-effective improvements to sampling methods implemented in future ADPs.

#### **Program costs and deployment rates**

NOAA Fisheries is providing the \$4.48 million start-up funding for the first year of this partial coverage category program. The fees collected from industry will fund the program in subsequent years. Total program funds cover both at-sea coverage and at dockside deployment.

NMFS and the Council created the ADP process to provide flexibility in the deployment to meet scientifically based estimation needs. NMFS and the Council recognized that coverage rates for any given year would be dependent on available revenue and anticipated vessel-days at-sea and these

annual changes in revenue and costs are inherent in the program. This flexibility allows NMFS to optimize deployment in each year so that statistically robust sampling can be achieved in a cost-effective manner.

The distribution of days fished by location will influence costs in 2013, therefore a simulation of potential fishing activity was used to develop a budget for the deployment of observers into the partial coverage category. An at-sea budget was developed by using 2011 as the base year of effort and simulating the deployment rate that resulted in 88 to 92% of the simulated values being less than or equal to the available funds after subtracting the cost of dockside sampling.

### **Electronic monitoring**

NMFS is working collaboratively with the Council to develop an Electronic Monitoring (EM) Strategic Plan to integrated video monitoring into the Observer Program. In 2013 pilot project, NMFS issued a contract to construct, deploy, and maintain a video based EM system on volunteering vessels in the vessel-selection pool. At the end of the study, NMFS will evaluate the efficacy of electronic monitoring to collect catch and discard data in the hook-and-line halibut and sablefish fleets on vessels between 40 ft LOA and 57.5 ft LOA.

<http://alaskafisheries.noaa.gov/sustainablefisheries/observers/>

### **Sampling catches**

Observers on vessels sample randomly choose catches for species composition. For each sampled haul, they also make a rough visual approximation of the weight of the non-prohibited species in their samples that are being retained by the vessel. This is expressed as the percent of that species that is retained. Approximating this percentage is difficult because discards occur in a variety of places on fishing vessels. Discards include fish falling off the processing conveyor belts, dumping of large portions of nets before bringing them on-board the vessel, dumping fish from the decks, size sorting by crewmen, quality-control discard, etc. Because observers can be in only one place at a time, they can provide only this rough approximation based on their visual observations rather than data from direct sampling. The discard estimate derived by expanding these approximations from sampled hauls to the remainder of the catch may be inaccurate because the approximation may be inaccurate. The numbers derived from the observer discard approximation can provide users with some information as to the disposition of the catch, but the discard numbers should not be treated as sound estimates. At best, they should be considered a rough gauge of the quantity of discard occurring. More than half of the estimates of retained catch and groundfish discarded at sea are derived exclusively from observer data (see table below). In 2008, approximately 63% of the retained catch was pollock, which is harvested by vessels that generally have high levels of observer coverage. For some vessels, at-sea discard rates based on observer data are multiplied by industry harvest reports to generate discard estimates. Only 6% of the estimated at sea discards of groundfish species is based on industry data alone. The groundfish TACs are established and monitored in terms of total catch, not retained catch; this means that both retained catch and discarded catch are counted against the TACs. Therefore, the catch-composition sampling methods used by at-sea observers provide the basis for NMFS to make estimates of total catch by species, not the disposition of that catch.

**Logbooks**

Paper logbooks are required to be completed and submitted for Federally permitted vessels over 60 feet in length that are fishing for groundfish and for vessels that are 25 feet and over in length fishing for IFQ halibut. Catcher vessels and catcher processors that participate in both the groundfish fishery and sablefish or halibut IFQ fishery during the same fishing year are allowed to submit a single combined NMFS/IPHC logbook.

The NMFS logbook program has been in place since 1991 and has largely been used for enforcement purposes. For example, catch information in logbooks is used to verify compliance with maximum retainable amounts and to document observer coverage. This information is submitted as hard copy and the information is not routinely entered into a database.

Haul-specific information, including date and time, location, vessel estimates of total catch and species-specific catch, fishing gear, fishing depth, and at-sea discard are recorded in the logbook. These data are not available electronically and thus are not used in catch estimation. For unobserved trips, the logbook data would be extremely useful to determine spatial and temporal trends in fishing effort. There have been some past efforts to keypunch data from subsets of paper logbooks into electronic format; however, the cost and logistics of this effort prohibit wholesale implementation of data entry efforts. A small number of vessels are currently participating in an electronic logbook program. This program was implemented in 2003 and involves 12 voluntary participants. Expansion of electronic logbooks would provide haul-specific effort information on unobserved vessels and the information could be useful to total catch estimation or observer deployment processes in the future.

Vessels participating in certain management programs have additional observer coverage requirements. For example, vessels participating in the Rockfish Pilot Program (50 CFR 679.80) require at least 100% observer coverage, regardless of the length of the vessel. Motherships and CPs that participate in either the American Fisheries Act (AFA) directed Pollock fishery) (50 CFR 679.60) or the Amendment 80 (50 CFR 679.90) management program, are required to have 200% observer coverage, which means that two observers are on board for every fishing trip and every haul is sampled.

On trawl vessels, the entire weight of the catch taken on observed hauls is either estimated by the observer or directly measured when onboard flowscales are available. For trawl vessels, a portion of the total haul is selected randomly and the weight of each species in the sample is recorded. The species-specific weight is expanded by the sampling fraction (size of sample divided by size of haul) to estimate the total catch of that species.

[http://www.afsc.noaa.gov/REFM/stocks/plan\\_team/ecosystem.pdf](http://www.afsc.noaa.gov/REFM/stocks/plan_team/ecosystem.pdf)

Vessels and processors in the full coverage category will obtain observers by contracting directly with observer providers. This will represent no change for many participants in the full coverage category. However, there will be some new entrants to the full coverage category since all catcher/processors are now included.

Year	Gulf of Alaska			Bering Sea and Aleutian Islands			All Alaska		
	Catcher vessels	Catcher processors	Total	Catcher vessels	Catcher processors	Total	Catcher vessels	Catcher processors	Total

2007	29	12	41	4	30	34	30	31	61
2008	33	6	39	3	34	37	35	35	70
2009	33	6	39	1	29	30	34	30	64
2010	27	6	33	-	29	29	27	30	57
2011	31	6	37	3	29	32	33	30	63

December 2012 Ecosystem SAFE

#### **CATCH AND BYCATCH ESTIMATION METHODS**

Estimates of retained catch and at-sea discarded groundfish and PSC are generated for each fishery described in the FMPs. Retained and discard catch estimates are based on both observer sample data and industry reports of catch. Estimation methods follow a post-stratification of hauls and deliveries based on gear and area fished, target species (as defined by realized catch), and vessel type. Fishery level estimates of total catch (retained catch and at-sea discard) are then obtained by summing all hauls or deliveries within the domain (fishery, time, and area) of interest.

Estimates of retained and discarded catch obtained from observer information are derived for each haul on observed trips based on the sampling design for sampled hauls. On trawl vessels, this is followed by a nearest-neighbor type of imputation of species composition from sampled to unsampled hauls on sampled trips. Estimates of retained catch from industry are taken from landing and production reports, and are assumed to be accurate.

#### **Haul-level Estimates**

The analytical methods that are used to generate point estimates of catch utilize ratio estimators that take into account the underlying sample design used to collect the data. The methods have been used since 2008 to generate point estimates of catch for sampled hauls on observed trips, based on data collected by the Observer Program. Variance estimates are not currently computed. All the estimators assume simple random selection of samples, although in most cases systematic sample selection with a single random starting point is used. The assumption of simple random sampling when systematic random sampling has been used will tend to result in an overestimation of variance.

#### **Observer Estimates of At-Sea Discard**

The catch of groundfish that is discarded at sea is estimated using the same general computations for all gear types (longline, pot, and trawl). The observer assesses the amount of catch that is discarded at sea for each species encountered in the haul. This estimate is based on the observer's best professional judgment and may include observations of at-sea discard from the deck, estimates of the numbers of fish that dropoff longline gear as it is retrieved, estimates of at-sea discard from the factory (made by the vessel or by the observer), and estimated differences between total catch and final product. Discard is challenging because it can occur at many places in a fishing and processing operation.

**Table 1.** Percentage of the 2008 catch estimates that were derived from different data source categories. The data type "Mixed Observer and Industry" refers to catch estimates generated from application of an at sea discard rate from observer data to an industry report of total catch.

Prohibited species catch (PSC) is the catch of specific species, such as salmon, that have economic value in non-groundfish fisheries and therefore cannot be retained in groundfish fisheries. Salmon and crab PSC is estimated as number of individual caught; halibut and herring PSC is estimated as weight in metric tons (t). Column percentages add to 100%.

Data type	Retained catch (Percent)	At-sea Discard of groundfish (Percent)	At-sea discard of PSC (#) salmon, crab (Percent)	At-sea discard of PSC (t) halibut, herring (Percent)
Observer	989,933 (60.6%)	62,300 (67.0%)	1,625,888 (36.0%)	7,607 (31.0%)
Industry	642,510 (39.4%)	5,596 (6.0%)	0.0	0.0
Mixed Observer and Industry	0.0	25,138 (27.0%)	2,888,428 (64.0%)	16,851 (68.9%)
Total	1,632,443	93,034	4,514,316	24,458

<http://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-205.pdf>

#### **PARTIAL COVERAGE FLEET**

The Partial Coverage category, which started in January 2013, includes vessels whose fishing operations are not required by federal regulation to always carry an observer. This category is divided into two sampling strata depending on the method used to deploy observers: trip-selection and vessel-selection.

- Trip selection vessels are those that are required to log trips into the Observer Declare and Deploy System (ODDS) using a NMFS supplied username and password. Each logged trip is assigned a random number that determines whether a trip is to be observed. The sampling frame for trip selection is generated one trip at a time.
- Vessel-selection vessels are those that are selected to have every trip observed for a two-month period of the year. From the pool of vessels that fished in the same two-month period in 2012, a number of vessels are randomly chosen for observer coverage. Only those vessels selected for coverage are provided access to the Vessels Assessment Logging System (VALS) in which they may petition NMFS for a conditional release of observer coverage. A conditional release is a case where the NMFS has decided under certain conditions to release the vessel from the observer coverage requirement for a period of time. If a vessel requests a conditional release from coverage through the VALS, NMFS follows up by contacting the vessel, conducting a visit and inspection of the vessel, and recording the results of the vessel assessment to be used in future vessel selections.

#### **Trip Selection**

A total of 1,300 trips were made by 206 vessels ranging from 58 to 176 feet in length in this stratum during the first sixteen weeks of 2013. Observer (NORPAC) data indicates that 17.7% of these trips were observed.

**Vessel Selection**

A total of 141 vessels ranging from 40 to 57 feet LOA in length made 507 deliveries in this stratum during the first sixteen weeks of 2013. Over both two-month sample periods, 11.8% of trips in this stratum were observed. In response to performance and issues identified in the restructured observer program, the NPFMC made the following recommendations for the June 2014 review of the observer program.

1. Include information on the volume of catch observed in both vessel and trip selection pools.
2. Include information on achieved coverage rates by gear type (trawl vs fixed gear).
3. Include information on trip length by observed and unobserved vessels in both the trip and vessel selection pools. Within the vessel selection pool, break out the IFQ fleet.
4. A review of the trip selected and vessel selected pools in consideration of whether vessels should have an option to choose either one, or whether the deployment plan should place every vessel in the partial coverage category in the trip selection pool (Dec. 2012 request).
5. An evaluation of the difference between observer coverage in the vessel and trip selection pools (a review of the sampling method) (Dec. 2012 request).
6. An evaluation of ways to insert cost effective measures into the deployment plan (Dec. 2012 request).
7. An evaluation of detailed programmatic costs (Dec. 2012 request).

**Table 2.** Number of deliveries made in each stratum, by observation status, whether a delivery was made to a tender (offload type) and the sampling unit used (Rate Type). \*: Observer data confirms that all trips were observed. This number is less than 100% because a field in NORPAC had not yet been updated in observer debriefing at the time of this writing.

Sampling Frame	Observed	Count	Observed	Offload Type	Rate Type
Vessel-Selection	43	440	9.8%	NonTender	Trip
Trip-Selection	220	1196	18.4%	NonTender	Trip
Full-Coverage	2,627	2,635	99.7%*	NonTender	Trip
No-Coverage	0	236	0.0%	NonTender	Trip
Vessel-Selection	17	67	25.4%	Tender	Trip
Trip-Selection	16	134	11.9%	Tender	Trip
Full-Coverage	12	12	100.0%	Tender	Trip
No-Coverage	0	39	0.0%	Tender	Trip
Vessel-Selection	60	507	11.8%	All	Trip
Trip-Selection	236	1330	17.7%	All	Trip
Full-Coverage	2,639	2,647	99.7%*	All	Trip
No-Coverage	0	275	0.0%	All	Trip
Vessel-Selection	15	172	8.7%	All Non Tender	Vessel
Vessel-Selection	5	27	18.5%	At Least One Tender	Vessel
Vessel-Selection	15	149	10.1%	All	Vessel

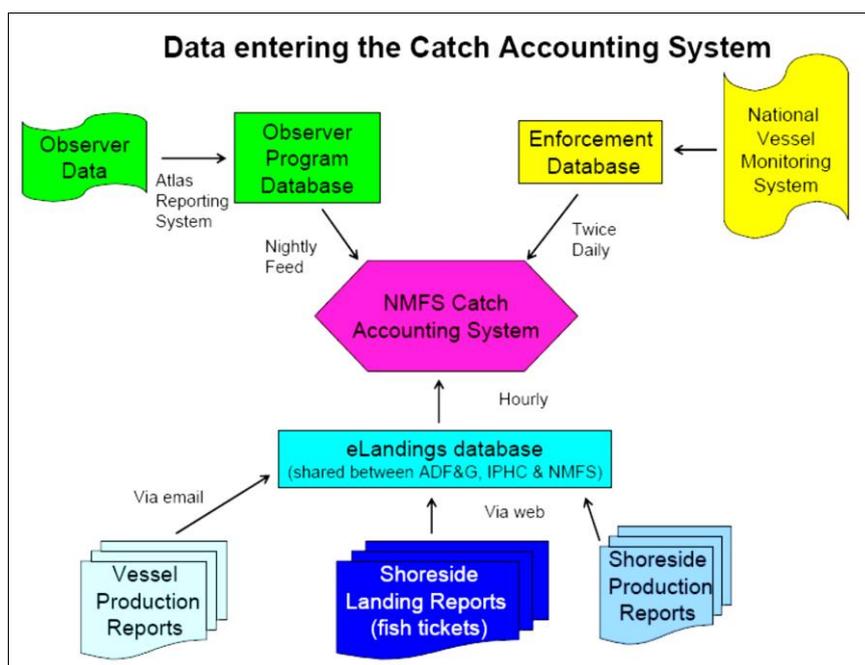
[http://alaskafisheries.noaa.gov/sustainablefisheries/observers/adpltr\\_npfmc0913.pdf](http://alaskafisheries.noaa.gov/sustainablefisheries/observers/adpltr_npfmc0913.pdf)  
<http://alaskafisheries.noaa.gov/sustainablefisheries/observers/draft2014adp.pdf>

Given the extensive observer coverage, its recent restructuring to correct issues, bias and coverage levels, the cost recovery model used, the breadth of scientific data collected and its use, the BSAI and GOA groundfish observer program are considered adequate for data collections needs.

<http://www.afsc.noaa.gov/REFM/Stocks/assessments.htm>  
<http://www.afsc.noaa.gov/Quarterly/jfm2013/jfm13featurelead.htm>  
 Calahan et al. 2010. <http://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-205.pdf>  
 Faunce, C.H. 2011. <http://icesjms.oxfordjournals.org/content/68/8/1769.full.pdf>

For all operations under Federal jurisdiction, all US vessels catching Pacific cod within the US EEZ, land based and stationary floating processor and factory (motherships) receiving catches of Pacific Cod are legally obliged to maintain records of all transactions.

To facilitate reporting of commercial catch from both state and federally managed fisheries, data from a wide range of sources is gathered in the Catch Accounting System (CAS), a multi-agency (NMFS, IPHC and ADFG) system that centrally collates landings data from shore based processing and landings operations as well as retained catch observations from individual vessels. The CAS system also provides a centralized data platform for the collation of catch (landings and discards) data from the extensive observer program.



**Figure 2.** Schematic of the inter-agency Catch Accounting System (CAS).

A detailed description of the catch sampling and catch estimation procedures used for groundfish fisheries of Alaska can be found at:

<http://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-205.pdf>

And the 2014 observer sampling manual can be found at:

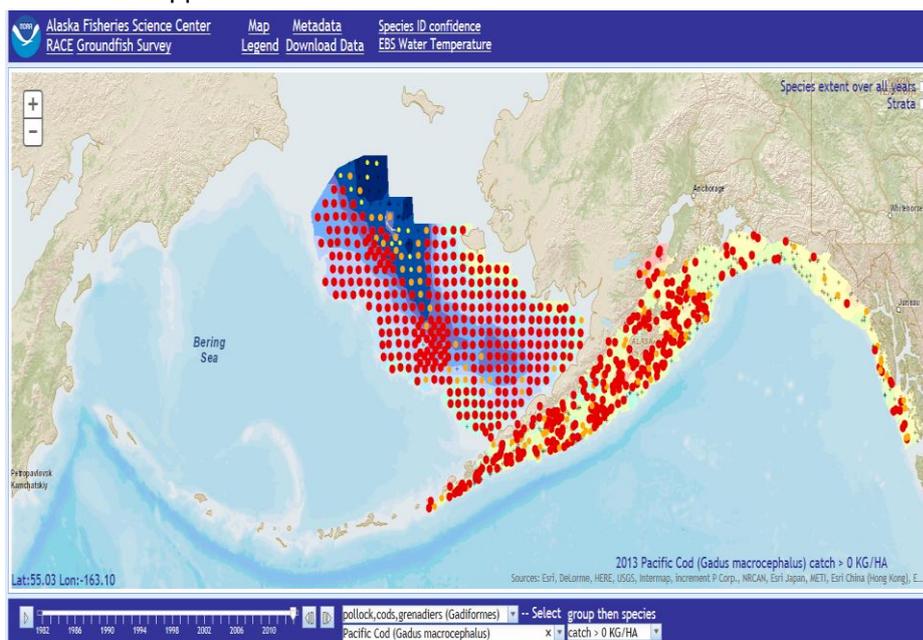
[http://www.afsc.noaa.gov/FMA/Manual\\_pages/MANUAL\\_pdfs/manual2014\\_2.pdf](http://www.afsc.noaa.gov/FMA/Manual_pages/MANUAL_pdfs/manual2014_2.pdf)

**Fishery independent survey data**

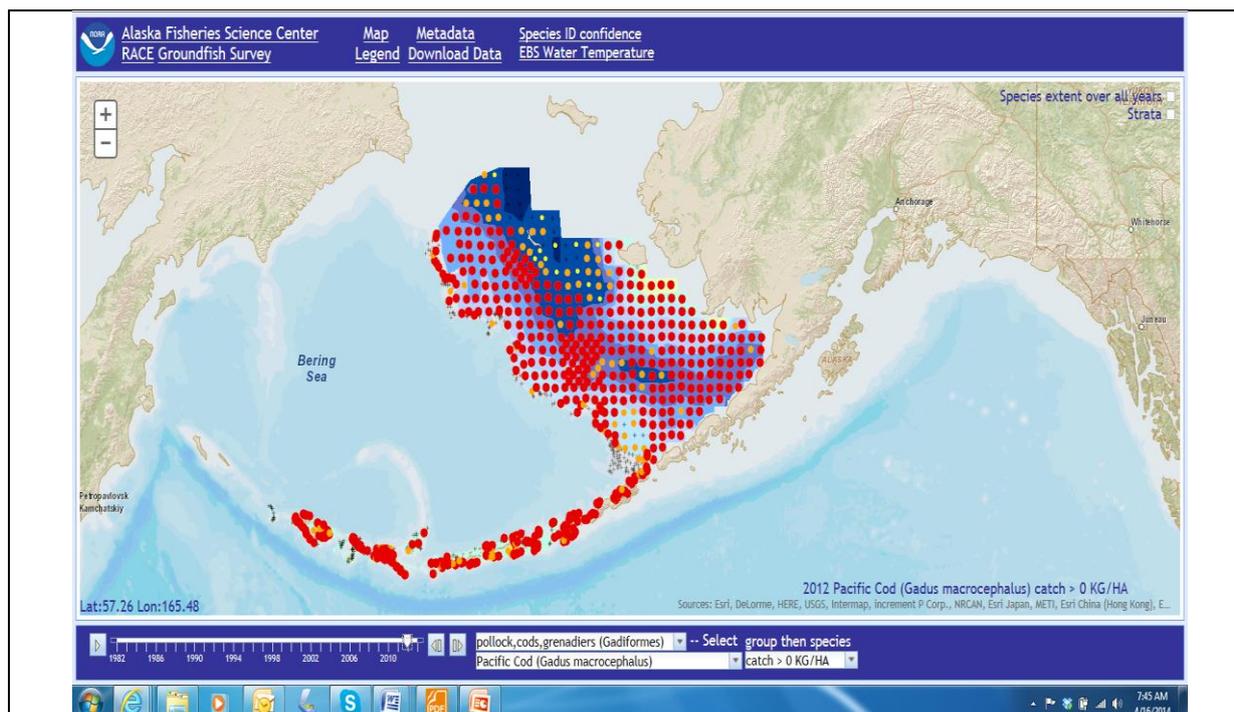
The RACE division undertakes a very extensive survey program covering the EBS, the GOA and the AI (<http://www.afsc.noaa.gov/RACE/>).

Annual NOAA EBS groundfish survey and a biannual AI survey data are used for the BSAI stock assessment. Sub-samples of length and age taken from the surveys are used for assessments. Previously, the EBS and AI Pacific cod were managed as a combined stock, where only the EBS stock was subject to a formal analytical assessment. The AI stock was quantified by inflating and extrapolating the results of the EBS assessment and the last available biomass ratios from each surveys used to scale up the assessment of the EBS stock to the BSAI area. In late 2013 It was decided to formally conduct separate assessments for the BS and AI Pacific cod stocks.

The NOAA biennial GOA groundfish survey data is used for the assessment for Pacific cod in the GOA. All three surveys (EBS, AI and GOA) collect demographic data (length and age) as well as stomach content data for potential use in multi-species assessment models. The survey schedule in the AI has been one trawl survey every 3 years from 1991 to 2000, from 2000 to 2006 the trawl survey was biennial. The survey schedule in the GOA has been a trawl survey every 3 ys from 1984 to 1999 and since 1999 the trawl survey is biennial. The annual EBS survey program follows systematic stratified design with two geographic strata: NW (arctic area) and SE (sub-arctic area) three depth strata (inner shelf < 50 m; mid-shelf between 50 and 200 m; and outer shelf > 200 m). On average 376 survey stations are completed annually in the EBS survey, with tow duration of 30 min. at a speed of 3 knots. The nominal survey abundance index is standardized with the area swept. The GOA survey follows the same stratification as the EBS survey, a random stratified survey design. The survey is biennial, with the NOAA survey schedule alternating each year between the GOA (Figure 3) and the AI survey area (Figure 4). For each survey year, on average 825 stations surveyed by three boats in the GOA, and 420 stations surveyed by two boats in the AI. Due to the relatively narrow shelf area around the AI, the AI survey design differs from the GOA and EBS surveys in that fixed station approach is used.



**Figure 3.** Positions for the 2013 RACE groundfish survey covering the EBS and GOA.



**Figure 4.** Survey positions for the 2012 RACE groundfish survey covering the EBS and AI.

The RACE groundfish survey program follows well defined and detailed survey protocols. The EBS survey was subject to an independent review in 2012 (<http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/SAFE/CrabSAFE/912Chapters/ChenReview912.pdf>) which concluded that the “EBS crab and groundfish bottom trawl surveys provide a comprehensive and consistent time series of abundance indices and relevant biological information on many key crab and finfish populations, which are critical to the stock assessment of these populations. The survey design and sampling protocol appear to be scientifically sound and robust, and adequately addresses management needs.”

In addition to the GOA and BSAI groundfish surveys undertaken by the ASFC, the ADFG also undertake an annual inshore bottom trawl survey. Intercalibration studies between the NMFS and ADFG have been undertaken to explore the possibility of generating a combined survey index.

<http://www.adfg.alaska.gov/static/home/library/PDFs/afrb/vonsv8n2.pdf>

#### History of Management in Pacific Cod in GOA Region

The history of acceptable biological catch (ABC) and total allowable catch (TAC) levels is summarized and compared with the time series of aggregate commercial catches in Table 3. For the first year of management under the MFCMA (1977), the catch limit for GOA Pacific cod was established at slightly less than the 1976 total reported landings. During the period 1978-1981, catch limits varied between 34,800 and 70,000 t, settling at 60,000 t in 1982. Prior to 1981 these limits were assigned for “fishing years” rather than calendar years. In 1981 the catch limit was raised temporarily to 70,000 t and the fishing year was extended until December 31 to allow for a smooth transition to management based on calendar years, after which the catch limit returned to

60,000 t until 1986, when ABC began to be set on an annual basis. From 1986 (the first year in which an ABC was set) through 1996, TAC averaged about 83% of ABC and catch averaged about 81% of TAC. In 8 of those 11 years, TAC equaled ABC exactly. In 2 of those 11 years (1992 and 1996), catch exceeded TAC.

To understand the relationships between ABC, TAC, and catch for the period since 1997, it is important to understand that a substantial fishery for Pacific cod has been conducted during these years inside State of Alaska waters, mostly in the Western and Central Regulatory Areas. To accommodate the State- managed fishery, the Federal TAC was set well below ABC (15-25% lower) in each of those years. Thus, although total (Federal plus State) catch has exceeded the Federal TAC in all but three years since 1997, this is basically an artifact of the bi-jurisdictional nature of the fishery and is not evidence of overfishing. At no time since the separate State waters fishery began in 1997 has total catch exceeded ABC, and total catch has never exceeded OFL.

Changes in ABC over time are typically attributable to three factors: 1) changes in resource abundance, 2) changes in management strategy, and 3) changes in the stock assessment model. Assessments conducted prior to 1988 were based on survey biomass alone. From 1988-1993, the assessment was based on stock reduction analysis (Kimura et al. 1984). From 1994-2004, the assessment was conducted using the Stock Synthesis 1 modeling software (Methot 1986, 1990) with length-based data. The assessment was migrated to Stock Synthesis 2 in 2005 (Methot 2005b), at which time age-based data began to enter the assessment. Several changes have been made to the model within the SS2 framework (renamed "Stock Synthesis," without a numeric modifier, in 2008) each year since then.

Historically, the majority of the GOA catch has come from the Central regulatory area. To some extent the distribution of effort within the GOA is driven by regulation, as catch limits within this region have been apportioned by area throughout the history of management under the MFCMA. Changes in area-specific allocation between years have usually been traceable to changes in biomass distributions estimated by Alaska Fisheries Science Center trawl surveys or management responses to local concerns. Currently, the ABC allocation follows the average biomass distribution estimated by the three most recent trawl surveys, and the TAC allocation is within one percent of this distribution on an area-by-area basis.

**Table 3.** History of Pacific cod catch (t, includes catch from State waters), Federal TAC (does not include State guideline harvest level), ABC, and OFL. ABC was not used in management of GOA groundfish prior to 1986. Catch for 2013 is current through 22 October. The values in the column labeled "TAC" correspond to "optimum yield" for the years 1980-1986, "target quota" for the year 1987, and true TAC for the years 1988-2009. The ABC value listed for 1987 is the upper bound of the range. Source: NPFMC staff.

Year	Catch	TAC	ABC	OFL
1980	35,345	60,000	-	-
1981	36,131	70,000	-	-
1982	29,465	60,000	-	-
1983	36,540	60,000	-	-
1984	23,898	60,000	-	-
1985	14,428	60,000	136,000	-
1986	25,012	75,000	125,000	-
1987	32,939	50,000	185,000*	-
1988	33,802	80,000	99,000	-
1989	43,293	71,200	71,200	-
1990	72,517	90,000	90,000	-
1991	76,328	77,900	77,900	-
1992	80,747	63,500	63,500	87,600
1993	56,488	56,700	56,700	78,100
1994	47,485	50,400	50,400	71,100
1995	68,985	69,200	69,200	126,000
1996	68,280	65,000	65,000	88,000
1997	77,018	69,115	81,500	180,000
1998	72,525	66,060	77,900	141,000
1999	81,785	67,835	84,400	134,000
2000	66,560	59,800	76,400	102,000
2001	51,542	52,110	67,800	91,200
2002	54,483	44,230	57,600	77,100
2003	52,579	40,540	52,800	70,100
2004	56,625	48,033	62,810	102,000
2005	47,585	44,433	58,100	86,200
2006	47,854	52,264	68,859	95,500
2007	51,428	52,264	68,859	97,600
2008	58,949	50,269	64,493	88,660
2009	52,931	41,807	55,300	66,000
2010	78,027	59,563	79,100	94,100
2011	84,841	65,100	86,800	102,600
2012	77,987	65,700	87,600	104,000
2013	60,073	60,600	80,800	97,200

### EBS/AI Management History

The history of acceptable biological catch (ABC), overfishing level (OFL), and total allowable catch (TAC) levels is summarized and compared with the time series of aggregate (i.e., all-gear, combined area) commercial catches in Table 4. From 1980 through 2013, TAC averaged about 83% of ABC (ABC was not specified prior to 1980), and from 1980 through 2013 aggregate commercial catch averaged about 91% of TAC (remembering that 2013 catch data are not yet final). In 10 of these 33 years (29%), TAC equalled ABC, and in 8 of these 34 years (24%), catch exceeded TAC (by an average of 3%). However, three of those overages occurred in 2007, 2008, and 2010, when TAC was reduced by 3% to account for a small, State-managed fishery inside State of Alaska waters (similar reductions have been made in all years since 2006); thus, while the combined Federal and State catch exceeded

the Federal TAC in 2007, 2008, and 2010 by 2% or less, the overall target catch (Federal TAC plus State GHL) was *not* exceeded. Total (BSAI) catch has been less than OFL in every year since 1993.

Changes in ABC over time are typically attributable to three factors: 1) changes in resource abundance, 2) changes in management strategy, and 3) changes in the stock assessment model. Assessments conducted prior to 1985 consisted of simple projections of survey numbers at age. In 1985, the assessment was expanded to consider all survey numbers at age from 1979-1985. From 1985-1991, the assessment was conducted using an *ad hoc* separable age-structured model. In 1992, the assessment was conducted using the Stock Synthesis modeling software (Methot 1990) with age-based data. All assessments from 1993 through 2003 continued to use the Stock Synthesis modeling software, but with length-based data. Age data based on a revised ageing protocol were added to the model in the 2004 assessment. At about that time, a major upgrade in the Stock Synthesis architecture resulted in a substantially new product, labeled "SS2" (Methot 2005). The assessment was migrated to SS2 in 2005, and several changes have been made to the model in most years since then. Since late 2013, due to recommendations from the SSC, there has been a split in stock assessment and management allocation for EBS and AI Region.

**Table 4.** History of BSAI Pacific cod catch, TAC, ABC, and OFL (t). Catch for 2013 is through October 12. Note that specifications through 2013 were for the combined BSAI region, so BSAI catch is shown rather than the EBS catches. Source for historical specifications: NPFMC staff.

Year	Catch	TAC	ABC	OFL
1977	36,597	58,000	-	-
1978	45,838	70,500	-	-
1979	39,354	70,500	-	-
1980	51,649	70,700	148,000	-
1981	63,941	78,700	160,000	-
1982	69,501	78,700	168,000	-
1983	103,231	120,000	298,200	-
1984	133,084	210,000	291,300	-
1985	150,384	220,000	347,400	-
1986	142,511	229,000	249,300	-
1987	163,110	280,000	400,000	-
1988	208,236	200,000	385,300	-
1989	182,865	230,681	370,600	-
1990	179,608	227,000	417,000	-
1991	220,038	229,000	229,000	-
1992	207,278	182,000	182,000	188,000
1993	167,391	164,500	164,500	192,000
1994	193,802	191,000	191,000	228,000
1995	245,033	250,000	328,000	390,000
1996	240,676	270,000	305,000	420,000
1997	257,765	270,000	306,000	418,000
1998	193,256	210,000	210,000	336,000
1999	173,998	177,000	177,000	264,000
2000	191,060	193,000	193,000	240,000
2001	176,749	188,000	188,000	248,000
2002	197,356	200,000	223,000	294,000
2003	210,969	207,500	223,000	324,000
2004	212,161	215,500	223,000	350,000
2005	205,635	206,000	206,000	265,000
2006	193,016	194,000	194,000	230,000
2007	174,125	170,720	176,000	207,000
2008	170,853	170,720	176,000	207,000
2009	175,732	176,540	182,000	212,000
2010	171,854	168,780	174,000	205,000
2011	220,102	227,950	235,000	272,000
2012	251,055	261,000	314,000	369,000
2013	211,867	260,000	307,000	359,000

#### 2013 GOA Survey Abundance Estimates

Estimates of total abundance (both in biomass and numbers of fish) obtained from the trawl surveys are shown in Table 5. The highest biomass ever observed by the survey was the 2009 estimate of 752,651 t, and the low point was the preceding (2007) estimate of 233,310 t. The 2009 biomass estimate represented a 223% increase over the 2007 estimate. The 2011 biomass estimate was down 33% from 2009, but still 115% above the 2007 estimate. The 2013 biomass estimate is a small increase (1%) from the 2011 estimate.

In terms of population numbers, the record high was observed in 2009, when the population

was estimated to include over 573 million fish. The 2005 estimate of 140 million fish was the low point in the time series. The 2009 abundance estimate represented a 199% increase over the 2007 estimate. The 2011 abundance estimate was a decrease of 39% from 2009, but still 81% above the 2007 estimate. The 2013 total abundance estimate is a small decrease (3%) from the 2011 estimate, and the 2013 estimate has a lower coefficient of variation (CV), 0.151, than the 2011 estimate. The 2013 abundance estimate for fish 27 cm and above is a decrease of 24% from the 2011 estimate, with a lower CV, 0.139, than in 2011. The 2013 abundance estimate for fish less than 27 cm is an increase of over 800% from the 2011 estimate, with a higher CV, 0.437, than in 2011. The total, 27-plus, and sub-27 abundance estimates for 2013 are a decrease of at least 39% from the 2009 estimates (Table 5).

**Table 5.** Pacific cod abundance measured in biomass (t) and numbers of fish (1000s), as assessed by the GOA bottom trawl survey. Point estimates are shown along with coefficients of variation. The two right-hand sections show the total abundance divided into fish 27 cm or larger and fish smaller than 27 cm (totals are very slightly different in the first four years due to exclusion of tows with no length data from the strata extrapolations).

Year	Biomass(t)	All lengths		27-plus		Sub-27cm		
		CV	Abundance	CV	Abundance	CV	Abundance	
1984	550,971	0.145	320,525	0.156	296,057	0.175	19,526	0.596
1987	394,987	0.129	247,020	0.185	238,165	0.234	6,772	0.374
1990	416,788	0.152	212,132	0.208	193,577	0.243	14,739	0.412
1993	409,848	0.178	231,963	0.190	214,244	0.210	17,021	0.372
1996	538,154	0.198	319,068	0.215	234,528	0.172	84,540	0.615
1999	306,413	0.126	166,584	0.112	157,019	0.118	9,565	0.272
2001	257,614	0.202	158,424	0.180	137,041	0.203	21,384	0.270
2003	297,402	0.149	159,749	0.129	153,895	0.134	5,854	0.231
2005	308,091	0.258	139,852	0.208	127,282	0.221	12,570	0.388
2007	233,310	0.138	192,025	0.175	134,261	0.163	57,764	0.425
2009	752,651	0.296	573,509	0.286	422,370	0.239	151,139	0.867
2011	500,975	0.135	348,060	0.177	339,410	0.178	8,650	0.347
2013	506,362	0.148	337,992	0.151	257,315	0.139	80,677	0.437

#### EBS NMFS SURVEY PACIFIC COD ABUNDANCES

##### Survey EBS Shelf Bottom Trawl Survey

Estimates of total abundance (both in biomass and numbers of fish) obtained from the trawl surveys are shown in Table 6, together with their respective standard errors. Upper and lower 95% confidence intervals are also shown for the biomass estimates. Survey results indicate that biomass remained relatively constant from 1982 through 1988. The highest biomass ever observed by the survey was the 1994 estimate of 1,368,120 t. Following the high observation in 1994, the survey biomass estimate declined steadily through 1998. The survey biomass estimates remained in the 596,000-619,000 t range from 2002 through 2005. However, the survey biomass estimates dropped after 2005, producing an all time low in 2008. Estimated biomass more than doubled between 2009 and 2010, and has remained within 10% of the 2010 value for the last three years.

Numerical abundance has shown more variability than biomass, with the estimates since 2007 generally well above average pre-2007 levels (with the exception of 2008, estimates since 2007 have all been at least 15% above the pre-2007 average). While still well above average, the 2013 estimate is down 24% from the 2012 estimate (which was the second highest in the time series). The 2013 total abundance estimate is a small decrease (3%) from the 2011 estimate, and the 2013 estimate has a lower coefficient of variation (CV), 0.151, than the 2011 estimate. The 2013 abundance estimate for fish 27 cm and above is a decrease of 24% from the 2011 estimate, with a lower CV, 0.139, than in 2011. The 2013 abundance estimate for fish less than 27 cm is an increase of over 800% from the 2011 estimate, with a higher CV, 0.437, than in 2011. The total, 27-plus, and sub-27 abundance estimates for 2013 are a decrease of at least 39% from the 2009 estimates.

**Table 6.** Total biomass and abundance, with standard deviations, as estimated by EBS shelf bottom trawl surveys, 1982-2013. For biomass, lower and upper 95% confidence intervals are also shown.

Year	Biomass (t)				Abundance (1000s of fish)	
	Estimate	Std. deviation	L95% CI	U95% CI	Estimate	Std. deviation
1982	1,013,061	73,621	867,292	1,158,831	583,781	38,064
1983	1,187,096	120,958	942,640	1,431,553	752,456	80,566
1984	1,048,493	63,632	922,501	1,174,484	680,883	49,913
1985	1,001,112	55,845	890,540	1,111,684	841,108	113,438
1986	1,118,006	69,626	980,146	1,255,866	838,217	83,855
1987	1,104,868	68,304	969,627	1,240,109	728,974	48,488
1988	960,962	76,961	808,579	1,113,344	507,560	35,581
1989	833,473	62,713	709,300	957,645	292,247	19,986
1990	691,256	51,455	589,376	793,136	423,835	36,466
1991	514,407	38,039	439,090	589,725	488,892	51,108
1992	551,369	45,780	460,725	642,013	601,795	70,551
1993	691,494	54,580	583,425	799,562	852,837	106,923
1994	1,368,109	250,045	868,019	1,868,200	1,237,291	153,084
1995	1,002,961	91,622	821,550	1,184,372	757,910	75,473
1996	889,366	87,521	716,076	1,062,657	607,198	88,384
1997	604,439	68,120	468,199	740,678	485,643	70,802
1998	558,510	45,182	469,050	647,970	537,342	48,429
1999	584,884	50,616	484,664	685,104	501,554	46,620
2000	531,171	43,160	445,714	616,627	483,808	44,188
2001	833,626	76,247	681,133	986,119	985,569	94,981
2002	618,680	69,082	480,516	756,845	566,471	57,676
2003	593,760	62,155	469,451	718,069	500,878	62,367
2004	596,279	35,216	526,552	666,007	424,662	36,140
2005	606,415	43,047	521,182	691,648	450,918	63,358
2006	517,698	28,341	461,583	573,813	394,051	23,784
2007	423,703	34,811	354,080	493,326	733,374	195,955
2008	403,125	26,822	350,018	456,232	476,697	49,413
2009	421,291	34,969	352,053	490,530	716,637	62,705
2010	860,210	102,307	657,642	1,062,778	887,836	117,022
2011	896,039	66,843	763,690	1,028,388	836,822	79,207
2012	890,665	100,473	689,718	1,091,612	987,973	91,589
2013	791,958	73,952	644,054	939,862	750,889	124,917

## AI NMFS Survey Biomass and Numerical Abundance

The time series of trawl survey biomass and numerical abundance are shown for Areas 541-543, together with their respective coefficients of variation, in Table 7. These estimates pertain to the Aleutian management area, and so are smaller than the estimates pertaining to the Aleutian survey area that have been reported in past BSAI Pacific cod stock assessments.

Both the biomass and numerical abundance data indicate very consistent declines throughout the time series. Simple linear regressions on both time series estimate negative slope coefficients that are significant at the 1% level. As in recent assessments of Pacific cod in the EBS, the Tier 3 models developed here use survey estimates of population size measured in units of individual fish rather than biomass. The Tier 5 models, on the other hand, use survey biomass.

**Table 7.** Total biomass and abundance, with coefficients of variation, as estimated by AI shelf bottom trawl surveys, 1991-2012.

**Biomass:**

Year	Western Aleutians (543)		Central Aleutians (542)		Eastern Aleutians (541)		Aleutian management area	
	Estimate	CV	Estimate	CV	Estimate	CV	Estimate	CV
1991	75,514	0.09	39,729	0.11	64,926	0.37	180,170	0.14
1994	23,797	0.29	51,538	0.39	78,081	0.30	153,416	0.21
1997	14,357	0.26	30,252	0.21	28,239	0.23	72,848	0.13
2000	44,261	0.42	36,456	0.27	47,117	0.22	127,834	0.18
2002	23,623	0.25	24,687	0.26	25,241	0.33	73,551	0.16
2004	9,637	0.17	20,731	0.21	51,851	0.30	82,219	0.20
2006	19,734	0.23	21,823	0.19	43,348	0.54	84,905	0.29
2010	21,341	0.41	11,207	0.26	23,277	0.22	55,826	0.19
2012	13,514	0.26	14,804	0.20	30,592	0.24	58,911	0.15

**Abundance (1000s of fish):**

Year	Western Aleutians (543)		Central Aleutians (542)		Eastern Aleutians (541)		Aleutian management area	
	Estimate	CV	Estimate	CV	Estimate	CV	Estimate	CV
1991	18,679	0.15	13,138	0.13	33,669	0.44	65,486	0.23
1994	4,491	0.24	12,425	0.20	37,284	0.44	54,201	0.31
1997	4,000	0.25	12,014	0.28	8,859	0.16	24,873	0.15
2000	13,899	0.54	10,661	0.30	18,819	0.29	43,379	0.23
2002	6,840	0.30	6,704	0.17	12,579	0.28	26,123	0.16
2004	3,220	0.17	5,755	0.17	13,040	0.24	22,016	0.15
2006	6,521	0.32	6,243	0.16	8,882	0.33	21,646	0.17
2010	5,323	0.34	5,169	0.17	9,577	0.22	20,068	0.14
2012	4,100	0.14	5,596	0.20	9,480	0.21	19,176	0.12

**2013 BS/AI and GOA SAFE Reports**

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

**FAO CCRF 7.2.1/12.2/12.3/12.5/12.6/12.7/12.17**

**FAO Eco 29-29.3**

***Evidence adequacy rating:***

**High**

**Medium**

**Low**

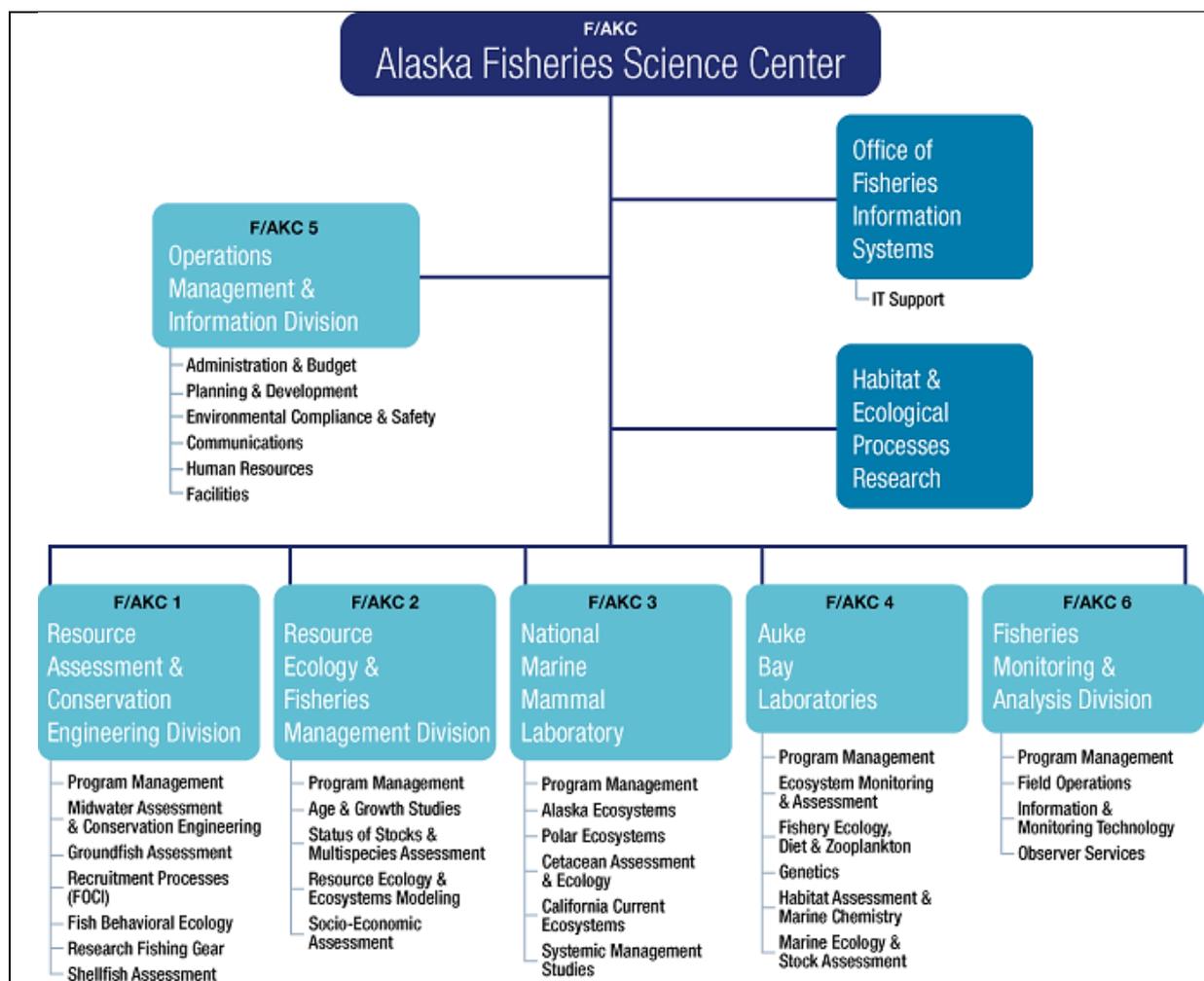
Rating determination

*Alaska ensures that appropriate research is conducted into all aspects of fisheries including biology, ecology, technology, environmental science, economics, social science, aquaculture and nutritional science (NMFS, ADFG, ASMI). The research is disseminated accordingly. Alaska also ensures the availability of research facilities and provides appropriate training, staffing and institution building to conduct the research.*

The nationally funded research into marine living resources in the North Pacific is primarily undertaken by the AFSC, although there are also a number of important research and monitoring programs undertaken by ADFG and academic institutions. The AFSC is a branch of the NMFS. The mission of the AFSC is to “*plan, develop, and manage scientific research programs which generate the best scientific data available for understanding, managing, and conserving the region's living marine resources and the environmental quality essential for their existence*”.

The staff of the AFSC, amounting to over 400, (not all working on Pacific cod) is engaged in a broad arena of science covering fishery resources, oceanography, marine mammal, and environmental research including impacts of global warming and the impact of receding ice cover in the North Pacific. Figure 5 shows the structure of the organization and the various programs that AFSC undertake.

AFSC is primarily engaged in providing scientific and technical advice for the NPFMC and state bodies such as ADFG.



**Figure 5.** AFSC structure.

Within AFSC, REFM is responsible for the provision of stock assessment. REFM scientists work as part of Plan Teams who have the primary responsibility of presenting the outcomes of stock assessments to the SSC of the NPFMC. The Age and Growth Program of the REFM division are responsible for age determination from samples taken by at-sea and shore based observers and from fishery independent surveys. In addition, the Age Determination Unit of the ADFG also provides age information for Pacific cod caught in state waters.

Specifically relating to the assessment and management of Pacific cod, the RACE division is responsible for annual groundfish surveys, develop by-catch reduction techniques to enable the commercial fisheries manage and limit catches of PSC species and other unwanted catches, assess and quantify discard mortality and to undertake research into benthic impact of commercial gears.

The Auke Bay Laboratories conducts scientific research on fish stocks, fish habitats, and the chemistry of marine environments. Information from this research is widely used by commercial interests such as fishing industries, and governmental agencies involved in managing natural resources.

The National Marine Mammal Laboratory conducts research on marine mammals, with particular

attention to issues related to marine mammals off the coasts of Oregon, Washington and Alaska. Information is provided to various U.S. governmental and international organizations to assist in developing rational and appropriate management regimes for marine resources under NOAA's jurisdiction.

The FMA division monitors groundfish fishing activities in the EEZ off Alaska and conducts research associated with sampling commercial fishery catches, estimation of catch and bycatch mortality, and analysis of fishery-dependent data. The Division is responsible for training, briefing, debriefing and oversight of observers who collect catch data on-board fishing vessels and at onshore processing plants and for quality control/quality assurance of the data provided by observers.

NOAA operates an extensive research programme into resource economics and social sciences.

The current areas of research include:

- 2010 Southeast Alaska Fisheries Economic Activity survey
- Alaska Fisheries and Global Trade
- Econometric Measurement of Fishing Capacity and Capacity Utilization
- Fishing Productivity and its Relation to Management Regimes
- Effects of Temporal Aggregation in Fishery Supply Models
- Properties of the Stochastic Distance Function and its Role in Fishery Analyses
- [Gulf of Alaska Groundfish Trawl Fishery Social Survey](#)

[http://www.afsc.noaa.gov/REFM/Socioeconomics/current\\_research.php](http://www.afsc.noaa.gov/REFM/Socioeconomics/current_research.php)

The entire data collation, analysis and assessment procedures are periodically subject to extensive external peer review through the CIE.

<http://www.fakr.noaa.gov/protectedresources/stellers/esa/biop/final/cie/about.htm>

BSAI and GOA were subject to such a review in 2011.

<ftp://ftp.afsc.noaa.gov/afsc/public/pcod/default.htm>

State management occurs from 0-3 miles from the coastline. The state of Alaska establishes seasons and GHs through the BOF process. State scientists, managers and regulators determine research priorities during annual Policy and Planning Committee (PPC) meetings. ADFG scientists conduct research associated with sampling commercial fishery catches, estimation of catch, and analysis of fishery-dependent data, and collect biological and economic data as basis for the setting of Pacific cod management objectives. ADFG also provides to Divisions of Sport Fish and Commercial Fisheries staff technical fisheries reports policies, standard and guidance (<http://www.adfg.alaska.gov/FedAidPDFs/SP12-14.pdf>).

ASMI is a public-private partnership between the State of Alaska and the Alaska seafood industry established to foster economic development of a renewable natural resource. ASMI is playing a key role in the repositioning of Alaska's seafood industry as a competitive market-driven food production industry. Its work to boost the value of Alaska's seafood product portfolio is accomplished through partnerships with retail grocers, foodservice distributors, restaurant chains,

foodservice operators, universities, culinary schools, and the media. It conducts consumer campaigns, public relations and advertising activities, and aligns with industry efforts for maximum effectiveness. ASMI also functions as a brand manager of the Alaska Seafood family of brands (<http://pressroom.alaskaseafood.org/about/>).

*Guided by MSA standards, and other legal requirements, the NMFS has a well-established institutional framework for research developed within the AFSC. Scientists at the AFSC conduct research and stock assessments on Pacific cod in Alaska each year, producing annual Stock Assessment and Fishery Evaluation (SAFE) reports for the federally managed BS, AI, and GOA Pacific cod stocks. These SAFE reports summarize the best-available science, including the fishery dependent and independent data, 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.*

The *National Standard Guidelines for Fishery Management Plans* published by the NMFS require that a stock assessment and fishery evaluation (SAFE) report be prepared and reviewed annually for each fishery management plan (FMP). To satisfy this requirement, an annual groundfish SAFE is published for both the BSAI and GOA groundfish fisheries. The SAFE reports summarize the best available scientific information concerning the past, present, and possible future condition of the groundfish stocks and their associated ecosystems. The information contained within the SAFE reports forms the basis for Council decisions on annual harvest levels, technical measures and other management actions.

The SAFE assessments are peer reviewed by experts and recommendations are made to improve the assessments through directed research. These recommendations are made by the assessment Plan Teams, the SSC, and during periodic reviews by the Center for Independent Experts (CIE). The recommendations from previous meetings are highlighted in the introductions of the assessment SAFE documents and progress on recommended research is noted accordingly. The groundfish SAFE reports are divided into sections covering individual stocks. In the case of the Pacific cod, originally the chapters were composed of the Eastern Bering Sea (EBS)/Aleutian Islands (AI), and Gulf of Alaska (GOA) stocks. However in late 2013 the EBS/AI chapter was split in two stocks.

### **Gulf of Alaska**

An age-structured model covering the period from 1977 to 2013 is used to assess Gulf of Alaska Pacific cod, and includes individuals from age 0 to age 20+. The same fundamental model structure and assumptions have been used since the 2005 assessment, although some considerable changes have been implemented (e.g. change from Stock Synthesis 1 to Stock Synthesis 2 in ADMODEL BUILDER platform). Pacific cod population dynamics are modeled using standard formulations for mortality and fishery catch. The 2013 SAFE assessment followed similar model configuration from 2012 assessment.

*Summary of changes in assessment inputs as reported in the December 2013 GOA Pacific cod SAFE.*

Fishery: 2013 total catch and catch at age update.

NMFS bottom trawl survey: 2013 biomass and length composition update.

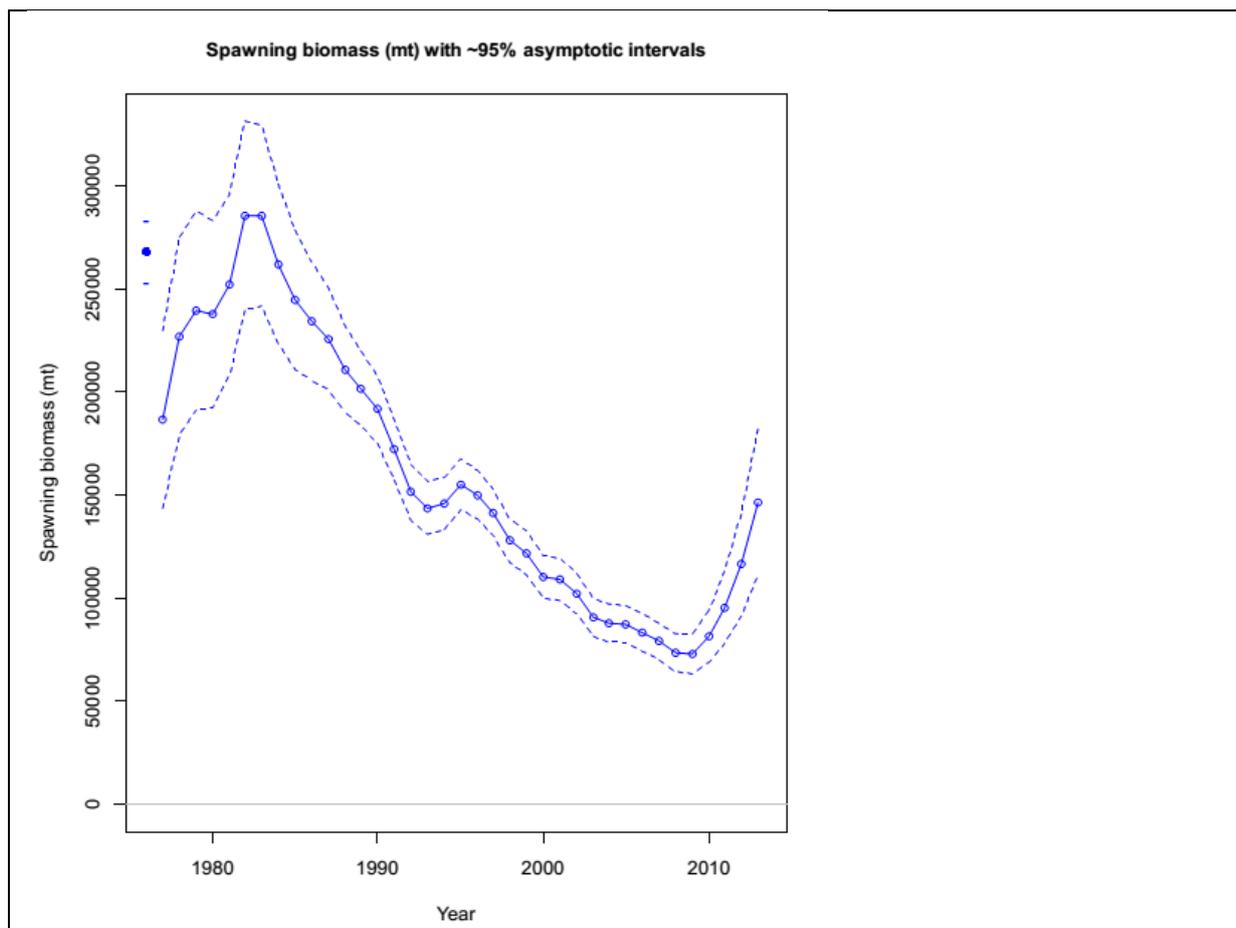
ADFG crab/groundfish trawl survey: 2013 biomass and length composition update.

*GOA Results*

The model projection of spawning biomass in 2014 was 120,100 t, which is 52% of unfished spawning biomass and above B40% (91,100 t). The 2014 ABC recommendation for Pacific cod in the Gulf of Alaska (GOA) was 88,500 t, an increase of 9.5% from the 2013 ABC. See the table below for a full summary of the GOA SAFE assessment conclusions.

**Table 8.** Results of the 2013 Stock Assessment for the GOA region.

Quantity	As estimated or specified last year:		As estimated or specified this year by the alternate model:	
	2013	2014	2014	2015
<i>M</i> (natural mortality rate)	0.38	0.38	0.38	0.38
Tier	3a	3a	3a	3a
Projected total (age 0+) biomass (t)	449,300	440,300	422,000	397,000
Female spawning biomass (t)				
Projected	111,000	112,900	120,100	111,500
Upper 95% confidence interval			142,800	132,500
Lower 95% confidence interval			97,500	90,500
<i>B</i> <sub>100%</sub>	234,800	234,800	227,800	227,800
<i>B</i> <sub>40%</sub>	93,900	93,900	91,100	91,100
<i>B</i> <sub>33%</sub>	82,100	82,100	79,700	79,700
<i>F</i> <sub>OFL</sub>	0.61	0.61	0.69	0.69
<i>maxF</i> <sub>ABC</sub>	0.49	0.49	0.54	0.54
<i>F</i> <sub>ABC</sub>	0.49	0.49	0.54	0.54
OFL (t)	97,200	101,100	107,300	101,800
maxABC (t)	80,800	84,200	88,500	84,100
ABC (t)	80,800	84,200	88,500	84,100
Status	As determined last year for:			
	2011	2012	2012	2013
Overfishing	no	n/a	no	n/a
Overfished	n/a	no	n/a	no
Approaching overfished	n/a	no	n/a	no



**Figure 6.** Time series of female spawning biomass estimates of error with 95% confidence intervals.

### Eastern Bering Sea

The EBS stock is assessed using a statistical age-structured assessment model applied over the period 1977-2013. The 2013 assessment used a similar assessment framework as the 2012 assessment.

#### *Summary of major changes in data input as reported in the Dec 2013 EBS Pacific cod SAFE*

The primary changes include:

- Catch data for 1991-2012 were updated, and preliminary catch data for 2013 were incorporated.
- Commercial fishery size composition data for 2012 were updated, and preliminary size composition data from the 2013 commercial fisheries were incorporated.
- Size composition data from the 2013 EBS shelf bottom trawl survey were incorporated.
- The numeric abundance estimate from the 2013 EBS shelf bottom trawl survey was incorporated.
- Age composition data from the 2012 EBS shelf bottom trawl survey were incorporated.

- Mean length at age data from the 2012 EBS shelf bottom trawl survey were incorporated.
- Seasonal catch per unit effort (CPUE) data for the trawl, longline, and pot fisheries from 2012 were updated, and preliminary CPUE data for the trawl, longline, and pot fisheries from 2013 were incorporated.

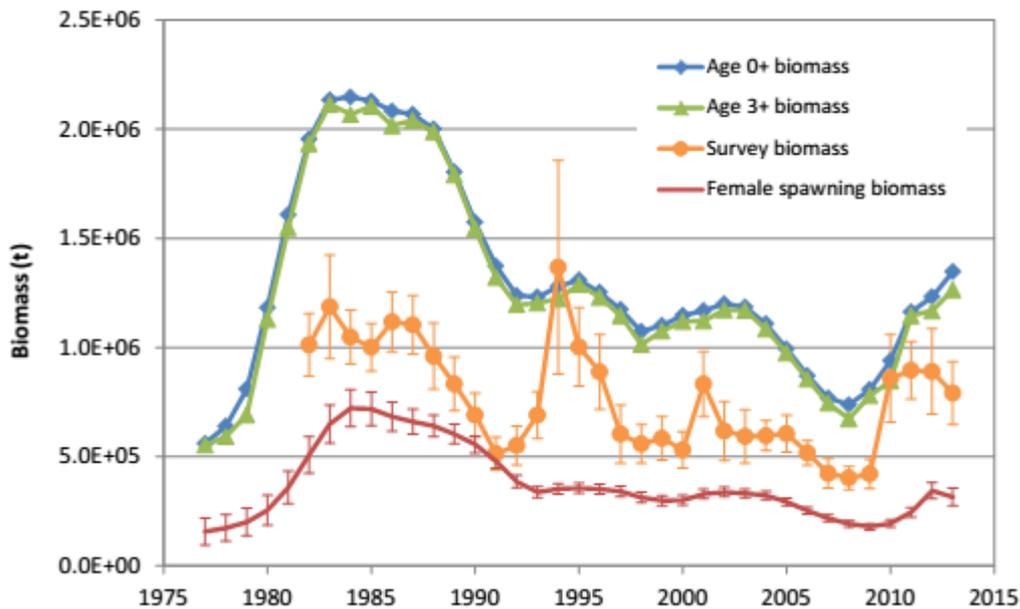
*Results*

The EBS model projection of spawning biomass in 2014 was 407,000 t, which is 45% of unfished spawning biomass and above B40% (318,000 t). The 2014 ABC recommendation for Pacific cod in the Bering sea was 255,000 t. The following table shows a summary of the model results plus harvest fishing strategies for the 2014 season.

**Table 9.** Results of the 2013 Stock Assessment for the EBS region.

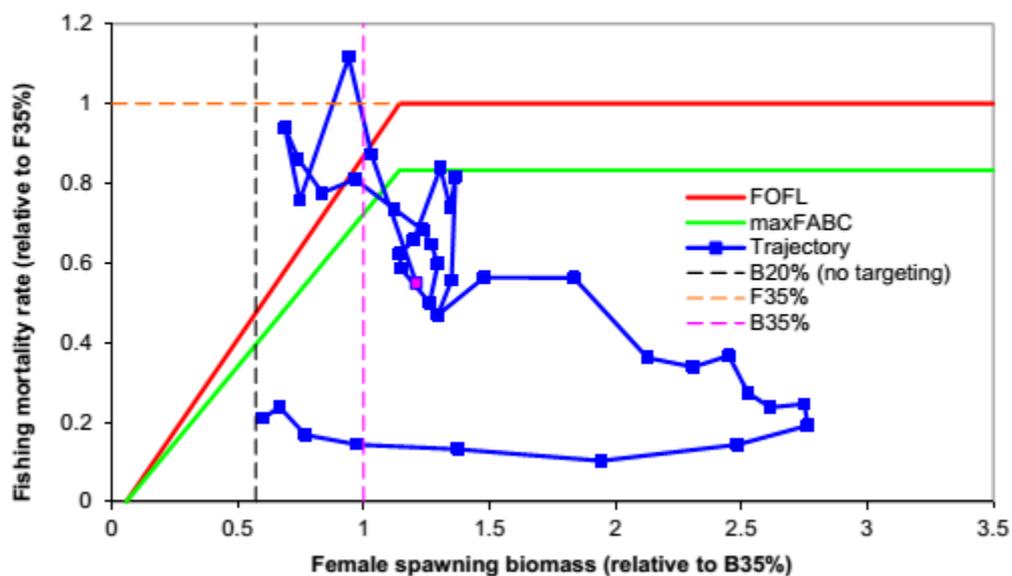
Quantity	As estimated or specified last year for:		As estimated or recommended this year for:	
	2013	2014	2014	2015
<i>M</i> (natural mortality rate)	0.34	0.34	0.34	0.34
Tier	3a	3a	3a	3a
Projected total (age 0+) biomass (t)	1,720,000	1,840,000	1,570,000	1,640,000
Female spawning biomass (t)				
Projected				
Upper 95% confidence interval	470,000	495,000	407,000	437,000
Point estimate	422,000	447,000	361,000	389,000
Lower 95% confidence interval	373,000	399,000	315,000	341,000
<i>B</i> <sub>100%</sub>	896,000	896,000	796,000	796,000
<i>B</i> <sub>40%</sub>	358,000	358,000	318,000	318,000
<i>B</i> <sub>35%</sub>	314,000	314,000	279,000	279,000
<i>F</i> <sub>OFL</sub>	0.34	0.34	0.34	0.34
<i>maxF</i> <sub>ABC</sub>	0.29	0.29	0.28	0.28
<i>F</i> <sub>ABC</sub>	0.29	0.29	0.28	0.28
OFL (t)	359,000	379,000	299,000	319,000
maxABC (t)	307,000	323,000	255,000	272,000
ABC (t)	307,000	323,000	255,000	272,000
Status	As determined last year for:		As determined this year for:	
	2011	2012	2012	2013
Overfishing	No	n/a	No	n/a
Overfished	n/a	No	n/a	No
Approaching overfished	n/a	No	n/a	No

Time series of BS age 0+, age 3+, and female spawning biomass estimates from the model are shown, together with the observed time series of trawl survey biomass, in Figure 7 below.



**Figure 7.** Time series of age 0+, age 3+, and female spawning biomass as estimated by the assessment model. Survey biomass is shown for comparison.

Figure 8 shows the trend in estimates of fishing mortality and female spawning biomass from 1977 through 2013 based on full-selection fishing mortality, along with the current harvest control rules (fishing mortality rates in the figure are standardized relative to  $F_{35\%}$  and biomasses are standardized relative to  $B_{35\%}$ , per SSC request). Approximately the entire trend lies below the *maxFABC* control rule.



**Figure 8.** Trajectory of Pacific cod fishing mortality and female spawning biomass as estimated by the stock assessment model, 1977-present (magenta square = 2013).

### Aleutian Islands

In late 2013, the BSAI Pacific cod SAFE was split into the eastern Bering Sea (EBS) stock and the Aleutian Islands (AI). Thus, separate harvest specifications were set for the EBS and AI Pacific cod stocks beginning with the 2014 fishery. Comments from the Plan Team and SSC (JPT4 and SSC2) were addressed in the assessment. Models were developed using tier 3 and 5 criteria.

#### Tier 3 Models

Two-Tier 3 models were conducted in this assessment, both of which are estimated using Stock Synthesis.

These models differ from the original EBS/AI model in several aspects.

- In the data file, length size class are extended out to 150 cm instead of 120 cm, because there were larger fish surveyed in the AI.
- Each year had one single season instead of five.
- A single fishery was defined instead of nine season-and-gear-specific fisheries.
- The surveys collect age 1 fish at true age of 1.5 instead of 1.41667.
- Estimates of initial abundances are calculated for the first ten age groups instead of the first three.
- Random walk modelling with respect to age is used to model selectivity for both the fishery and survey instead of the usual double normal (SS selectivity-at-age pattern )

Another difference from the EBS model is that the following quantities are tuned iteratively in the two-tier 3 models:

- Size and age structure input sample sizes are tuned so that the harmonic mean effective sample size is approximately as large as the arithmetic mean input sample size.
- Normal prior distribution parameters for each selectivity pattern are tuned so that the prior mean is consistent with logistic selectivity and the prior standard deviation is consistent with any departures from logistic selectivity.
- Selectivity parameter can be time-varying with annual additive deviations; therefore, the sigma term is tuned to match the standard deviation of the estimated deviations.

#### *Tier 5 Models*

Two-Tier 5 models were also explored in this assessment:

- The Kalman filter model that has been used previously to estimate the expansion factor for converting results from the EBS Pacific cod model into BSAI equivalents.
- The random effects model recommended by the Survey Averaging Working Group ([http://www.afsc.noaa.gov/REFM/stocks/Plan\\_Team/2013/Sept/SAWG\\_2013\\_draft.pdf](http://www.afsc.noaa.gov/REFM/stocks/Plan_Team/2013/Sept/SAWG_2013_draft.pdf)).
- These are state-space “random walk” models. Both models have a parameter that consists of the variance of the process errors.
- In the Kalman filter, this parameter consists of the process error standard deviation, and in the random effects model, it is the log of the process error coefficient of variation (CV).
- Both models need natural mortality rate estimates to implement Tier 5 harvest control rules.
- The Tier 5 models use the survey biomass time series as the only data, but, because they are state-space models, they incorporate both process error and observation error in the likelihood.

#### ***Selection of Final Model***

The following selection criteria were used to compare model performance prior to selecting the final model for harvest strategy recommendations:

1. Has the model been sufficiently reviewed?
2. Does the model fit the data sufficiently well?
3. Are the quantities estimated by the model reasonable?
4. Is there an immediate need to move to an age-structured model?

#### **Results of model comparisons**

Both models were sufficiently reviewed in several SSC meetings and workshops. However, results showed that the models for Tier 5 fitted the survey data better than the models for the Tier 3. Also the biomass estimates from Tier 5 models were more plausible than the ones from Tier 3. Based on these results, the authors recommended the random effects model in Tier 5 for harvest strategies. If the SSC determines that the estimates of 2014-15 spawning biomass and the Tier 3 reference points from either of the Tier 3 models are all reliable, then AI Pacific cod will be managed under Tier 3. If

the SSC determines that neither of the Tier 3 models produces reliable estimates of all of these quantities, then AI Pacific cod will be managed under Tier 5.

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% <  $(B/B40\% - 0.05) \times 1/0.95$*

*FABC < F40% <  $(B/B40\% - 0.05) \times 1/0.95$*

*3c) Stock status:  $B/B40\% < 0.05$*

*FOFL = 0*

*FABC = 0*

The following formulae apply under Tier 5:

*FOFL = M*

*FABC < 0.75M*

Estimates of projected biomass and all Tier 3 and Tier 5 reference points are shown for the respective models in Table 10. As shown in Table 10, Tier 3 models project that female spawning biomass will be below *B40%* in both 2014 and 2015. Thus, if either of those models is accepted for use in setting harvest specifications, harvest specifications for AI Pacific cod will be based on sub-tier "b" of Tier 3 for both 2014 and 2015.

**Table 10.** Summary of key management reference points. Tier 3 values come from the standard projection algorithm (except the last seven rows, which come from SS). All biomass figures are in t. Color scale extends from red (low) to green (high) in each row.

Quantity	Tier 3		Tier 5	
	Model 1	Model 2	KF	RE
B100%	115,000	89,500	n/a	n/a
B40%	46,100	35,800	n/a	n/a
B35%	40,300	31,300	n/a	n/a
B(2014)	33,900	31,800	58,800	59,000
B(2015)	31,200	29,000	58,800	59,000
B(2014)/B100%	0.29	0.36	n/a	n/a
B(2015)/B100%	0.27	0.32	n/a	n/a
F40%	0.23	0.37	n/a	n/a
F35%	0.28	0.45	n/a	n/a
maxFABC(2014)	0.17	0.16	0.26	0.26
maxFABC(2015)	0.15	0.14	0.26	0.26
maxABC(2014)	13,500	17,400	15,000	15,100
maxABC(2015)	12,000	15,200	15,000	15,100
FOFL(2014)	0.17	0.20	0.34	0.34
FOFL(2015)	0.16	0.18	0.34	0.34
OFL(2014)	15,800	20,700	20,000	20,100
OFL(2015)	14,100	18,000	20,000	20,100
Pr(maxABC(2014)>truOFL(2014))	0.28	0.28	n/a	n/a
Pr(maxABC(2015)>truOFL(2015))	0.32	0.32	n/a	n/a
Pr(B(2014)<B20%)	0.05	0.01	n/a	n/a
Pr(B(2015)<B20%)	0.07	0.01	n/a	n/a
Pr(B(2016)<B20%)	0.03	0.00	n/a	n/a
Pr(B(2017)<B20%)	0.00	0.00	n/a	n/a
Pr(B(2018)<B20%)	0.00	0.00	n/a	n/a

For the authors' recommended model (Tier 5, random effects), the estimates are as follow:

Year 2014 2015,

OFL (t) 20,100 20,100,

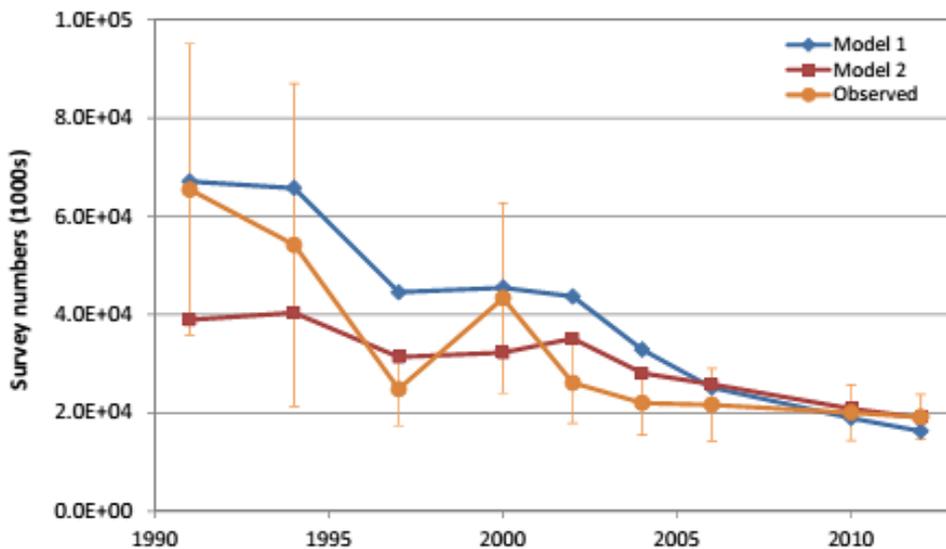
maxABC (t) 15,100 15,100,

FOFL 0.34 0.34

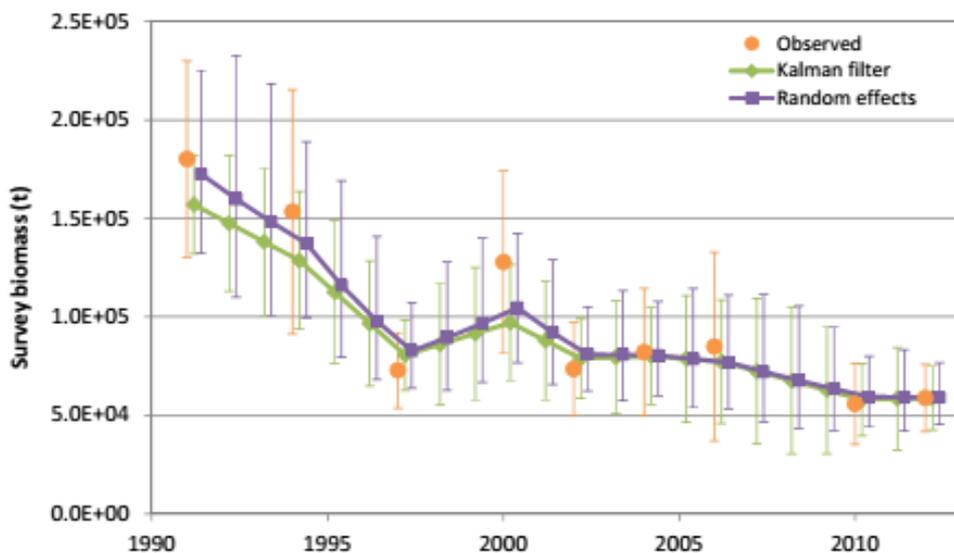
maxFABC 0.26 0.26

### Spawning Biomass Trajectory

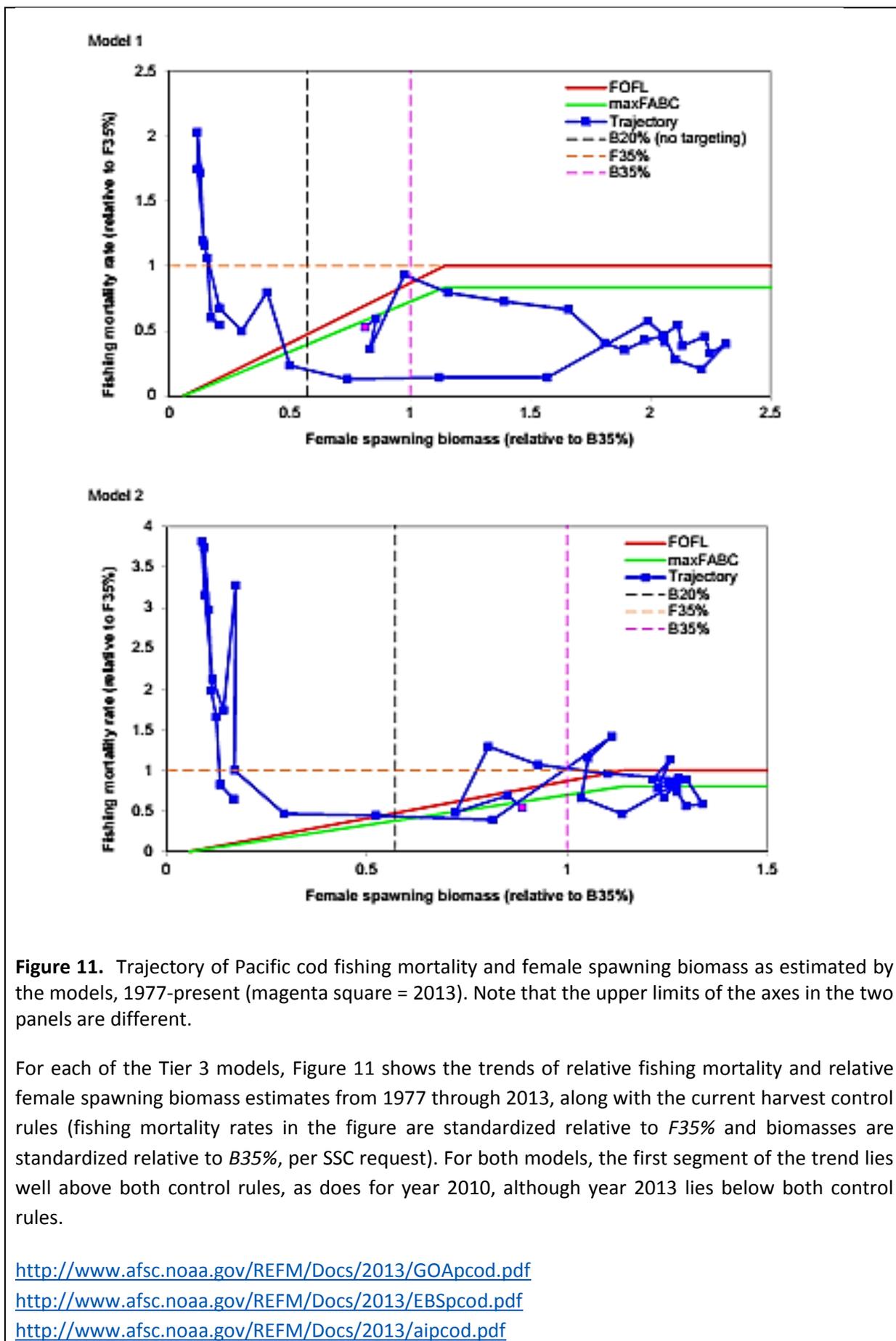
The time series of female spawning biomass as estimated by the Tier 3 models are shown, together with the observed time series of trawl survey biomass, in Figure 9.



**Figure 9.** Tier 3 model fits to the survey abundance time series, with 95% confidence intervals for the observations.



**Figure 10.** Tier 5 model fits to the survey biomass time series, with 95% confidence intervals for the observations and estimates. Horizontal axis values have been offset to avoid over-plotting.





(3)	<i>Information available: Reliable point estimates of <math>B_{40\%}</math>, <math>F_{30\%}</math>, and <math>F_{40\%}</math>.</i>
3a)	<i>Stock status: <math>B/B_{40\%} &gt; 1</math></i> $F_{OFL} = F_{30\%}$ $F_{ABC} \leq F_{40\%}$
3b)	<i>Stock status: <math>a &lt; B/B_{40\%} \leq 1</math></i> $F_{OFL} = F_{30\%} \times (B/B_{40\%} - a)/(1 - a)$ $F_{ABC} \leq F_{40\%} \times (B/B_{40\%} - a)/(1 - a)$
3c)	<i>Stock status: <math>B/B_{40\%} \leq a</math></i> $F_{OFL} = 0$ $F_{ABC} = 0$
(4)	<i>Information available: Reliable point estimates of <math>B_{30\%}</math>, and <math>F_{40\%}</math>.</i> $F_{OFL} = F_{30\%}$ $F_{ABC} \leq F_{40\%}$
(5)	<i>Information available: Reliable point estimates of <math>B</math> and natural mortality rate <math>M</math>.</i> $F_{OFL} = M$ $F_{ABC} \leq 0.75 \times M$
(6)	<i>Information available: Reliable catch history from 1978 through 1995.</i> $OFL = \text{the average catch from 1978 through 1995, unless an alternative value is established by the SSC on the basis of the best available scientific information}$ $ABC \leq 0.75 \times OFL$

**Figure 12.** Tier used to determine ABC and OFL for groundfish stocks.

In general terms, the harvest control rules become progressively precautionary with increasing tier classification and catch options are automatically adjusted depending on the status of stocks relative to  $B_{msy}$  or the biomass  $B_{x\%}$  corresponding to the percentage of the equilibrium spawning biomass that would be obtained in the absence of fishing (Tier 1-2; 3).

For Pacific cod, there are no reliable estimates of  $MSY$ , but reliable estimates of reference points relative to spawning per recruit are:  $B_{40\%}$  which equates to 40% of the equilibrium spawning biomass that would be obtained in the absence of fishing and  $F_{35\%}/F_{40\%}$  the fishing mortality rate that reduces the equilibrium level of spawning per recruit to 35%/40% of the level that would be obtained in the absence of any fishing. This places both BSAI and GOA Pacific cod into Tier 3. The suitability of these proxies has been the subject of considerable research (Clark 1991, Restrepo 1999).

#### Evidence

<http://www.afsc.noaa.gov/REFM/Docs/2013/GOApcod.pdf>

<http://www.afsc.noaa.gov/REFM/Docs/2013/EBSpcod.pdf>

<http://www.afsc.noaa.gov/REFM/Docs/2013/aipcod.pdf>

#### EBS Pacific cod

The 2014 EBS Pacific cod spawning biomass was projected by the 2013 SAFE to be 361,000 t which is above the  $B_{40\%}$  (the  $B_{MSY}$  proxy in tier 3 stocks) of 318,000 t. This places the stock into Tier 3a.

**AI Pacific cod**

The 2014 AI Pacific cod spawning biomass projected by the 2013 SAFE for the two models, were 33,900 and 31,500 tonnes which is below  $B_{40\%}$  (the  $B_{MSY}$  proxy in tier 3 stocks). This places the stock into Tier 3b.

**GOA Pacific cod stock**

The 2014 GOA Pacific cod spawning biomass was projected by the 2013 SAFE to be 120,000, which is above  $B_{40\%}$  of 91,900t. This places the stock into Tier 3a.

**Overfishing and overfished determinations.**

**Neither of the EBS, AI, or GOA Pacific cod management units is considered overfished or undergoing overfishing.** For each stock and stock complex, a determination of status with respect to “overfishing” is made in-season as the fisheries are monitored to prevent exceeding the TAC and annually as follows: If the catch taken during the most recent calendar year exceeded the OFL that was specified for that year, then overfishing occurred during that year; otherwise, overfishing did not occur during that year. In the event that overfishing is determined to have occurred, a remedial action will result. This may be an in season action, an FMP amendment, a regulatory amendment or a combination of these actions implemented to end such overfishing immediately.

A stock or stock complex is determined to be “overfished” if it falls below the MSST. According to the National Standard Guidelines definition, the MSST equals whichever of the following is greater: One-half the MSY stock size, or the minimum stock size at which rebuilding to the MSY level would be expected to occur within 10 years, if the stock or stock complex were exploited at the MFMT. 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  $F_{OFL}$  and  $F_{MSY}$  that will rebuild the stock within an appropriate time frame.

The “approaching overfished” determination is made by projecting the numbers-at-age vector from the current year forward two years under the assumption that the stock will be fished at maxFABC in each of those years, then determining whether the stock would be considered “overfished” at that time. In the event that a stock or stock complex is determined to be approaching a condition of being overfished, a remedial action will result. This may be an inseason action, an FMP amendment, a regulatory amendment or a combination of these actions implemented to prevent overfishing from occurring.

**Evidence**

<http://www.afsc.noaa.gov/REFM/Docs/2013/GOApcod.pdf>

<http://www.afsc.noaa.gov/REFM/Docs/2013/EBSpcod.pdf>

<http://www.afsc.noaa.gov/REFM/Docs/2013/aipcod.pdf>

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

**FAO CCRF 7.5.1/7.5.4/7.5.5  
FAO ECO 29.6/32**

**Evidence adequacy rating:**

**High**

**Medium**

**Low**

*When new uncertainties arise, research recommendations are made and there is accountability in subsequent years to follow up on related action items. However, these uncertainties do not lead to a postponement for providing advice, in all cases precaution is the rule.*

In Alaska waters, Pacific cod fisheries are managed separately. In the Bering Sea, Aleutian Islands, and Gulf of Alaska Pacific cod are managed under groundfish fishery management plans. All these fishery management plans includes the precautionary approach on the management principles and determination of stock status. Following is an example of BSAI FMP that contains management procedures according the precautionary example. This is also included on the GOA FMP

**Management Approach for the BSAI Groundfish Fisheries**

The Council's policy is to apply judicious and responsible fisheries management practices, based on sound scientific research and analysis, proactively rather than reactively, to ensure the sustainability of fishery resources and associated ecosystems for the benefit of future, as well as current generations. The productivity of the North Pacific ecosystem is acknowledged to be among the highest in the world. For the past 25 years, the Council management approach has incorporated forward looking conservation measures that address differing levels of uncertainty. This management approach has in recent years been labeled the precautionary approach. Recognizing that potential changes in productivity may be caused by fluctuations in natural oceanographic conditions, fisheries, and other, non-fishing activities, the Council intends to continue to take appropriate measures to insure the continued sustainability of the managed species. It will carry out this objective by considering reasonable, adaptive management measures, as described in the Magnuson-Stevens Act and in conformance with the National Standards, the Endangered Species Act (ESA), the National Environmental Policy Act, and other applicable law. This management approach takes into account the National Academy of Science's recommendations on Sustainable Fisheries Policy.

As part of its policy, the Council intends to consider and adopt, as appropriate, measures that accelerate the Council's precautionary, adaptive management approach through community-based or rights-based management, ecosystem-based management principles that protect managed species from overfishing, and where appropriate and practicable, increase habitat protection and bycatch constraints. All management measures will be based on the best scientific information available. Given this intent, the fishery management goal is to provide sound

conservation of the living marine resources; provide socially and economically viable fisheries for the well-being of fishing communities; minimize human-caused threats to protected species; maintain a healthy marine resource habitat; and incorporate ecosystem-based considerations into management decisions.

This management approach recognizes the need to balance many competing uses of marine resources and different social and economic goals for sustainable fishery management, including protection of the long-term health of the resource and the optimization of yield. This policy will use and improve upon the Council's existing open and transparent process of public involvement in decision-making.

#### Status Determinations

To the extent practicable, two status determinations are made annually for each stock and stock complex. The first is the "overfishing" status, which describes whether *catch* is too *high*. The second is the "overfished" status, which describes whether *biomass* is too *low*.

#### Determination of "Overfishing" Status

The OFL for a given calendar year is specified at the end of the preceding calendar year on the basis of the most recent stock assessment. For each stock and stock complex, a determination of status with respect to "overfishing" is made inseason as the fisheries are monitored to prevent exceeding the TAC and annually as follows: If the catch taken during the most recent calendar year exceeded the OFL that was specified for that year, then overfishing occurred during that year; otherwise, overfishing did not occur during that year.

In the event that overfishing is determined to have occurred, an inseason action, an FMP amendment, a regulatory amendment or a combination of these actions will be implemented to end such overfishing immediately.

#### Determination of "Overfished" Status

A stock or stock complex is determined to be "overfished" if it falls below the MSST. According to the National Standard Guidelines definition, the MSST equals whichever of the following is greater: One-half the MSY stock size, or the minimum stock size at which rebuilding to the MSY level would be expected to occur within 10 years, if the stock or stock complex were exploited at the MFMT.

The above definition raises two questions: 1) How is the definition to be applied when "the MSY level" cannot be estimated? 2) In the context of an age-structured assessment, what is the meaning of the phrase, "the minimum stock size at which rebuilding to the MSY level would be expected to occur within 10 years?" These questions are addressed in this FMP as follows:

1) Direct estimates of  $B_{MSY}$  (i.e., "the MSY level") are available for Tiers 1 and 2. For Tier 3, no direct

estimate of  $B_{MSY}$  is available, but  $B_{35\%}$  is used as a proxy for  $B_{MSY}$ . For Tiers 4-6, neither direct estimates of  $B_{MSY}$  nor reliable estimates of  $B_{MSY}$  proxies are available. Therefore, the “overfished” status of stocks and stock complexes managed under Tiers 4-6 is *undefined*.

2) For a stock assessed with an age-structured model (as is typically the case for stocks and stock complexes managed under Tiers 1-3), there is more than one stock size or numbers-at-age vector at which rebuilding to the MSY level would be expected to occur in exactly 10 years. Generally, there is no limit to the range of numbers-at-age vectors that satisfy this constraint, and each of these vectors corresponds to a stock size. Therefore, stock status in Tiers 1-3 is determined annually as follows: The determination of “overfished” status begins with an estimate of the stock’s “current spawning biomass,” which is defined as the estimated spawning biomass for the “current year,” which in turn is defined as the most recent year from which data are used in the assessment. Given these definitions, and with the understanding that  $B_{35\%}$  is used as a proxy for  $B_{MSY}$  in Tier 3, the determination proceeds as follows:

a. If current spawning biomass is estimated to be below  $\frac{1}{2} B_{MSY}$ , the stock is below its MSST. b. If current spawning biomass is estimated to be above  $B_{MSY}$  the stock is above its MSST.

c. If current spawning biomass is estimated to be above  $\frac{1}{2} B_{MSY}$  but below  $B_{MSY}$ , then conduct a large number of stochastic simulations by projecting the numbers-at-age vector from the current year forward under the assumption that it will be fished at the MFMT in every year, and determine status as follows:

1. If the mean spawning biomass in the 10<sup>th</sup> year beyond the current year is below  $B_{MSY}$ , the stock is below its MSST.

2. Otherwise, the stock is above its MSST.

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  $F_{ofl}$  and  $F_{msy}$  that will rebuild the stock within an appropriate time frame.

The Magnuson-Stevens Act also requires identification of any fisheries that are “approaching a condition of being overfished,” which is defined as a determination that the fishery “will become overfished within two years.” The “approaching overfished” determination is made by projecting the numbers-at-age vector from the current year forward two years under the assumption that the stock will be fished at  $maxF_{ABC}$  in each of those years, then determining whether the stock would be considered “overfished” at that time. In more detail, the determination proceeds as follows:

a. If the mean spawning biomass for two years beyond the current year is below  $\frac{1}{2} B_{MSY}$ , the stock is approaching an overfished condition.

b. If the mean spawning biomass for two years beyond the current year is above  $B_{MSY}$ , the stock is not approaching an overfished condition.

c. If the mean spawning biomass for two years beyond the current year is above  $\frac{1}{2} B_{MSY}$  but below  $B_{MSY}$ , then conduct a large number of stochastic simulations by projecting the numbers-at-age vector from the current year forward under the assumption that it will be fished at  $maxF_{ABC}$  for two years, then at the MFMT for ten years, and determine status as follows:

1. If the mean spawning biomass in the 11<sup>th</sup> year beyond the current year is below  $B_{MSY}$ , the stock is approaching an overfished condition.
2. Otherwise, the stock is not approaching an overfished condition.

In the event that a stock or stock complex is determined to be approaching a condition of being overfished, an inseason action, an FMP amendment, a regulatory amendment or a combination of these actions will be implemented to prevent overfishing from occurring.

### **Harvest Guidelines**

#### **Fishery in the state waters of Alaska**

The Pacific cod fishery occurring in the state waters of Alaska is managed by the Alaska Department of Fish and Game (ADF&G). There are a number of management areas within the state waters of Alaska, and some regulations vary by region. The three areas managed by ADF&G are the Southeast Region (Eastern GOA/Southeast Alaska), Central Region (Cook Inlet/Prince William Sound/Central GOA), and the Westward Region (Alaska Peninsula/Kodiak/Western GOA). Management measures implemented in state waters (not specific to management area) include a guideline harvest of 750,000 – 1.25 million pounds round weight in the Southern and Northern Southeast Inside Subdistricts, and gear restrictions depending on the management region and logbook requirements.

#### **U.S. fisheries in federal waters**

In the BSAI, Pacific cod is managed by the North Pacific Fishery Management Council (NPFMC) under the Fishery Management Plan for the Bering Sea/Aleutian Islands Groundfish. The BSAI Groundfish Plan Team recommends the acceptable biological catch (ABC) and overfishing level (OFL) levels, which the Science and Statistical Committee may agree with, or make its own recommendations. The Science and Statistical Committee is part of the NPFMC. The NPFMC then determines the TAC based on these recommendations (NPFMC 2004). In the BSAI, overall catch of all species cannot exceed 2 million mt. The BSAI TAC is allocated by gear type, with the fixed gear fishery (longlines and pots), trawl fishery, and jig fishery receiving 51%, 47%, and 2% of the TAC, respectively (Thompson and Dorn 2004). The TAC may be reallocated at the end of the year if a particular gear type is unlikely to catch their specified share (Thompson and Dorn 2004).

Pacific cod in the GOA is managed by the North Pacific Fishery Management Council under the Fishery Management Plan for Groundfish of the Gulf of Alaska. The GOA TAC is allocated by area, processor component (90% to the inshore component and 10% to the offshore component), and season (Thompson et al. 2004). State management of the Pacific cod fishery also affects the TAC, as

some of these overages in the past have been due to take in the state fishery, with the quota being adjusted accordingly.

The BSAI and GOA longline fleets have been required to use some form of bird deterrent device since 1997 (62 FR 23176, April 29, 1997). Recently, management has implemented additional mandatory bycatch reduction measures, such as towing a buoy, and use of single or paired streamers depending on the size of the longline fishing vessel (69 FR 1930, January 13, 2004). Paired streamers have been shown to be the most effective seabird bycatch reduction device for the Alaskan longline fleet, while single streamers do not eliminate the risk of hooking albatrosses (Melvin et al. 2001). Since 1997, the observed takes of all seabird species has declined, suggesting that management's bycatch reduction measures are effective.

The NPFMC has implemented numerous closed areas to protect both EFH and HAPCs; a total area of 310,500 km<sup>2</sup> has been closed to bottom trawls in the federal waters off Alaska (NRC 2002). These closures have been implemented to protect diverse habitat and species from trawling (DiCosimo 1999).

In addition, there are five haulouts in the Bering Sea for which no fishing is permitted within the 0 – 20 nm zone (NMFS 2003). In the Bering Sea, there is also no trawling permitted within 0 – 10 nm of all rookeries and haulouts, and no fishing with any gear type permitted within 0 – 3 nm of all rookeries and haulouts (with the exception of jig gear, which is permitted in the 0 – 3 nm closures around haulouts) (NMFS 2003).

The Pacific cod fishery in the BSAI and GOA is regulated by a permitting system, limited entry, quotas, mandatory observer coverage (100% on large vessels), and reporting requirements. In addition, the Community Development Quota (CDQ) in western Alaska allocates 7.5% of the Pacific cod catch to coastal Alaskan communities.

Most of the Pacific Cod catch is taken with bottom and pelagic trawls and longline gear (NMFS, 2004), but pot and jig gear are also used. In the Bering Sea/Aleutian Islands region, TAC (Total Allowable Catch) is allocated by gear type. Forty-seven percent is allocated to trawl fisheries, 51% is allocated to fixed gear fisheries (i.e., longline and pots), and 2% to jig fisheries. In the Gulf of Alaska region, there are no specific allocations by gear type (NMFS, 2004).

#### **Evidence**

<http://www.npfmc.org/wp-content/PDFdocuments/fmp/BSAI/BSAIfmp.pdf>

[http://www.seafoodwatch.org/cr/cr\\_seafoodwatch/content/media/mba\\_seafoodwatch\\_pacificcodreport.pdf](http://www.seafoodwatch.org/cr/cr_seafoodwatch/content/media/mba_seafoodwatch_pacificcodreport.pdf)

## D. Management Measures

8. Management shall adopt and implement effective measures including; harvest control rules and technical measures applicable to sustainable utilization of the fishery and based upon verifiable evidence and advice from available scientific and objective, traditional sources.

FAO CCRF 7.1.1/7.1.2/7.1.6/7.4.1/7.6.1/7.6.9/12.3

FAO Eco 29.2/29.4/30

Evidence adequacy rating:

High

Medium

Low

### Rating determination

*Alaska Pacific cod commercial fisheries are managed according to a modern management plan that attempts to balance long-term sustainability of the resources with optimum utilization. For every change/amendment or new development affecting fisheries management and therefore modifying the FMPs, there is an evaluation of alternative conservation and management measures, including considerations of their cost effectiveness and social impact.*

Conservation and management measures are outlined in the BSAI and GOA FMPs for Groundfish. Along with yearly stock assessment surveys and reports (SAFEs), evaluation of the fisheries stock status, determination of OFL (consistent with MSY), ABC, ACL and TAC accounting for scientific uncertainty and variability and precision in catch control (see explanatory figure below), part of the assessment procedure is an extensive ecosystem assessment that shows development towards ecosystem-based management.

The management is intended to conform to the *National Standards for Fishery Conservation and Management* according to the MSA. Within this framework the groundfish fishery has 46 clear management objectives falling under the following objectives:

- *Prevent Overfishing;*
- *Promote Sustainable Fisheries and Communities;*
- *Preserve Food Web;*
- *Manage Incidental Catch and Reduce Bycatch and Waste;*
- *Avoid Impacts to Seabirds and Marine Mammals;*
- *Reduce and Avoid Impacts to Habitat;*
- *Promote Equitable and Efficient Use of Fishery Resources;*
- *Increase Alaska Native Consultation.*

### Determining Harvest Levels

The management uses several reference points that are summarized and discussed in the FMPs.

- *Maximum sustainable yield (MSY)* is the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental

conditions fishery technological characteristics (e.g., gear selectivity), and distribution of catch among fleets.

- *Optimum yield (OY)* is the amount of fish which a) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems; b) is prescribed as such on the basis of the MSY from the fishery, as reduced by any relevant economic, social, or ecological factor; and c) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the MSY in such fishery.
- *Maximum fishing mortality threshold (MFMT, also called the "OFL control rule")* is the level of fishing mortality (F), on an annual basis, used to compute the smallest annual level of catch that would constitute overfishing. Overfishing occurs whenever a stock or stock complex is subjected to a level of fishing mortality or annual total catch that jeopardizes the capacity of a stock or stock complex to produce MSY on a continuing basis. The MFMT may be expressed either as a single number (i.e., a fishing mortality rate or F value), or as a function of spawning biomass or other measure of reproductive potential.
- *Overfishing limit (OFL)* is the annual amount of catch that results from applying the MFMT to a stock or stock complex's abundance. The OFL is the catch level above which overfishing is occurring.
- *Minimum stock size threshold (MSST)* is the level of biomass below which the stock or stock complex is considered to be overfished. To the extent possible, the MSST should equal whichever of the following is greater: One-half the MSY stock size, or the minimum stock size at which rebuilding to the MSY level would be expected to occur within 10 years, if the stock or stock complex were exploited at the MFMT.
- *Acceptable biological catch (ABC)* is a level of a stock or stock complex's annual catch that accounts for the scientific uncertainty in the estimate of OFL and any other scientific uncertainty. The ABC is set below the OFL.
- *Annual catch limit (ACL)* is the level of annual catch of a stock or stock complex that serves as the basis for invoking accountability measures. ACL cannot exceed the ABC, and may be divided into sector- ACLs.
- *Total allowable catch (TAC)* is the annual catch target for a stock or stock complex, derived from the ABC by considering social and economic factors and management uncertainty (i.e., uncertainty in the ability of managers to constrain catch so the ACL is not exceeded, and uncertainty in quantifying the true catch amount). The TAC is also constrained by the BSAI and GOA Optimum Yield cap.

Management measures in the FMPs include (i) permit and participation, (ii) authorized gear, (iii) time and area, and catch restrictions, (iv) measures that allow flexible management authority, (v) designate monitoring and reporting requirements for the fisheries, and (vi) describe the schedule and procedures for review of the FMP or FMP component.

For every change/amendment or new development affecting fisheries management and therefore modifying the FMPs, there is an evaluation of alternative conservation and management measures, including considerations of their cost effectiveness and social impact. The Regulatory Flexibility Act (RFA) requires agencies (NPFMC, ADFG) to consider the impact of their rules (Fishery Management

Plans, Fishing Regulations) on small entities (fishermen communities) and to evaluate alternatives that would accomplish the objectives of the rule without unduly burdening small entities when the rules impose a significant economic impact on a substantial number of small entities.

In August 2000, the NMFS issued guidelines for economic analysis of Fishery Management Actions. The purpose of the document was to provide guidance on understanding and meeting the procedural and analytical requirements of E.O. 12866 and the RFA for regulatory actions of federally managed fisheries. [http://www.epa.gov/fedfac/documents/executive\\_order\\_12898.htm](http://www.epa.gov/fedfac/documents/executive_order_12898.htm)

Economic and social analysis is part of the NEPA (essentially an environmental impact assessment) requirements, of which the NPFMC and NMFS consistently adhere and comply with. A recent change affecting Pacific cod fisheries in Alaska is the restructuring and implementation (Jan 2013) of the groundfish observer program.

<http://www.fakr.noaa.gov/sustainablefisheries/amds/default.htm>  
[http://ceq.hss.doe.gov/nepa\\_contacts/agency\\_implementing\\_procedures.html](http://ceq.hss.doe.gov/nepa_contacts/agency_implementing_procedures.html)

In addition to the federal FMPs, regulations for 6 of the 7 state-managed fisheries are set out in annual region-specific FMPs (regulations for parallel fisheries in state waters are generally identical to federal regulations). The board uses the biological and socio-economic information provided by ADFG, public comment received from inside and outside the state, as well as guidance from the Alaska Department of Public Safety and the Alaska Department of Law when creating regulations that are sound and enforceable. These exist for Kodiak, South Alaska Peninsula, Chignik, the Aleutian Islands, Cook Inlet and Prince William Sound and Dutch Harbor. The state fisheries are managed by allocation of a portion of the federal TAC to the state fishery (depending on biomass abundance in the various areas). Overall, state managed fisheries removals are eventually accounted for by ACL.

### **Management**

Pacific cod fisheries in Alaska are managed by both the federal and state governments (Woodby et al 2004). The federally-managed fisheries for Pacific cod occur in both the Gulf of Alaska and Bering Sea/Aleutian Islands, with the bulk of the Gulf catch coming from the Central regulatory area (Thompson et al. 2003), and most of the BSAI catch coming from the eastern Bering Sea (EBS; Thompson and Dorn 2003). Parallel fisheries for Pacific cod occur in state waters at the same time as the federal fisheries in Prince William Sound, Cook Inlet, and in the vicinities of Kodiak Island, Chignik and the South Alaska Peninsula (Ruccio et al. 2004), as well as in the Aleutian Islands (Failor-Rounds 2004).

For these parallel fisheries, NMFS management, allowable gear, bycatch levels, and fishing season actions are also “paralleled” for Pacific cod in state waters (Ruccio et al. 2004). The total allowable catch (TAC) set by the NPFMC applies to both the federal and parallel fisheries.

In the GOA, the annual federal TAC for Pacific cod is apportioned among seasons and regulatory areas, and on the basis of processor type, either inshore or offshore. Some apportionments were designed to try to limit possible negative impacts of the fishery on the endangered western

population of Steller sea lion, *Eumetopias jubatus* (Thompson et al. 2003). The BSAI TAC is apportioned among the same gear types used in the GOA, but also among vessel size-classes (Thompson and Dorn 2003). The Pacific halibut mortality limit sometimes constrains the harvest of Pacific cod by longline and trawl fisheries (Thompson et al. 2003).

State-waters fisheries for Pacific cod began in 1997 in the Prince William Sound, Cook Inlet, Chignik, Kodiak, and the South Alaska Peninsula districts, and these are distinct from the parallel fisheries. Management plans approved by the Alaska Board of Fisheries for all five districts have some common elements focused on gear and area limitations.

Vessels participating in the South Alaska Peninsula and Chignik areas are limited to no more than 58 feet in length. Catches are allocated on a percentage basis to various gear types. Guideline harvest limits (GHLs) for each of the 5 state-waters district are set by ADF&G as a percentage (2.25% to 15%) of the GOA Pacific cod allowable biological catch (ABC) set by the NPFMC for federal fisheries (Ruccio et al. 2004). If the GHL is attained it may be increased in increments of the ABC in successive years. Pacific cod are also harvested under state regulations in Southeast Alaskan waters independent of the federal fishery.

#### Relationship of State to Federal Management

In general, once the federal and parallel fisheries close, the state water fisheries are opened (except that there is no state-waters cod fishery in the Bering Sea/Aleutian Islands area) and these are not currently subject to limits on the number of licensed fisherman who can participate. To accommodate the catch in the state-waters fisheries since 1997, TACs in the federally-managed fisheries have been set well below the ABC (Thompson et al. 2003).

#### New developments in management of Pacific cod

##### **Gear modifications**

- In 2011, new regulations required all BS flatfish fisheries to elevate their trawl sweeps off the seafloor to reduce habitat damage and crab mortality. In 2013, this requirement was extended to all central GOA flatfish fisheries (Note that the flatfish fisheries catch the majority of Pacific cod).
- Pot fishing gear is required to have biodegradable panels to prevent lost pots from 'ghost fishing' and tunnel openings or escape panels to reduce crab bycatch

##### **GOA Trawl Bycatch Management**

Pacific halibut and Chinook salmon are taken as prohibited species catch (PSC) in the GOA groundfish trawl fisheries. In June 2012, the Council initiated the process of developing a program to provide the groundfish trawl fleet with tools for effective management of PSC, including incentives for minimization of bycatch, and vessel level accountability.

##### **Pacific halibut bycatch reduction**

The Council has implemented new measures or refined existing measures to reduce bycatch of prohibited species, such as Chinook and chum salmon, Pacific halibut, and crab in the Federal fisheries.

In June 2012, the Council took action to reduce halibut bycatch limits by 15% in the Gulf of Alaska (GOA) trawl fisheries and longline catcher vessel fisheries and 7% in the GOA freezer longline fisheries.

### **Chinook salmon bycatch reduction**

#### **Gulf of Alaska**

- In 2012, a bycatch cap of 25,000 Chinook salmon was established for the western and central GOA pollock trawl fisheries.
- In 2013, the Council approved a hard cap (7,500 salmon) on Chinook bycatch in all remaining GOA trawl fisheries.
- Full retention of Chinook salmon is also required in all trawl fisheries.

Retention of salmon supports research to identify the stock of origin of Chinook salmon bycatch in the GOA.

#### **New Observer Program**

In January 2013, a restructured observer program was implemented. All sectors of the groundfish fishery, including previously uncovered sectors such as vessels less than 60 feet length overall (LOA) and the commercial halibut sector, are included in the new Observer Program. The program places all vessels and processors in the groundfish and halibut fisheries off Alaska into one of two observer coverage categories: (1) a full coverage category, where vessels must have at least one observer onboard 100% of the time, and (2) a partial coverage category. In the partial coverage category, the new program allows NMFS to determine when and where to deploy observers according to management and conservation needs, and based on a scientifically defensible deployment plan. Funds are provided through an industry fee equal to 1.25% of the retained value of groundfish and halibut in fisheries subject to partial coverage.

#### **Allocation of Harvest Rules for Aleutian Islands**

Starting for year 2014. The SAFE EBS/AI report was split in two. Therefore biological reference points and harvest allocations are calculated specifically for Aleutian Islands.

#### Evidence

<http://www.adfg.alaska.gov/FedAidPDFs/sp05-09.pdf>

<http://www.npfmc.org/wp-content/PDFdocuments/bycatch/Bycatchflyer913.pdf>

<http://www.npfmc.org/observer-program/>

<http://www.sfos.uaf.edu/fitc/teaching/courses/FSN261/lectures/FISH%20261%20Lect%205%20Management%20Enforcement%20as%20given%202012.pdf>

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

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

*FAO Eco 29.2bis*

**Evidence adequacy rating:**

**High**

**Medium**

**Low**

**Rating determination**

*Measures are introduced to identify and protect depleted resources and those resources threatened with depletion, and to facilitate the sustained recovery of such stocks (MSA). Also, efforts are made to ensure that resources and habitats critical to the wellbeing of such resources (EFH) which have been adversely affected by fishing or other human activities are restored.*

**Neither of the EBS, AI, or GOA Pacific cod management units is considered overfished or undergoing overfishing.** Careful stock surveys and accompanying stock analysis carried out annually by staff from the NMFS and ADFG ensure populations remain at sustainable levels. See evidence from Section B – Science and Stock Assessment Activities, Fundamental Clauses 5 and 6.

The EFH regulations state that the NPFMC and NMFS should conduct a complete review of EFH provisions of FMPs at least once every 5 years and revise or amend the EFH provisions as warranted based on available information. An Omnibus FMP Amendment implemented the changes recommended via the 5-year review that was completed in 2010.

The last 5-year review found that fishing effects on the habitat of Pacific cod in the BSAI and GOA does not appear to have impaired either the stocks 'ability to sustain itself at or near the MSY level. When weighted by the proportions of habitat types used by Pacific cod, the long-term effect indices are low, particularly those of the habitat features most likely to be important to Pacific cod (infaunal and epifaunal prey). The fishery appears to have had minimal effects on the distribution of adult Pacific cod. Effects of fishing on weight at length, while statistically significant in some cases, are uniformly small and sometimes positive. While the fishery may impose some habitat-mediated effects on recruitment, these fall below the standard necessary to justify a rating of anything other than minimal or temporary.

**Evidence**

<http://www.fakr.noaa.gov/habitat/efh/review.htm>

<http://www.afsc.noaa.gov/REFM/Docs/2013/GOApcod.pdf>

<http://www.afsc.noaa.gov/REFM/Docs/2013/EBSpcod.pdf>

<http://www.afsc.noaa.gov/REFM/Docs/2013/aipcod.pdf>

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

**FAO CCRF 8.1.7/8.1.10/8.2.4/8.4.5**

**Evidence adequacy rating:**

**High**

**Medium**

**Low**

*The North Pacific Fishing Vessel Owners association (NPFVO) provides a large and diverse training program that many of the professional Pacific cod crew members must pass. Such programmes take into account agreed international standards and guidelines.*

The North Pacific Fishing Vessel Owners association (NPFVO) provides a large and diverse training program that many of the professional Pacific cod crew members must pass. Training ranges from firefighting on a vessel, damage control, man- overboard, MARPOL, etc., and The Sitka-based Alaska Marine Safety Education Association alone has trained more than 10,000 fishermen in marine safety and survival through a Coast Guard-required class on emergency drills <http://www.npfvoa.org/> ; <http://www.adn.com/2011/04/27/1832381/workplace-fatalities-fall-sharply.html#ixzz1Xt1ESQgh>.

The State of Alaska, Department of Labor & Workforce Development (ADLWD) includes AVTEC (formerly called Alaska Vocational Training & Education Center, now called Alaska's Institute of Technology). One of AVTEC's main divisions is the Alaska Maritime Training Center. The goal of the Alaska Maritime Training Center is to promote safe marine operations by effectively preparing captains and crew members for employment in the Alaskan maritime industry. The Alaska Maritime Training Center is a United States Coast Guard (USCG) approved training facility located in Seward, Alaska, and offers USCG/STCW-compliant maritime training. (STCW is the international Standards of Training, Certification, & Watchkeeping.) In addition to the standard courses offered, customized training is available to meet the specific needs of maritime companies. Courses are delivered through the use of their world class ship simulator, state-of-the-art computer-based navigational laboratory, and modern classrooms equipped with the latest instructional delivery technologies.

The Center's mission is to provide Alaskans with the skills and technical knowledge to enable them to be productive in Alaska's continually evolving maritime industry.

Supplemental to their on-campus classroom training, the Alaska Maritime Training Center has a partnership with the Maritime Learning System to provide mariners with online training for entry-level USCG Licenses, endorsements, and renewals.

The Center's course offerings include –

Video Tutorials –

\* How to get your Merchant Mariner's Credential; \* Which Course Do You Need?

U.S. Coast Guard Approved/STCW-Compliant Courses –

\* Able Seaman; \* Assistance Towing Operations; \* Automatic Radar Plotting Aids (ARPA) Operations;

\* Basic Safety Training - STCW'95; includes:

\*\* First Aid & CPR; \*\* Personal Safety and Social Responsibility; \*\* Basic Fire Fighting; \*\* Personal Survival Techniques; Bridge Resource Management (BRM); Global Maritime Distress & Safety System (GMDSS);

\* Master Not More Than 200 Tons Program; \* Meteorology; \* Operator of Uninspected Passenger Vessels (OUPV); \* Proficiency in Survival Craft; \* Qualified Member of Engine Department (QMED) Oiler; \* Radar Observer (Unlimited), Original; \* Radar Observer (Unlimited), Refresher; \* Radar Observer (Unlimited), Recertification; \* Rating Forming Part of a Navigational Watch; \* Seafood Processor Orientation and Safety Course; \* Shipboard Emergency Medicine.

\* Tankship – Dangerous Liquids (P.I.C.); \* Visual Communications/Flashing Lights; \* Medical Care Provider

Additional AVTEC Maritime Courses

\* FCC Marine Radio Operators Permit Examination

The University of Alaska Sea Grant Marine Advisory Program (MAP) provides education and training in several other sectors, including –

\* better process control; \* HACCP (Hazard Analysis / Critical Control Point); \* sanitation control procedures; \* marine refrigeration technology; \* net mending; \* icing & handling; \* direct marketing; \* financial management for fishermen; \* maximizing fuel efficiency

In addition, MAP conducts sessions of their Alaska Young Fishermen's Summit. Each Summit is an intense, 3-day course in all aspects of Alaska fisheries, from fisheries management & regulation, to seafood markets & marketing. The target audience for these Summits is young Alaskans from coastal communities. In addition to this, MAP provides training and technical assistance to fishermen and seafood processors in Western Alaska. Following completion of a needs assessment in year one of the project, a number of training courses and workshops were developed in cooperation with local communities and CDQ groups.

Additional education is provided by the Fishery Industrial Technology Center, in Kodiak, Alaska.

### **Evidence**

<http://www.avtec.edu/AMTC.htm>

<http://www.stcw.org/>

<http://seagrant.uaf.edu/map/>

<http://seagrant.uaf.edu/map/fishbiz/index.php>

<http://www.sfos.uaf.edu/fitc/academicprograms/>  
<http://www.npfvoa.org/>  
<http://www.adn.com/2011/04/27/1832381/workplace-fatalities-fall-sharp.html#ixzz1Xt1ESQqh>  
<http://www.sfos.uaf.edu/pcc/projects/07/brown/>

## E. Implementation, Monitoring and Control

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

*FAO CCRF 7.1.7/7.7.3/7.6.2/8.1.1/8.1.4/8.2.1*

*FAO Eco 29.5*

**Evidence adequacy rating:**

**High**

**Medium**

**Low**

**Rating determination**

*Management of Alaska Pacific cod fisheries by the NPFMC, BOF and the agencies responsible for implementation and enforcement of regulations ensure that effective mechanisms are in place to assure compliance. Enforcement measures include an observer program, vessel monitoring systems on board vessels, USCG and AWT boardings and inspection activities and dockside landing inspections.*

**VMS requirements**

On January 8, 2002, an emergency interim rule (67 FR 956) was issued by NMFS to implement Steller sea lion protection measures. All vessels using pot, hook-and-line or trawl gear in the directed fisheries for pollock, Pacific cod or Atka mackerel are required [Section 679.7(a)(18)] to have an operable VMS on board. This requirement is necessary to monitor fishing restrictions in Steller sea lion protection and forage areas.

Also, when the vessels are fishing Pacific cod in the state parallel fishery, they would use their VMS as directed by their federal fishing permit.

**U.S. Coast Guard and Office of Law Enforcement activities**

The U.S. Coast Guard (USCG) and NMFS Office of Law Enforcement (OLE) enforce federal fisheries laws and regulations, especially 50CFR679. OLE Special Agents and Enforcement Officers conduct complex criminal and civil investigations, board vessels fishing at sea, inspect fish processing plants, review sales of wildlife products on the internet and conduct patrols on land, in the air and at sea. According to OLE –

“While a vast majority of commercial and recreational fishermen comply with the enacted conservation measures, there are still those fishermen - both domestic and foreign - who attempt to thwart the law and conduct fraudulent business. In recent years, the OLE has stepped up its presence in the international scene as more and more fish are imported and exported into and out of the United States.”

“Major fishing companies, commercial fishermen, recreational boaters and sport fishermen and other ocean users are ultimately responsible for the conservation of the ocean, therefore they must be vigilant of their actions which might inflict damage upon the numerous ecosystems within our

oceans.”

“While catches are usually seized at the onset of an investigation, violators can also be assessed both civil penalties and criminal fines; and on occasion boats are seized and individuals are sent to Federal prison.”

NOAA Agents and Officers can assess civil penalties directly to the violator in the form of Summary Settlements (SS) or can refer the case to NOAA's Office of General Counsel for Enforcement and Litigation (GCEL). GCEL can then assess a civil penalty in the form of a Notice of Permit Sanctions (NOPs) or Notice of Violation and Assessment (NOVAs), or they can refer the case to the U.S. Attorney's Office for criminal proceedings.

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

The Alaska Wildlife Troopers enforce state regulations. OLE mainly operates on shore, USCG at sea, and the AWT enforce heavily on shore. Additionally, ADFG field staff is properly trained and deputized and can therefore enforce regulations and make arrests.

Summary of Enforcement actions by US Coastguard.

#### **Bering Sea/Aleutian Islands Pacific Cod**

Pacific cod in the Bering Sea is targeted by many different gear types including nonpelagic trawl, longline, pot, and jig gear. The active size of these fleets is approximately 263 vessels, and the Coast Guard attempts to board approximately 48 vessels each year. Some of these fleets are required to have VMS coverage while others are exempt, specifically the jig fleet. In addition, observer coverage for these vessels ranges from 100% for many of the trawl vessels, to partial coverage for most of the rest of the vessels, with the jig fleet exempt. From fiscal year 2008 through the end of fiscal year 2013, the Coast Guard conducted 187 boardings on Bering Sea Pacific cod vessels, noting 32 violations on 26 vessels resulting in a detected violation rate for this fleet of 13.90%. A detail of the boardings and violations detected by fiscal year is provided below. Significant violations noted below include MRA overages, failure to meet observer coverage rates as required, IR/IU violations, and not using VMS.

2013 – 27 with 1 violation for minor logbook errors – fix-it ticket written

2012 – 28 with 3 violations on 3 vessels

- 1) FFP not on board (1)
- 2) Logbook errors (1)
- 3) LLP not on board (1)

2011 – 47 with 14 violations on 8 vessels

- 1) Logbook errors (4)
- 2) MRA overages (3)
- 3) LLP not on board (2)
- 4) FFP not on board (1)
- 5) Boarding Ladder (1)
- 6) Observer Coverage (1)
- 7) SSL No Transit Violation (1)
- 8) IR/IU Violation (1)

2010 – 30 with 2 violations on 2 vessels

- 1) Logbook errors (1)
- 2) Boarding Ladder (1)

2009 – 17 with 3 violations on 3 vessels.

- 1) VMS not turned on (1)
- 2) Logbook errors (2)

2008 – 38 with 9 violations on 9 vessels.

- 1) Boarding Ladder (2)
- 2) Logbook errors (5)
- 3) MRA Overage (1)
- 4) Not Retaining IR/IU Species (1)

#### **Gulf of Alaska Pacific Cod**

Pacific cod in the Gulf of Alaska is targeted by many different gear types including nonpelagic trawl, longline, pot, and jig gear. The active size of these fleets is approximately 643 vessels, and the Coast Guard attempts to board approximately 52 vessels each year. Some of these fleets are required to have VMS coverage while others are exempt, specifically the jig fleet. In addition, observer coverage for these vessels ranges from 100% for some of the trawl vessels, to partial coverage for most of the rest of the vessels, with the jig fleet exempt. From fiscal year 2008 through the end of fiscal year 2013, the Coast Guard conducted 302 boardings on Gulf of Alaska Pacific cod vessels, noting 25 violations on 19 vessels resulting in a detected violation rate for this fleet of 6.29%. A detail of the boardings and violations detected by fiscal year is provided below. Significant violations noted below include failure to meet observer coverage rates as required, failure to use seabird avoidance gear, closed area incursions, illegal retention or unsafe release of bycatch species, and failure to use VMS as required.

2013 – 11 with 0 violations.

2012 – 58 with 1 violation for a logbook error.

2011 – 80 with 11 violations on 8 vessels

- 1) Observer coverage (3)
- 2) Logbook errors (1)
- 3) FFP not on board (1)

- 4) Seabird Avoidance (1)
- 5) Closed Area (1)
- 6) Unsafe Release of halibut (1)
- 7) Illegal retention of halibut (1)
- 8) Gear (Pot Gear fish openings) (1)
- 9) Not using VMS as required (1)

2010 – 68 with 11 violations on 8 vessels

- 1) No FFP on board (3)
- 2) Boarding Ladder (3)
- 3) Logbook errors (2)
- 4) Seabird Avoidance Gear (2)
- 5) Observer Coverage (1)

2009 – 20 with 0 violations

2008 – 65 with 2 violations on 2 vessels.

- 1) Unsafe release of halibut (1)
- 2) Logbook errors (1)

#### Evidence

Information provided from US Coastguard Lt Kenne

#### **Stated-managed waters**

##### **The Alaska Wildlife Troopers**

The Department of Public Safety, Division of Alaska Wildlife Troopers is responsible for protecting this resource from the shore out to 3 miles. The State is also responsible for the preservation of the migratory fish resource, such as salmon, up to 200 miles off shore of Alaska. The Bering Sea alone encompasses 886,000 square miles of fishing grounds. The Department of Public Safety's effort in the patrol and enforcement of these waters is entrusted to the Marine Enforcement Section (MES) with the Alaska Wildlife Troopers. Assigned to MES, as well as other posts from Ketchikan to Kotzebue, are 17 vessels that range in size from 25 to 156 feet. Numerous other smaller skiffs augment patrol and boarding operations either independently or in support of the MES.

##### **NOAA OFFICE OF LAW ENFORCEMENT**

NOAA's Office of Law Enforcement protects marine wildlife and habitat by enforcing domestic laws and international treaty requirements designed to ensure these global resources are available for future generations. Our special agents and enforcement officers ensure compliance with the nation's marine resource laws and take enforcement action when these laws are violated.

Our work helps to:

- Sustain fish stocks for commercial, recreational, tribal, and U.S. territorial users.
- Prevent the illegal, unregulated, and unreported harvesting and trafficking of fish and wildlife.

- Protect marine mammals and endangered species.
- Maintain and restore marine and inland water habitats.
- Support vibrant coastal communities.
- Conserve coral reefs and marine protected areas.
- Provide a level playing field for all industry participants.
- Hold accountable those who violate the law.

While we work to enforce the laws, the Office of the General Counsel is NOAA's civil prosecutor. Together, we make up NOAA's Enforcement Program and work with other NOAA program offices to establish national law enforcement policy.

The U.S. Department of Justice and U.S. Attorney's Office serve as legal advisors and prosecutorial partners in criminal matters. Go to our partners page to learn more about how we work with others to protect marine resources.

All our work supports the core mission mandates of NOAA Fisheries—maximizing productivity of sustainable fisheries and fishing communities and protection, recovery, and conservation of protected species.

<http://www.nmfs.noaa.gov/ole/index.html>

<http://dps.alaska.gov/AWT/marine.aspx>

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

*FAO CCRF 7.7.2/8.2.7*

**Evidence adequacy rating:**

**High**

**Medium**

**Low**

***Rating determination***

*The MSA treats sanctions against the fishing vessel permit to be the carrying out of a purpose separate from that accomplished by civil and criminal penalties against the vessel or its owner or operator. The State of Alaska also has an aggressive marine fisheries compliance program with stiff penalties if a vessel is caught in non-compliance.*

In Alaska waters, federal enforcement policy section 50CFR600.740 states –

(a) The MSA provides four basic enforcement remedies for violations, in ascending order of severity, as follows:

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

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

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

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

It shall be the policy of NMFS to enforce vigorously and equitably the provisions of the MSA by utilizing that form or combination of authorized remedies best suited in a particular case to this end.

(b) Processing a case under one remedial form usually means that other remedies are inappropriate in that case. However, further investigation or later review may indicate the case to be either more or less serious than initially considered, or may otherwise reveal that the penalty first pursued is inadequate to serve the purposes of the MSA. Under such circumstances, the Agency may pursue other remedies either in lieu of or in addition to the action originally taken. Forfeiture of the illegal catch does not fall within this general rule and is considered in most cases as only the initial step in remedying a violation by removing the ill-gotten gains of the offense.

(c) If a fishing vessel for which a permit has been issued under the MSA is used in the commission of an offense prohibited by section 307 of the MSA, NOAA may impose permit sanctions, whether or not civil or criminal action has been undertaken against the vessel or its owner or operator. In some cases, the MSA requires permit sanctions following the assessment of a civil penalty or the imposition of a criminal fine. In sum, the MSA treats sanctions against the fishing vessel permit to be the carrying out of a purpose separate from that accomplished by civil and criminal penalties against the vessel or its owner or operator. The State of Alaska also has a very aggressive marine fisheries compliance program with stiff penalties if a vessel is caught in non-compliance.



## Magnuson-Stevens Act Schedule

Magnuson-Stevens Act Schedule	
VIOLATION	OFFENSE LEVEL
<b>VIOLATIONS REGARDING GEAR</b>	
<p><b>Minor-Moderate Violations</b>                      Examples: Violating area specific gear requirements, having non-complying gear onboard, or fishing with non-compliant gear; falsifying or failing to affix vessel markings; failing to comply with gear tag or marking requirements; dumping gear.</p>	II - III
<p><b>Moderate Violations</b>                      Example: Fishing for Western Pacific bottomfish management unit species (MUS) using prohibited gear.</p>	IV
<b>VIOLATIONS REGARDING THE FACILITATION OF ENFORCEMENT, SCIENTIFIC MONITORS OR OBSERVERS</b>	
<p><b>Minor - Moderate Violations</b>                      Examples: Failing to provide information, notification, accommodations, access, or reasonable assistance to either a NFMS-approved observer or a sea sampler conducting his or her duties aboard a vessel; submitting false or inaccurate data, statements, or reports; discarding, release, or transferring fish before bringing it aboard or making it available to an observer for sampling.</p>	II-III



## Magnuson-Stevens Penalty Matrix

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

[http://www.nmfs.noaa.gov/sfa/reg\\_svcs/Councils/ccc\\_2011/Tab%20L%20-%20Enforcement%20Issues/Enforcement%20Issues.pdf](http://www.nmfs.noaa.gov/sfa/reg_svcs/Councils/ccc_2011/Tab%20L%20-%20Enforcement%20Issues/Enforcement%20Issues.pdf)

The Marine Division of AWT and the State of Alaska Department of Law pursue a very aggressive enforcement policy. They attend the BOF and are integral into the process for formulation or legislation, analogous to the USCG attendance and input in the Council process. AWT has Statutory / Regulatory legislation pertaining to their Authority: AS 16 Fish & Game, 5AAC Fish & Game, 20 AAC Commercial Fishing, AS 11 Criminal, AS 46 Environment, AS 44 State Government, AS 02 Aeronautics, AS 18 Health & Safety. A State violation is a criminal violation (strict liability).

50CFR600.740 Enforcement policy <http://www.law.cornell.edu/cfr/text/50/600/740>

AWT: [http://housemajority.org/coms/hres/27/AWT\\_Fisheries\\_Enforcement.pdf](http://housemajority.org/coms/hres/27/AWT_Fisheries_Enforcement.pdf)

## F. Serious Impacts of the Fishery on the Ecosystem

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

**FAO CCRF 7.2.3/8.4.7/8.4.8/12.11**

**Eco 29.3/31**

**Evidence adequacy rating:**

**High**

**Medium**

**Low**

**Rating determination**

*Alaska's fisheries management organizations conduct assessments and research on environmental factors on Pacific cod and associated species and their habitats. Findings and conclusions are published in SAFE document, annual Ecosystem Considerations documents, and other research reports.*

**SAFE documents.** SAFE documents for the BS, AI and GOA Pacific cod summarize ecosystem considerations for the stocks. They include sections for 1) Ecosystem effects on the stock; and 2) Effects of the Pacific cod fishery on the ecosystem. Since 2003, SAFE documents for BSAI and GOA have also included an annual summary Ecosystem Assessment in the appendix prepared by the REEM group at the AFSC. The primary intent of the assessment is to summarize historical climate and fishing effects of the shelf and slope regions of the eastern BSAI, and GOA, and to provide an assessment of the possible future effects of climate and fishing on ecosystem structure and function from an ecosystem perspective. It also looks at the effects of environmental change on fish stocks. Since 1999, information on indicators of ecosystem status and trends, and more ecosystem-based management performance measures have been included.

**Ecosystem Effects on Pacific cod stock**

**Note:** Due to a shutdown of the Federal government during the dates October 1-16, 2013, some customary features are missing from this stock assessment: For the writing of this report there have been no updates on ecosystems consideration section of the 2013 BSAI and GOA Safe report. The last update is from SAFE 2011.

A primary ecosystem phenomenon affecting the Pacific cod stock seems to be the occurrence of periodic "regime shifts" in which central tendencies of key variables in the physical environment change on a scale spanning several years to a few decades (Boldt (ed.), 2005). One well documented example of such regime shift occurred in 1977, and shifts occurring in 1989 and 1999 have also been suggested (e.g. Hare and Mantua 2000). An attempt was made to estimate the change in median recruitment of BSAI and GOA Pacific cod associated with the 1977 regime shift. According to this year's model, pre-1977 median recruitment was only about 20% and 32% of post-1976 recruitment for BSAI and GOA Pacific cod, respectively. Establishing a link between environment and recruitment within a particular regime is more difficult. In the 2004 assessment (Thompson et al. 2004), for example, the correlations between age 1 recruits spawned since 1977 and monthly values of the

Pacific Decadal Oscillation (Mantua et al. 1997) were computed and found to be very weak.

The prey and predators of Pacific cod have been described or reviewed by Albers and Anderson (1985), Livingston (1989, 1991), Lang et al. (2003), Westrheim (1996), and Yang (2004). The composition of Pacific cod prey varies to some extent by time and area. In terms of percent occurrence, some of the most important items in the diet of Pacific cod in the BSAI and GOA have been polychaetes, amphipods, and crangonid shrimp. In terms of numbers of individual organisms consumed, some of the most important dietary items have been euphausiids, miscellaneous fishes, and amphipods. In terms of weight of organisms consumed, some of the most important dietary items have been walleye pollock, fishery offal, yellowfin sole, and crustaceans. Small Pacific cod feed mostly on invertebrates, while large Pacific cod are mainly piscivorous. Predators of Pacific cod include Pacific cod, halibut, salmon shark, northern fur seals, Steller sea lions, harbor porpoises, various whale species, and tufted puffin. Major trends in the most important prey or predator species could be expected to affect the dynamics of Pacific cod to some extent.

<http://www.afsc.noaa.gov/REFM/Docs/2013/GOApcod.pdf>

<http://www.afsc.noaa.gov/REFM/Docs/2013/EBSpcod.pdf>

<http://www.afsc.noaa.gov/REFM/Docs/2013/Alpcod.pdf>

#### **FATE research.**

##### Mission

The mission of the Fisheries and the Environment (FATE) Program is to provide the information necessary to effectively adapt management to mitigate the ecological, social and economic impacts of major shifts in the productivity of living marine resources.

##### **Approach**

The FATE program improves single species and ecosystem assessments across the U. S. through the following activities: a) analysis of the response of fish and shellfish to environmental change, b) development of ecosystem indicators, c) incorporation of ecosystem indicators in stock assessments, and d) construction of next generation forecasting models. The FATE program provides leading indicators of ecological and oceanographic change at the population and ecosystem level from local to ocean basin scales. FATE supports research on the functional relationships between environmental forces and the growth, distribution, or reproductive success of managed species.

FATE facilitates the development of cross-cutting projects within the National Oceanic and Atmospheric Administration (NOAA) that allow comparisons of fisheries responses to ecosystem change through the use of a matrix approach to staffing, annual announcements of opportunity, and annual scientific symposia. When fully staffed the FATE program will have representatives at eight NOAA Fisheries research Laboratories in: La Jolla, California; Monterey, California; Honolulu, Hawaii; Newport, Oregon; Seattle, Washington; Juneau, Alaska; Woods Hole, Massachusetts; and Miami, Florida. These individuals form a matrix of expertise that is shared across line offices to facilitate data sharing, regional comparisons and rapid transfer of advanced modeling techniques and

ecosystem indices to Science Centers and managers. The FATE program announces opportunities for competitive research on an annual basis. FATE encourages collaborative proposals between fisheries oceanographers and scientists responsible for stock assessments or ecosystem assessments. Investigators and FTEs are required to meet on an annual basis to share research findings. The FATE annual science meetings have evolved into a NOAA Fisheries' national forum for the discussion of fisheries oceanography.

<http://www.st.nmfs.noaa.gov/fate/>

#### **PICES Special Publication 4: Marine Ecosystems of the North Pacific.**

The first version entitled "Marine Ecosystems of the North Pacific" was published in 2004 as PICES Special Publication Number 1\*. It was a pilot project to determine whether a comprehensive overview of the status and trends in the North Pacific could be achieved through voluntary efforts, and once created, whether a report of this nature would be of value to PICES Member Countries. In 2007, following recommendations by the PICES Study Group on Ecosystem Status Reporting, the Governing Council and Science Board endorsed the development of a second version of the North Pacific Ecosystem Status Report, adding that it should represent an incremental improvement over the first endeavour.

[http://www.pices.int/publications/special\\_publications/NPESR/2010/NPESR\\_2010.aspx](http://www.pices.int/publications/special_publications/NPESR/2010/NPESR_2010.aspx)

The North Pacific Research Board (NPRB) was created by Congress in 1997 to conduct research activities on or relating to the fisheries or marine ecosystems in the North Pacific Ocean, Bering Sea, and Arctic Ocean with a priority on cooperative research efforts designed to address pressing fishery management or marine ecosystem information needs.

Here is a list of recent publications resulting from that program on Pacific cod

#### List of Publications

Hurst, Thomas P., Laurel, Benjamin J., and Ciannelli, Lorenzo 2010. Ontogenetic patterns and temperature-dependence of growth rate in early life stages of Pacific cod (*Gadus macrocephalus*). *Fishery Bulletin* 108: 382-392

Laurel, Benjamin J., Hurst, Thomas P., Copeman, Louise A., and Davis, Michael W. 2008. The role of temperature on the growth and survival of early and late hatching Pacific cod larvae (*Gadus macrocephalus*). *Journal of Plankton Research* 30: 1051-1060. doi:10.1093/plankt/fbn057.

Laurel, Benjamin J., Ryer, Clifford H., Knoth, Brian, and Stoner, Allan W. 2009. Temporal and ontogenetic shifts in habitat use of juvenile Pacific cod (*Gadus macrocephalus*). *Journal of Experimental Marine Biology and Ecology* 377: 28-35. doi:10.1016/j.jembe.2009.06.010.

Hurst, Thomas P., Moss, Jamal H., and Miiller, Jessica A. 2012. Distributional patterns of 0-group Pacific cod (*Gadus macrocephalus*) in the eastern Bering 3 Sea under variable recruitment and thermal conditions. *ICES Journal of Marine Science*

While the NPRB has invested millions of dollars on obtaining this objective, they have also developed two special projects that seek to understand the integrated ecosystems of the BSAI and GOA. For the GOA Integrated Ecosystem Research Program, more than 40 scientists from 11 institutions are taking part in the \$17.6 million Gulf of Alaska ecosystem study that looks at the physical and biological mechanisms that determine the survival of juvenile groundfish in the eastern and western GOA .The

study includes two field years (2011 and 2013) followed by one synthesis year (<http://gulfofalaska.nprb.org/>).

For the Bering Sea, a large multiyear ecosystem project is winding towards completion. It consists of two large projects that will be integrated. One funded by the National Science Foundation (NSF's BEST program is the Bering Ecosystem Study, a multi-year study (2007-2010)). The other funded by NPRB (BSIERP, is the Bering Sea Integrated Ecosystem Research Program (2008-2012)). The overlapping goals of these projects led to a partnership that brings together some \$52 million worth of ecosystem research over six years, including important contributions by NOAA and the US Fish & Wildlife Service. From 2007 to 2012, NPRB, NSF, and project partners combined talented scientists and resources for three years of field research on the eastern Bering Sea Shelf, followed by two more years for analysis and reporting (<http://bsierp.nprb.org/focal/index.html>).

The Final Programmatic Supplemental Environmental Impact Statement is an extensive review of the Alaska Groundfish Fisheries (PSEIS) (NMFS 2004). It provides information about effects of the fishery on the ecosystem and effects of the ecosystem on the groundfish fishery.

The Final Alaska Groundfish Fisheries Programmatic Supplemental Environmental Impact Statement (PSEIS) serves as the primary decision document for determining the future overarching management policies and directions of the Fishery Management Plan for the Groundfish Fishery of the Gulf of Alaska and the Fishery Management Plan for the Groundfish Fishery of the Bering Sea and Aleutian Islands Area (FMPs). The PSEIS also serves as the current primary environmental review document supporting the FMPs. It summarizes and analyzes the best scientific information about the natural and physical environment in the Gulf of Alaska and Bering Sea and Aleutians Islands areas and the relationship of people with that environment. It assesses the environmental impacts resulting from past and present fishery management regimes and from the expected impacts of alternative future fishery management regimes. Significant environmental and fishery changes have occurred since the original Environmental Impact Statements (EISs) for the FMPs were prepared approximately 25 years ago

[http://alaskafisheries.noaa.gov/sustainablefisheries/seis/final062004/Exec\\_sum.pdf](http://alaskafisheries.noaa.gov/sustainablefisheries/seis/final062004/Exec_sum.pdf)

[http://alaskafisheries.noaa.gov/sustainablefisheries/seis/final062004/Chaps/chpt\\_3/chpt\\_3\\_5.pdf](http://alaskafisheries.noaa.gov/sustainablefisheries/seis/final062004/Chaps/chpt_3/chpt_3_5.pdf)

<https://alaskafisheries.noaa.gov/sustainablefisheries/seis/intro.htm>

### **Essential Fish Habitat Pacific Cod**

EFH is defined in the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." EFH for groundfish species is determined to be the general distribution of a species described by life stage. EFH is described for FMP-managed species by life stage as general distribution using guidance from the EFH Final Rule (50 CFR 600.815), including the EFH Level of Information definitions.

Characterization of Essential Fish Habitat Pacific Cod

Pacific Cod

Eggs: No EFH description determined. Pacific cod eggs, which are demersal, are rarely encountered during surveys in the BSAI.

Larvae: EFH for larval Pacific Cod is the general distribution area for this life stage, located in epipelagic waters along the entire shelf (0 to 200 m), upper slope (200 to 500 m), and intermediate slope (500 to 1,000 m) throughout the BSAI depicted in Figure 13.

Early Juveniles: No EFH description determined. Insufficient information is available.

Late Juveniles: EFH for late juvenile Pacific cod is the general distribution area for this life stage, located in the lower portion of the water column along the inner (0 to 50 m), middle (50 to 100 m), and outer (100 to 200 m) shelf throughout the BSAI wherever there are soft substrates consisting of sand, mud, sandy mud, and muddy sand, as depicted in Figure 14.

Adults: EFH for adult Pacific cod is the general distribution area for this life stage, located in the lower portion of the water column along the inner (0 to 50 m), middle (50 to 100 m), and outer (100 to 200 m) shelf throughout the BSAI wherever there are soft substrates consisting of sand, mud, sandy mud, muddy sand, and gravel, as depicted in Figure 14.

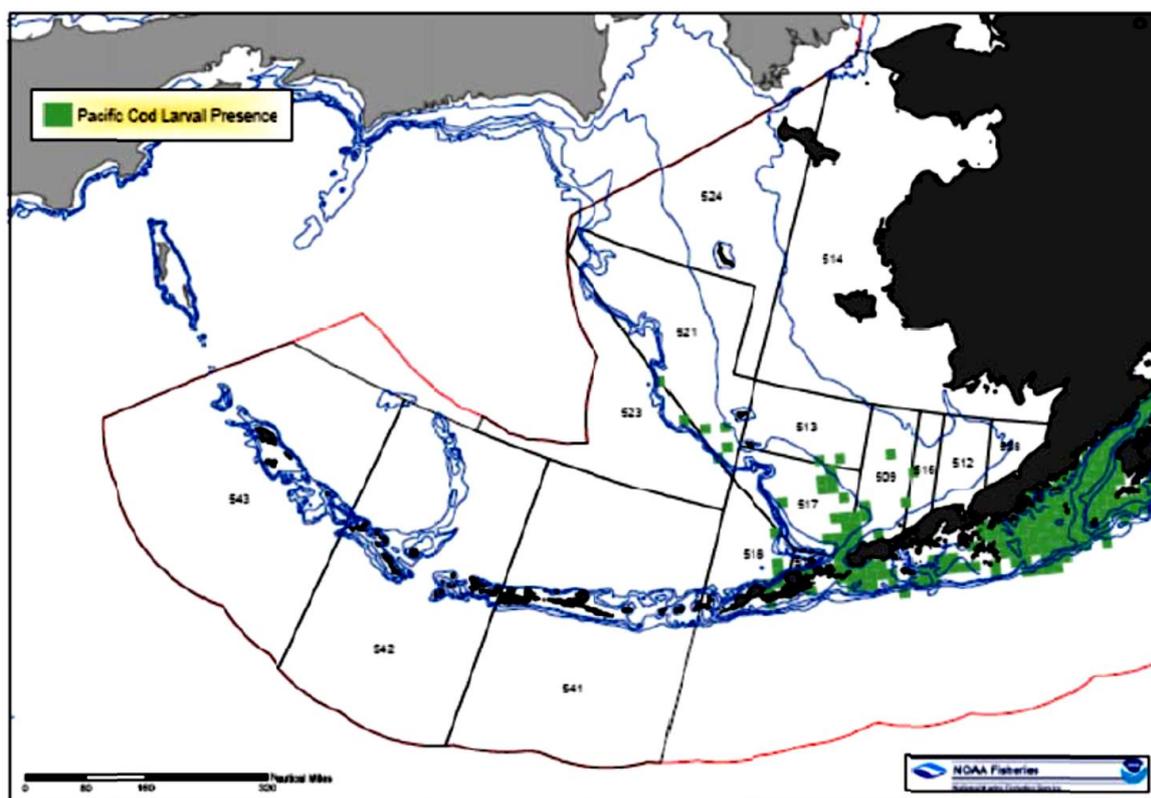
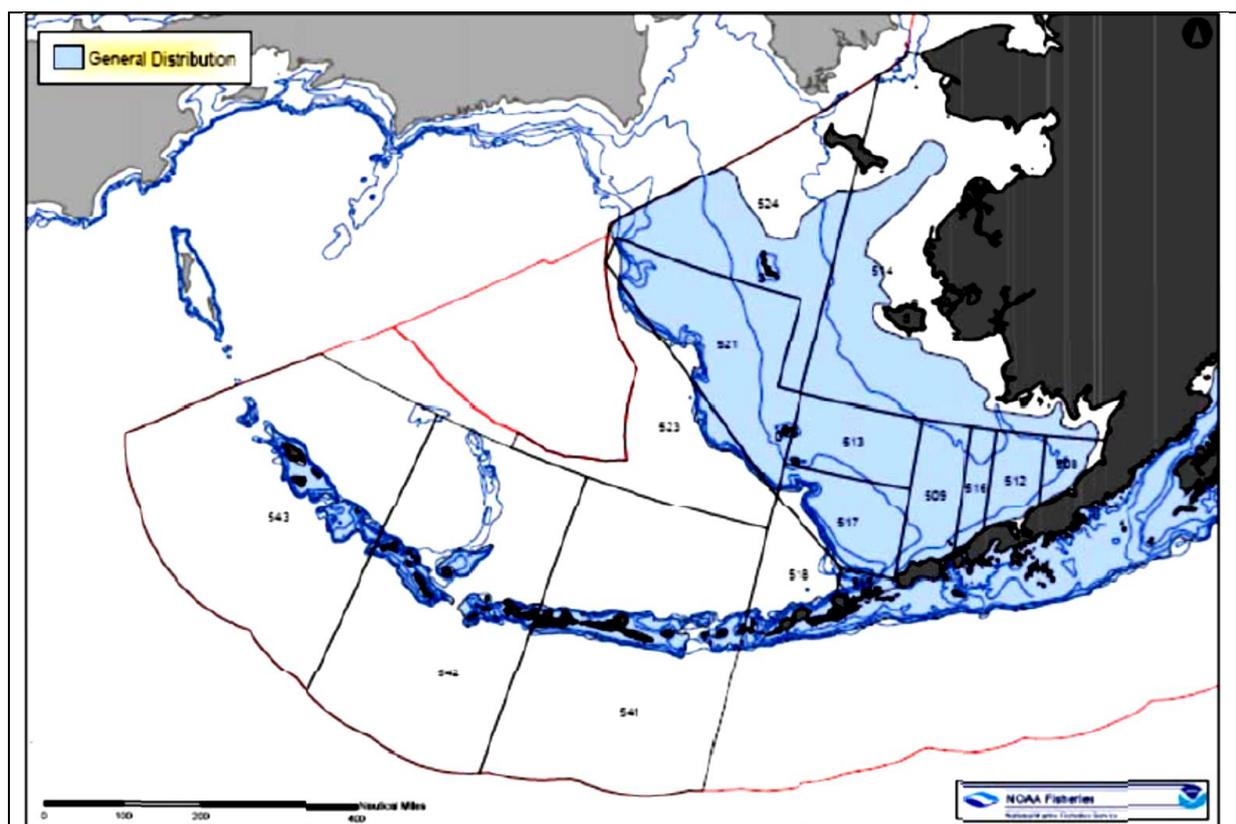


Figure 13. Distribution EFH for P cod larvae.



**Figure 14.** Distribution EFH for P cod juveniles and adults.

There have been new initiatives by the Alaska Fisheries Science Center on understanding environmental effects on Pacific cod ecology and fishery.

A new study by AFSC/Seattle is examining the Bering Sea Aleutian Islands (BSAI) Pacific cod fishery “freezer longline” sector response to inter-annual climate variability. In their study they are investigating

- The relationship between climate regime and fishery CPUE
- How vessel trips change in relation to abundance and CPUE changes that are driven by climate.

URL: [http://access.afsc.noaa.gov/pubs/posters/pdfs/pHaynie01\\_effects-climate-cod.pdf](http://access.afsc.noaa.gov/pubs/posters/pdfs/pHaynie01_effects-climate-cod.pdf)

Another study by AFSC/ABL is looking at the effects of climate change and variability on fitness of age-0 Pacific cod

URL: [http://access.afsc.noaa.gov/pubs/posters/pdfs/pSreenivasan01\\_growth-consumption-cod.pdf](http://access.afsc.noaa.gov/pubs/posters/pdfs/pSreenivasan01_growth-consumption-cod.pdf)

URL: [http://access.afsc.noaa.gov/pubs/posters/pdfs/pFarley02\\_ebs-pac-cod.pdf](http://access.afsc.noaa.gov/pubs/posters/pdfs/pFarley02_ebs-pac-cod.pdf)

Potentially, fisheries for Pacific cod can have effects on other species in the ecosystem through a variety of mechanisms, for example by relieving predation pressure on shared prey species (i.e., species which serve as prey for both Pacific cod and other species), by reducing prey availability for predators of Pacific cod, by altering habitat, by imposing bycatch mortality, or by “ghost fishing” caused by lost fishing gear. Overall there are strong efforts to consider and limit the effect of the fishery on the ecosystem and environment.

#### **Effects of Pacific cod fisheries on Habitat**

Fishing operations change the abundance or availability of certain habitat features (e.g., prey availability or the presence of living or non-living habitat structure) used by managed fish species to accomplish spawning, breeding, feeding, and growth to maturity. These changes can reduce or alter the abundance, distribution, or productivity of that species, which in turn can affect the species’ ability to “support a sustainable fishery and the managed species’ contribution to a healthy ecosystem” (50 CFR 600.10). The outcome of this chain of effects depends on characteristics of the fishing activities, the habitat, fish use of the habitat, and fish population dynamics. The duration and degree of fishing’s effects on habitat features depend on the intensity of fishing, the distribution of fishing with different gears across habitats, and the sensitivity and recovery rates of habitat features. A mathematical model was developed as a tool to structure the relationships among available sources of information that may influence the effects of fishing on habitat. The model was designed to estimate proportional effects on habitat features that would persist if current fishing levels were continued until affected habitat features reached an equilibrium with the fishing effects. Details on the limitations and uncertainties of the model and the process used by the analyst are in Section B.1 of Appendix B of the EFH EIS (NMFS 2005).

Summary of Effects—Fishing’s effects on the habitat of Pacific cod in the BSAI and GOA do not appear to have impaired either stocks’ ability to sustain itself at or near the MSY level. When weighted by the proportions of habitat types used by Pacific cod, the long-term effect indices are low, particularly those of the habitat features most likely to be important to Pacific cod (infaunal and epifaunal prey). The fishery appears to have had minimal effects on the distribution of adult Pacific cod. Effects of fishing on weight at length, while statistically significant in some cases, are uniformly small and sometimes positive. While the fishery may impose some habitat-mediated effects on recruitment, these fall below the standard necessary to justify a rating of anything other than minimal or temporary.

Evidence

<http://www.npfmc.org/wp-content/PDFdocuments/fmp/BSAI/BSAIfmpAppendix.pdf>

<http://www.npfmc.org/wp-content/PDFdocuments/fmp/GOA/GOAIfmpAppendix.pdf>

#### **Ecosystem impacts and gear modifications**

Gear modifications have been implemented in the BSAI and are in the process of being implemented in the GOA to lift the sweep off the seafloor and hence limit detrimental effects of fishing gear interacting with seafloor, habitat and related biota. Research has demonstrated that elevated sweeps also reduces unobserved mortality of crab from interacting with the trawl sweeps.

There are also several regulations in place dealing with seabird avoidance, including circle hooks,

scarelines, line settings, weighted longlines (see clause 8.4.3) for vessels fishing with hook-and-line gear. Further gear-related measures include (i) biodegradable panels required for pot gear, to minimize bycatch associated with ghost fishing of lost gear (5 AAC 39.145 *Escape Mechanism for Shellfish and Bottomfish Pots*) and (ii) tunnel openings for pot gear (tunnel eye openings must be 36 inches in perimeter or less) to reduce incidental catch of halibut and crabs. Gillnets for groundfish have been prohibited to prevent ghost fishing and bycatch of non-target species.

### **Bycatch**

Due to a shutdown of the Federal government during the dates October 1-16, 2013, some customary features are missing from AI and EBS stock assessments, including:

1. Responses to some SSC and Plan Team comments
2. Retrospective analyses

For the same reason, certain tables have not been updated, including:

1. Discards of Pacific cod in the Pacific cod fishery
2. Incidental catch of FMP species in the Pacific cod fishery
3. Incidental catch of non-target species in the Pacific cod fishery
4. Incidental catch of prohibited species in the Pacific cod fishery

Therefore, information from latest surveillance report is included here.

For GOA there is information on bycatch of FMP species and incidental bycatch of nontarget species as of October 2013 compiled from AKFIN.

Detailed bycatch reduction programs are in place for species impacted by the fishery such as crab, halibut, seabirds, as well as measures to allow sufficient cod resources for Steller sea lions predation. Incidental catches of non-target species in the GOA (as of October 2013) BSAI(2010-2011) are shown in Tables 9 and 10 . Only sea stars and giant grenadier account for a significant bycatch per year.

With the development of the groundfish fisheries, regulations were implemented to limit bycatch of halibut, so as to minimize impacts on the domestic halibut fisheries. Interception of juvenile halibut (~30 cm and smaller) often occurs in trawl fisheries targeting other groundfish species (such as rock sole, pollock, yellowfin sole, and Pacific cod). Incidental catch of halibut also occurs in groundfish hook and line and pot fisheries. Regulations require that all halibut caught incidentally must be discarded, regardless of whether the fish is living or dead. Halibut is a PSC species and reaching the PSC quota closes the fishery.

**Table 11.** Incidental catch (t) of non-target species groups by GOA Pacific cod fisheries, 2004-2013 (as of 17 October 2013).

Species/group	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Benthic urochordata	0.0	0.0	0.0	0.0	0.6	3.0	0.0	0.2	0.0	0.0
Birds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Bivalves	0.3	1.3	2.1	1.2	1.7	4.2	2.7	6.1	1.7	1.9
Brittle star unidentified	0.1	0.2	0.1	0.3	0.1	0.0	0.1	2.1	0.0	0.1
Capelin	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Corals Bryozoans	0.1	0.0	0.1	0.2	0.0	1.7	0.0	0.7	4.0	0.1
Dark Rockfish	0.0	0.0	0.0	0.0	0.3	2.7	12.3	2.4	1.5	1.0
Eelpouts	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.3	0.1
Eulachon	0.0	0.0	2.4	0.0	0.1	0.0	0.6	0.0	0.0	0.0
Giant Grenadier	0.0	0.0	21.9	81.5	31.0	51.3	140.9	60.4	171.3	126.4
Greenlings	6.2	1.5	3.7	0.8	7.1	1.3	0.8	0.8	1.9	1.0
Grenadier	0.4	0.0	0.6	0.0	66.0	6.6	0.0	8.2	0.0	21.3
Gunnels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hermit crab unidentified	0.1	0.4	0.5	1.7	2.9	3.9	2.1	0.8	0.8	1.9
Invertebrate unidentified	3.7	0.0	12.6	1.6	1.3	0.1	1.1	8.9	4.5	0.4
Misc crabs	0.3	1.7	0.7	6.6	2.4	1.5	3.4	2.5	2.2	3.0
Misc crustaceans	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
Misc fish	136.5	152.5	176.0	539.4	210.5	99.0	87.6	133.7	224.7	72.8
Misc inverts (worms etc)	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other osmerids	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0
Pacific Sand lance	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Pandalid shrimp	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Polychaete unidentified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scypho jellies	1.5	1.1	4.6	0.1	0.4	0.2	10.8	0.8	0.6	1.1
Sea anemone unidentified	1.5	0.7	0.3	5.1	6.0	6.6	7.3	8.8	6.1	5.6
Sea pens whips	0.0	0.0	3.2	1.0	0.0	3.3	3.1	1.4	0.8	1.6
Sea star	1,009.3	937.7	703.5	299.0	316.5	471.9	869.4	717.2	463.6	555.7
Snails	0.6	4.8	2.9	0.8	0.9	2.5	0.7	1.3	3.7	2.4
Sponge unidentified	0.6	1.0	1.2	0.0	1.1	1.6	0.4	0.5	0.4	0.4
Stichaeidae	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0
Surf smelt	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
urchins dollars cucumbers	0.5	1.1	1.0	3.2	0.5	1.3	0.5	2.2	3.6	1.1

**Table 12.** Incidental catches (t) of non-target species groups in the BSAI in 2010-2011.

Area	BSAI	
	2010	2011
Benthic urochordata	10	34
Birds	3	3
Bivalves	3	9
Brittle star unidentified	0	1
Capelin	0	1
Corals bryozoans	12	7
Dark rockfish	4	0
Eelpouts	3	3
Eulachon	0	0
Giant grenadier	515	1067
Greenlings	1	0
Grenadier	116	10
Gunnels		
Hermit crab unidentified	1	1
Invertebrate unidentified	45	46
Lanternfishes (myctophoidae)		
Misc crabs	6	3
Misc crustaceans	0	0
Misc fish	58	92
Misc inverts (worms etc)	0	0
Other osmerids	0	0
Pacific sand lance	0	0
Pandalid shrimp	0	0
Polychaete unidentified	0	0
Scypho jellies	42	180
Sea anemone unidentified	85	123
Sea pens whips	23	24
Sea star	154	148
Snails	18	18
Sponge unidentified	14	13
Stichaeidae	0	
Surf smelt		
Urchins dollars cucumbers	2	4

**Table 13.** Groundfish bycatch, discarded and retained, for GOA Pacific cod as target species (AKFIN; as of 17 October 2013)

	2008		2009		2010		2011		2012		2013	
	D	R	D	R	D	R	D	R	D	R	D	R
Arrowtooth Flounder	2,227.0	904.7	644.9	109.0	391.4	66.6	309.0	269.8	348.0	500.4	719.7	459.3
Atka Mackerel	333.4	1.0	46.5	0.9	56.9	0.1	16.6	0.2	11.8	1.9	19.4	0.1
Flathead Sole	70.9	312.9	25.3	95.0	40.8	33.2	18.8	149.7	51.7	157.5	244.0	163.2
GOA Deep Water Flatfish	16.2	4.6	1.5	0.4	12.5	1.3	7.9	3.8	0.2	3.1	18.3	2.6
GOA Demersal Shelf Rockfish		6.1		2.0		0.8		1.6		0.5		0.4
GOA Dusky Rockfish									25.0	9.4	17.3	5.9
GOA Pelagic Shelf Rockfish	27.7	31.4	32.7	11.2	12.7	14.8	9.8	7.5				
GOA Rex Sole	35.4	113.9	0.0	66.3	8.9	6.8	8.6	31.6	27.8	109.9	26.9	82.2
GOA Rougheye Rockfish	7.3	4.2	4.0	3.3	6.5	1.8	0.9	4.5	0.6	4.3	0.8	2.3
GOA Shallow Water Flatfish	794.3	878.6	43.5	204.9	161.4	517.3	127.6	816.3	124.5	686.3	175.2	698.9
GOA Shortraker Rockfish	3.6	1.8	3.5	4.0	4.7	3.4	3.8	4.0	2.3	3.9	1.3	4.1
GOA Skate, Big	189.4	396.9	211.0	339.2	330.3	609.6	256.4	662.5	83.3	671.6	127.5	419.9
GOA Skate, Longnose	203.5	157.0	115.9	208.8	170.8	253.9	115.7	230.1	12.3	317.1	98.0	257.8
GOA Skate, Other	857.5	100.2	623.6	65.8	900.5	158.1	471.5	195.0	648.9	119.2	674.9	10.9
GOA Thornyhead Rockfish	1.0	6.5	0.4	7.4	0.6	5.4	0.4	7.0	0.3	2.7	4.9	3.3
Halibut											127.8	18.2
Northern Rockfish	91.6	47.0	10.8	13.9	13.9	4.7	7.7	8.2	26.8	24.0	46.2	61.9
Octopus							480.3	379.4	140.8	273.1	30.1	129.8
Other Rockfish	19.3	12.9	23.7	11.8	19.5	8.7	18.5	32.2	9.0	38.3	29.4	34.4
Other Species	950.5	281.4	498.1	264.1	581.9	233.4						
Pacific Ocean Perch	4.4	12.8	4.4	38.2	0.2	8.5	1.3	18.5	7.5	45.8	7.2	4.8
Pollock	2,126.1	866.9	123.2	353.2	203.9	423.7	46.1	503.7	709.8	970.5	62.0	667.4
Sablefish	297.3	63.7	25.5	19.1	43.1	70.4	33.5	60.3	0.6	23.1	48.6	15.4
Sculpin							322.3	10.3	493.4	42.2	419.4	4.4
Shark							76.0	0.7	18.7	0.6	39.0	0.0
Squid											0.2	
<b>Total</b>	<b>8,256.4</b>	<b>4,204.4</b>	<b>2,438.5</b>	<b>1,818.4</b>	<b>2,960.5</b>	<b>2,422.5</b>	<b>2,332.6</b>	<b>3,396.8</b>	<b>2,743.5</b>	<b>4,005.5</b>	<b>2,938.0</b>	<b>3,047.2</b>

**PSC**

Incidental catches of PSC in 2010-2011 are shown in Table 14. Catches of prohibited species are highest for halibut and crabs.

**Table 14.** Catches of prohibited species by BSAI and GOA Pacific cod fisheries in 2010-2011.

Area	BSAI		GOA	
	2010	2011	2010	2011
Halibut (kg)	>6.6*10 <sup>6</sup>	>3.9 * 10 <sup>6</sup>	>2*10 <sup>6</sup>	>2*10 <sup>6</sup>
Herring (kg)	94	6	0	0
Chinook salmon (n)	1264	480	435	1247
Non Chinook salmon (n)	47	287	114	0
Bairdi tanner crab (n)	>400*10 <sup>3</sup>	>300*10 <sup>3</sup>	>170*10 <sup>3</sup>	>18*10 <sup>3</sup>
Blue king crab (n)	>54*10 <sup>3</sup>	>1*10 <sup>3</sup>	0	0
Golden king crab (n)	903	385	0	2
Opilio tanner crab (n)	>300*10 <sup>3</sup>	>190*10 <sup>3</sup>	18	0
Red king crab (n)	>6*10 <sup>3</sup>	>18*10 <sup>3</sup>	0	0

**Evidence**

<http://www.afsc.noaa.gov/REFM/Docs/2013/GOApcod.pdf>

<http://www.afsc.noaa.gov/REFM/Docs/2013/EBSpcod.pdf>

<http://www.afsc.noaa.gov/REFM/Docs/2013/aipcod.pdf>

<http://www.afsc.noaa.gov/REFM/Docs/2012/GOApcod.pdf>

<http://www.afsc.noaa.gov/REFM/Docs/2012/EBSAipcod.pdf>

**Seabirds**

The incidental mortality of seabirds, mostly albatrosses and petrels, in longline fisheries continues to be a serious global concern and was major reason for the establishment of the Agreement on the Conservation of Albatrosses and Petrels (ACAP). In longline fisheries seabirds are killed when they become hooked and drowned while foraging for baits on longline hooks as the gear is deployed. They also can become hooked as the gear is hauled; however, many of these seabirds can be released alive with careful handling. Although most mitigation measures are broadly applicable, the application and specifications of some will vary with local longlining methods and gear configurations.

At the latest mitigation reduction workshop a set of recommendations to reduce seabirds bycatch was provided:

**Pelagic Longlines**

A combination of weighted branch lines, bird scaring lines and night setting are best practice mitigation in pelagic longline fisheries.

**Demersal Longlines**

Use of an appropriate line weighting regime to maximise hook sink rates close to vessel sterns to reduce the availability of baits to seabirds, actively deterring birds from baited hooks by means of bird scaring lines, and setting by night.

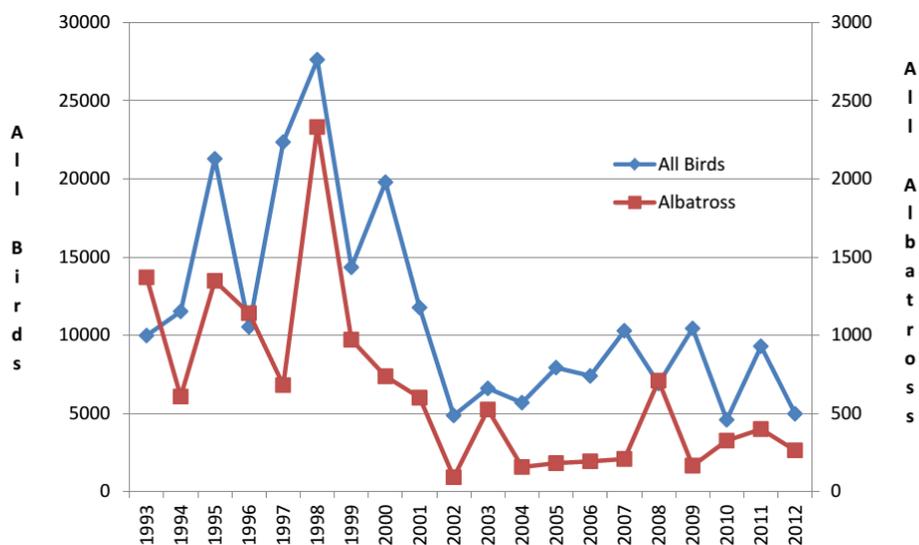
NOAA has developed a Fisheries National Seabird Program which addresses an array of seabird issues, i.e. monitoring and reducing seabird bycatch in US marine fisheries, working globally to reduce seabird interactions in international fisheries, and promoting the importance of seabirds as ecosystem indicators and a vital component of healthy ocean ecosystems.

The FMA Division supports the world's largest seabird bycatch monitoring effort through the North Pacific Groundfish Observer Program. Between 36,000 and 39,000 coverage days are completed each year in the Alaskan groundfish fisheries (longline, pot, pelagic trawl, and non-pelagic trawl), and data are provided for analysis of seabird bycatch. The AFSC has been producing estimates of seabird bycatch in Alaskan groundfish fisheries since the late 1990s.

Total estimated seabird bycatch in all Alaskan groundfish fish fisheries in 2012 was 4,997 birds. This estimate is 40% below the running 5-year average for 2007-2011 of 8,295 birds (Table 14, Figure 15). Bycatch in the longline fishery showed a marked decline beginning in 2002 due to the deployment of streamer lines as bird deterrents. In general there seems to be a generally decreasing trend since the new estimation procedures began in 2007 indicating no immediate management concern other than continuing the general goal of decreased seabird bycatch.

**Table 14.** Total estimated seabird bycatch in Alaskan groundfish fisheries, all gear types and Fishery Management Plan areas combined, 2007 through 2012. Note that these numbers represent extrapolations from observed bycatch, not direct observations. See text for estimation methods.

Species/Species Group	2007	2008	2009	2010	2011	2012
Unidentified Albatross	16	0	0	0	0	0
Short-tailed Albatross	0	0	0	15	5	0
Laysan Albatross	17	420	114	267	189	128
Black-footed Albatross	176	290	52	44	206	136
Northern Fulmar	4,581	3,426	7,921	2,357	6,214	3,016
Shearwater	3,602	1,214	622	647	199	510
Storm Petrel	1	44	0	0	0	0
Gull	1,309	1,472	1,296	1,141	2,208	885
Kittiwake	10	0	16	0	6	5
Murre	7	5	13	102	14	6
Puffin	0	0	0	5	0	0
Auklet	0	3	0	0	0	7
Other Alcid	0	0	105	0	0	0
Other Bird	0	0	136	0	0	0
Unidentified	509	40	166	18	259	284
<b>Total</b>	<b>10,228</b>	<b>6,914</b>	<b>10,441</b>	<b>4,596</b>	<b>9,298</b>	<b>4,997</b>



**Figure 15.** Seabird bycatch in Alaskan groundfish fisheries, all gear types combined, 1993 to 2012. Total estimated bird numbers are shown in the left-hand axis while estimated albatross numbers are shown in the right-hand axis.

#### Evidence

<http://www.afsc.noaa.gov/REFM/Docs/2013/ecosystem.pdf>

#### ***Incidental Take of an Endangered Short-Tailed Albatross in the Pacific cod fishery***

In 2011, a groundfish fishery observer reported to their inseason advisor that they had recovered a short-tailed albatross (*Phoebastria albatrus*) (listed as endangered under the US Endangered Species Act in 2000) while monitoring gear retrieval on a Bering Sea freezer longline vessel fishing for Pacific cod. The AFSC immediately reported this take to the U.S. Fish and Wildlife Service and also informed interested parties in NOAA, the fishing industry, and environmental non-government organizations. Based on information supplied by AFSC staff, the Alaska Regional Office issued a Fisheries Information Bulletin on 31 October 2011, describing this most recent take. The Short-tailed Albatross Biological Opinion for the longline fleet allows for 4 observed birds in a two-year period. This is based on observed birds, whether within or outside of the actual sample period, and is not based on the extrapolated numbers. A new 2-year period began on 16 September 2011, making this the first take in the current period. The vessel was using paired streamer lines and had not observed any short-tailed albatross in the area prior to the take event.

This single Short-tailed albatross recorded by an observer expanded to an estimate of 5 birds taken by the Pacific cod fishing fleet in 2011, according to the bird catch accounting system. There are no reported Short-tailed albatross takes thus far in 2013.

Some of the most current species status information for the North Pacific albatrosses can be found in the Agreement on the Conservation of Albatrosses and Petrels (ACAP) website in their [species](#)

[assessments](#). The short-tailed, black-footed and Laysan albatross species are all listed under ACAP's Annex 1.

<http://www.acap.aq/acap-species/english/other-documents/species-assessments>

#### **Seabird avoidance by fishing gears and methods**

Several regulations on seabird avoidance by fishing gears and methods are in place. Regulations - 50 CFR 679: Fisheries of the Exclusive Economic Zone Off Alaska. These are specifically:

§ 679.2 Definitions. Definition of avoidance gear and seabirds.

§ 679.5 Recordkeeping and Reporting. 679.5(c)(1)(xvii) The bird avoidance gear codes used on Catcher Vessel Daily Fishing Logbook (DFL) and Catcher/processor Daily Cumulative Production Logbook (DCPL)

§ 679.24 Gear Limitations. 679.24(e) Seabird avoidance program for vessels fishing with hook-and-line gear.

§ 679.32 Groundfish and halibut CDQ catch monitoring. 679.32(f)(5) Seabird avoidance requirements for CDQ.

§ 679.42 Limitations on use of QS and IFQ. 679.42(b)(2) Seabird avoidance gear and methods for IFQ.

§ 679.50 Groundfish Observer Program. 679.50(g)(1)(viii)(F) Vessel responsibilities for collecting all seabirds that are incidentally taken.

<http://alaskafisheries.noaa.gov/protectedresources/seabirds.htm>

<http://alaskafisheries.noaa.gov/protectedresources/seabirds/regulations.htm>

<http://alaskafisheries.noaa.gov/protectedresources/seabirds/bycatchregs.htm>

<http://alaskafisheries.noaa.gov/protectedresources/seabirds/guide.htm>

<http://www.afsc.noaa.gov/REFM/Docs/2013/ecosystem.pdf>

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

*FAO CCRF 9.1.2/9.1.3/9.1.4/9.1.5/9.3.1/9.3.5*

**Evidence adequacy rating:**

**High**

**Medium**

**Low**

**Fundamental Clause 14 “Where fisheries enhancement is utilized, environmental assessment and monitoring must consider genetic diversity and ecosystem integrity” is not applicable to the Alaska Pacific cod commercial fishery as it is not an enhanced fishery.**

## **8. Performance specific to agreed corrective action plans**

Not Applicable. This is the 1<sup>st</sup> FAO RFM Alaska Pacific cod surveillance assessment report. Non-conformances were issued neither during the full assessment nor the surveillance assessment. However, splitting of the Aleutian Islands and Eastern Bering Sea TAC was identified during full assessment as an item of importance during the first surveillance. The NPFMC final plans to address this issue were formulated in early 2013. BS/AI TAC split took place in December 2013.

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

Not applicable as no unclosed or new non-conformances has been issued.

## **10. Future Surveillance Actions**

The assessment team will review the following during the 2015 surveillance assessment:

- Re-instatement of Alaska Coastal Management Plan
- Coverage of restructured groundfish observer program

## **11. Client signed acceptance of the action plan**

Not applicable.

## **12. Recommendation and Determination**

Following this 1<sup>st</sup> surveillance assessment, in 2014, the assessment team and the certification committee recommends that continued Certification under the FAO-Based Responsible Fisheries Management Certification Program is maintained for the management system of the applicant fishery, the Pacific cod commercial fishery employing bottom trawl gear, longline gear, pot gear and jig gear within Alaska jurisdiction (200 nautical miles EEZ), and subjected to federal [National Marine Fisheries Service (NMFS)/North Pacific Fishery Management Council (NPFMC)] and state [Alaska Department of Fish and Game (ADFG) & Board of Fisheries (BOF)] management.

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## Appendix 1

Based on the technical expertise required to carry out the above fishery assessment, Global Trust Certification Ltd., is pleased to confirm the 3<sup>rd</sup> Surveillance assessment team members for the fishery as follows:

### **Dr. Ivan Mateo**

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

### **Dr. Geraldine Criquet**

Géraldine Criquet holds a PhD in Marine Ecology (École Pratique des Hautes Études, France) which focused on coral reef fisheries management, Marine Protected Areas and fish ecology. She has also been involved during 2 years in stock assessments of pelagic resources in the Biscay Gulf, collaborating with IFREMER. She worked 2 years for the Institut de Recherche pour le Développement (IRD) at Reunion Island for studying fish target species growth and connectivity between fish populations in the Indian Ocean using otolith analysis. She served as Consultant for FAO on a Mediterranean Fisheries Program (COPEMED) and developed and implemented during 2 years a monitoring program of catches and fishing effort in the Marine Natural Reserve of Cerbère-Banyuls (France). Geraldine has joined Global trust Certification in August 2012 as Fisheries Assessment Officer and is involved in FAO RFM and MSC fisheries assessments.

### **Bruce R. Turris, Assessor**

Bruce Turris is the President of Pacific Fisheries Management Inc. (PFMI), a consulting firm that provides policy, strategic planning and management advice to clients involved in the commercial fishing industry, including government agencies, commercial fishing associations, environmental organizations and eco-certification companies. Bruce has been involved in commercial fisheries management for more than 30 years, having worked for the Canadian Department of Fisheries and Oceans from 1984 – 1997, where he was the Groundfish Manager, Pacific Region. During his career in fisheries, Bruce has been involved in the design, development and implementation of more than a dozen catch share programs throughout North America, including a comprehensive integrated groundfish program in British Columbia consisting of multiple gear types and more than 60 fish

stocks. Bruce has been involved with the management of Pacific halibut and Pacific cod throughout his career and continues to be closely involved in the management of west coast groundfish fisheries, serving as an advisor to numerous regional, national and international groundfish advisory committees.

**Vito Ciccio Romito (Lead Assessor)**

Vito Ciccio Romito holds a BSc in Ecology and an MSc in Tropical Coastal Management (Newcastle University, United Kingdom). His BSc studies focused on bycatch, discards, benthic impact of commercial fishing gear and relative technical solutions, after which he spent a year in Tanzania as a Marine Research officer at Mafia Island Marine Park carrying out biodiversity assessments and monitoring studies of coral reef, mangrove and seagrass ecosystems. Subsequently, for his MSc, he worked on fisheries assessment techniques, ecological dynamics of overexploited tropical marine ecosystems, and evaluation of low trophic aquaculture as a support to artisanal reef fisheries. Since 2010, he has been fully involved through Global Trust with the FAO-based RFM Assessment and Certification program covering the Alaska commercial salmon, halibut, sablefish, Pollock, crab and cod fisheries as well Icelandic Cod, Saithe, Haddock and Redfish fisheries. Vito is also a lead, third party IRCA approved auditor.