FAO-BASED RESPONSIBLE FISHERIES MANAGEMENT CERTIFICATION FULL ASSESSMENT AND CERTIFICATION REPORT

For The

U.S. Alaska Flatfish Complex Commercial Fisheries

Applicant Group

Alaska Seafood Marketing Institute (ASMI)

Published in January 2014

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I. Summary and Recommendations

Summary

The Alaska Seafood Marketing Institute (ASMI), on behalf of the Alaska flatfish commercial fisheries, has requested its assessment to the requirements of the United Nations Food and Agriculture Organisation (FAO) Code of Conduct for Responsible Fisheries (CCRF, 1995) based Responsible Fisheries Management (RFM) Certification Program.

The ASMI application was made in late 2012. After Validation Assessment was completed in July, 2013, a full Assessment Team was formed to undertake the assessment and final certification determination was given on the 5th of December 2013.

The Alaska flatfish complex consisting of species distributed in the Bering Sea/Aleutian Islands (BSAI) and the Gulf of Alaska (GOA) includes BSAI Alaska plaice (*Pleuronectes quadrituberculatus*), BSAI/GOA arrowtooth flounder (*Atheresthes stomias*), BSAI/GOA flathead sole (*Hippoglossoides elassodon*), BSAI Greenland turbot (*Reinhardtius hippoglossoides*), BSAI Kamchatcka flounder (*Atheresthes evermanni*), BSAI/GOA northern rock sole (*Lepidopsetta polyxystra*), GOA rex sole (*Glyptocephalus zachirus*), GOA southern rock sole (*Lepidopsetta bilineata*) and BSAI yellowfin sole (*Limanda aspera*). These are the species of focus in this Assessment and Certification Report. The Alaskan flatfish complex commercial fisheries employ bottom trawl gear and longline gear (Greenland Turbot only) within Alaska jurisdiction (200 nautical miles EEZ). These fisheries are principally managed by two federal agencies, the National Marine Fisheries Service (NMFS) and the North Pacific Fishery Management Council (NPFMC).

The FAO CCRF was initiated in 1991 by the FAO Committee on Fisheries and unanimously adopted on 31 October 1995 by the over 170 member Governments of the FAO Conference. A further FAO document, the Guidelines on Eco-labelling of Fish and Fishery Products from Marine Capture Fisheries (FAO 2005, FAO 2009) was used to help contextualize and add clarity to the audit criteria, and to integrate the fishery minimum substantive requirements within the conformance criteria. The fisheries specific conformance reference points from the published FAO CCRF and Eco-labelling guidelines (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 FAO CCRF, Eco-labelling Guidelines and the FAO-Based RFM Conformance Criteria were submitted to a National Accreditation Board of the International Accreditation Forum for further cross reference and ISO 65/EN45011 accreditation validity. Formal accreditation was granted in February 2012.
This Full Assessment Report should be read in conjunction with the Certification Summary attached in Appendix 3 of this document.

The assessment was conducted according to the SAI Global/Global Trust procedures for FAO-Based RFM Certification using the FAO-Based Conformance Criteria (Version 1.2, September 2011). Whilst the FAO CCRF contains Articles with various focuses (e.g. post landing requirements, aquaculture), the core of the FAO-Based Conformance Criteria requirements focus on responsible fisheries management, including enhancement practices (but excluding full cycle aquaculture), up to the point of landing, with the main objective being the biological sustainability of the “stock under consideration”, with due consideration for conservation, biodiversity and ecosystem integrity; and regard to social responsibility and the economic viability of the fishery.

During the assessment process the key outcomes evaluated and documented by the Assessment Team included:

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

Outcome summaries for Section A-F of the Full Assessment and Certification Report can be found in Section 6.

Please note that the website references provided in this report were correct at the time of the assessment.

Recommendations

Recommendation of the Assessment Team

The Assessment Team recommends that the management system of the applicant fishery, the Alaska flatfish complex consisting of species distributed in the Bering Sea/Aleutian Islands (BSAI) and the Gulf of Alaska (GOA) including BSAI Alaska plaice (*Pleuronectes quadrituberculatus*), BSAI/GOA arrowtooth flounder (*Atheresthes stomias*), BSAI/GOA flathead sole (*Hippoglossoides elassodon*), BSAI Greenland turbot (*Reinhardtius hippoglossoides*), BSAI Kamchatcka flounder (*Atheresthes evermanni*), BSAI/GOA northern rock sole (*Lepidopsetta polyxystra*), GOA rex sole (*Glyptocephalus zachirus*), GOA southern rock sole (*Lepidopsetta bilineata*) and BSAI yellowfin sole (*Limanda aspera*) taken with bottom trawl gear and longline gear (Greenland Turbot only) within Alaska jurisdiction (200 nautical miles EEZ) managed by two federal agencies, the National Marine Fisheries Service (NMFS) and the North Pacific Fishery Management Council (NPFMC), is certified against the FAO-Based Responsible Fisheries Management Certification Program.

Peer Reviewer A's main summary and recommendation states:

The NPFMC has a stellar reputation for precautionary management, and most of the flatfish stocks appear to be very lightly exploited (with the exception of Greenland turbot), so the main issue with evaluating an entire species complex comes down to management of weak stocks, fishery effects on essential fish habitat, and the assessment of stock status on more minor species in the complex. The main challenge is therefore an assessment of a multispecies target fishery and associated bycatch levels and how potential changes in fishery operations (e.g. use of halibut excluders, development of market for minor species) may change impacts on other species in the complex or in the wider ecosystem, and how the management system is structured to monitor and manage those effects in the future.

The report characterises the stock-specific management and time series very well. Ample information is provided about the NPFMC tier system and its application to flatfish. However, the fishery complex itself; the catch assemblage and how it changes with target or season or area, is not characterised (only partially under section 3.5). I think this is because the certification clauses are focused on single species target fisheries with some "ecosystem" effects, rather than a multispecies target and therefore there are important fishery dynamics that are not yet assessed in the report.

My comments on specific aspects of the report are in the sections below. My main recommendation is that report text needs to be developed to characterise "the fishery", i.e. Total species composition depending on main targets in the BSAI and GOA (these numerical summaries are in the SAFE chapters already, and similar to Table 30 for GOA rex sole, but need to be tied together and described for the report reader). I would add this as a section 3.6 instead of "Incidental catch in the Alaska flatfish complex fishery". Then conduct an evaluation of what limits the catch for each of the targets (e.g., Is it target species TAC, PSC, TAC of Greenland turbot, or Alaska plaice). And finally, then evaluate how the management system would detect and manage fishery changes resulting from a change in that constraint. Using this information to score section 8 and section 13 would then round out the evaluation.

Overall comments about the report

As I mention above, there are several aspects of report structure which caused me confusion and should be addressed. There is no rationale given for which species are included in the application. Why not all the species in the complex? The flatfish complex fishery is not characterised. The approach appears to be that species that are managed with separate TACS are treated as fisheries. But it is clear that these species are harvested together in different proportions depending on the timing and location of fishing. The report is not clear in how to evaluate this as a complex, as the certification criteria are clearly aimed at a single species target stock fishery. The criteria and assessment units are therefore framed as target species, but the other species in the application are not listed as bycatch within those target fisheries when bycatch is discussed. Is this report merely 12 species all seeking certification at the same time?

Conversely, if the application is to evaluate the species complex as a whole, then where is the description of the complex fishery and how it interacts with the various flatfish species (both those with separate TACS and those with combined TACs)? Which species are targeted as a complex and what is bycatch from that complex? This is not just semantics. Am I to assume that the constrained Greenland turbot quota has no impact on the other species harvested in the Bering Sea? Then there are the 16 “Other flatfish” species in the BSAI and 6 other flatfish species in the GOA shallow water complex - which are not mentioned at all - even under the ecosystem effects section. Several of these other flatfish species are also managed at tier 5, so it is confusing as to why some tier 5 species are in the application and some are not (e.g. Starry flounder and Rex sole in the Bering Sea).

Further, the proposed units of assessment in Section 4 combines BSAI and GOA stocks for the species in common while the report splits them, as does the NPFMC. This again blurs what is meant by the complex, the target, or the region. The rationale for this aggregation is not given and Section 4 seems a bit late in the document to specify – unless the first three sections are supposed to generate the rationale for the units? That purpose is not apparent.

One other general report feature is that the document navigation only goes to broad headings, and the individual sub-sections (such as “Incidental catch in the Alaska flatfish complex fishery”) do not show up anywhere as identified headings. Further, the order (and number) of stocks addressed in a given section varies (e.g. in the incidental catch section only 4 stocks are summarised). With 12 stocks, I spent most of my time thumbing back and forth trying to find information. Better document navigation and table of contents would allow a more consistent document structure.

I found the stock assessment section provided a lot of detail that was not necessary. The criteria do not ask for a technical review of the stock assessments themselves, rather the focus is on whether the management system is receiving adequate advice on stock status relative to its reference points and control rules. Therefore, I think including stock assessment details are not necessary and that any technical review of the performance of the assessments requires direct review of the assessment itself, not a summary.

Peer Reviewer B’s main summary and recommendation states:

The information presented in sections 1, 2 and 3 and elsewhere in the report provide sufficient information to support a broad understanding of the general history, development and main management entities and management systems in use by the fishery.

I generally agree with the recommendations and ratings of the assessment team but note two sections (4. and 7.) where additional evidence is required and for others where some discussion or changes are required.

The document is reasonably well written although the background material, in particular, is needlessly repetitious and reflects a excessively cut-and-paste style. The ratings section is better written although still repetitious. Some of this results from the repetition in the clauses.

I do find the tone of the document overly positive. The Alaska Flatfish fishery is not without its difficulties but the document tends to focus on the achievements and not the weaknessses. In particular the document tends to assume that because a process is place, that all the criteria are met without more investigation into how well the process works. In this respect, I note:

- Partial observer programs are fraught with problems, but there is little discussion of the potential for bias.
- The document, and therefore I assume the management of fisheries in Alaska pays little or no attention to the assessment of minor fish species that are not prohibited, or of commercial value. I refer to such species as sculpins and poachers.
- The document keeps repeating that methodology that is in place to ensure that the logic for choosing a TAC is precautionary, but less time demonstrating that catches are kept within the TACs.
- In section 13.1.4, the document notes that *Habitat interaction is not considered significant due to the development of trawl sweep modification, already implemented in the BSAI Region and to be implemented in the GOA in 2014.* This change is oversold. The footrope still does damage. The problem has not gone away (see my comment in 13.1.4).

I have elaborated on these issues within the appropriate sections below and conclude with some editorial suggestions.

Note. All Peer Review comments were addressed by the Assessment Team. The Peer Review reports can be found in Section 8 along with the Assessment Team responses to comments made.

Determination: The appointed members of the SAI Global/Global Trust Certification Committee met on 5th December 2013. After a detailed discussion, the Committee determined that the applicant fishery, the Alaska flatfish complex consisting of species distributed in the Bering Sea/Aleutian Islands (BSAI) and the Gulf of Alaska (GOA) including BSAI Alaska plaice (*Pleuronectes quadrituberculatus*), BSAI/GOA arrowtooth flounder (*Atheresthes stomias*), BSAI/GOA flathead sole (*Hippoglossoides elassodon*), BSAI Greenland turbot (*Reinhardtius hippoglossoides*), BSAI Kamchatcka flounder (*Atheresthes evermanni*), BSAI/GOA northern rock sole (*Lepidopsetta polyxystra*), GOA rex sole (*Glyptocephalus zachirus*), GOA southern rock sole (*Lepidopsetta bilineata*) and BSAI yellowfin sole (*Limanda aspera*) taken with bottom trawl gear and longline gear (Greenland Turbot only) within Alaska jurisdiction (200 nautical miles EEZ) managed by two federal agencies, the National Marine Fisheries Service (NMFS) and the North Pacific Fishery Management Council (NPFMC), is certified against the FAO-Based Responsible Fisheries Management Certification Program.

I. Schedule of Key Assessment Activities

Assessment Activities	Date (s)
Application Date	December, 2012
Initial Site Visit Consultation Meetings	March, 2013
Initial Validation Assessment Report	July, 2013
Appointment of Full Assessment Team	August, 2013
On-site Witnessed Assessment and Consultation Meetings	September, 2013
Draft Assessment Report	October, 2013
External Peer Review	November, 2013
Final Assessment Report	December 2013
Certification Review/Decision	5th December 2013

II. Assessment Team Details

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***Validation Report Prepared by*:** Vito Ciccia Romito, Erica Fruh, Geraldine Criquet and Jeff Fargo.

II. Acronyms

ABC	Allowable Biological Catch
ACL	Annual Catch Limit
ADFG	Alaska Department of Fish and Game
AFA	American Fisheries Act
AFSC	Alaska Fisheries Science Center
AI	Aleutian Islands
AP	Advisory Panel
ASMI	Alaska Seafood Marketing Institute
AWT	Alaska Wildlife Troopers
BOF	Board of Fisheries
BSAI	Bering Sea and Aleutian Islands
CAS	Catch Accounting System
CCRF	Code of Conduct for Responsible Fisheries
CDQ	Community Development Quota
CFEC	Commercial Fisheries Entry Commission
CIE	Center of Independent Expert
CPUE	Catch per Unit Effort
EBS	Eastern Bering Sea
EIS	Environmental Impact Statement
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
ESA	Endangered Species Act
FAO	Food and Agriculture Organization of the United Nations
FMA	Fisheries Monitoring and Analysis Division
FMP	Fishery Management Plan
GOA	Gulf of Alaska
GHL	Guideline Harvest Level
GHR	Guideline Harvest Range
GRS	Groundfish Retention Standard
IFQ	Individual Fishing Quota
IPHC	International Pacific Halibut Commission
IRFA	Initial Regulatory Flexibility Analysis
IR/IU	Improved Retention/Improved Utilization
LLP	License Limitation Program
MSA	Magnuson-Stevens Fisheries Management and Conservation Act
MSST	Minimum Stock Size Threshold
MSY	Maximum Sustainable Yield
mt	Metric tons
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
NPRB	North Pacific Research Board
OFL	Overfishing Level
OLE	Office for Law Enforcement
OY	Optimum Yield

PA	Precautionary Approach
PSC	Prohibited Species Catch
RACE	Resource Assessment and Conservation Engineering
RAM	Restricted Access Management
REFM	Resource Ecology and Fisheries Management
RFM	Responsible Fisheries Management
RFA	Regulatory Flexibility Act
SAFE	Stock Assessment and Fishery Evaluation (Report)
SSC	Scientific and Statistical Committee
SSL	Steller Sea Lion
TAC	Total Allowable Catch
USCG	U.S. Coast Guard

1. Introduction

The US Alaska flatfish complex commercial fisheries, under federal (NMFS/NPFMC) management, fished with bottom trawl and longline gear (only Greenland Turbot), within Alaska's 200 nm EEZ, were assessed against the requirements of the FAO-Based RFM Conformance Criteria Version 1.2. The application was made by the Alaska Seafood Marketing Institute (ASMI) on behalf of Alaska flatfish complex commercial fisheries and participants, and was validated by SAI Global/ Global Trust Certification Ltd.

This Full Assessment and Certification Report documents the procedure and assessment for the certification of commercially exploited Alaska flatfish species to the FAO-Based RFM Certification Program. This is a voluntary program for Alaska fisheries that has been supported by ASMI who wishes to provide an independent, third-party certification program that can be used to verify that Alaska flatfish complex fisheries are responsibly managed according to the FAO Code of Conduct for Responsible Fisheries.

The assessment was conducted according to the SAI Global/Global Trust procedures for FAO-Based RFM Certification in accordance with EN45011/ISO/IEC Guide 65 accredited certification procedures. The assessment is based on the criteria specified in the FAO CCRF and the minimum substantive criteria set out for marine fisheries in the FAO Guidelines for the Eco-Labeling of Fish and Fishery Products from Marine Capture Fisheries (2005/2009), hereafter referred to as the FAO-Based RFM Conformance Criteria.

The assessment is based on 6 major components of responsible management derived from the FAO CCRF and Guidelines for the Eco-labelling of products from marine capture fisheries.

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 which in turn are sustained by 122 sub-clauses. Collectively, these form the FAO-Based Conformance Criteria Version 1.2 against which a capture fishery applying for RFM assessment and certification is assessed.

The assessment comprised of application review, validation reporting, assessment planning, assessment and verification reporting, Peer Review and Certification Committee review and decision. Two site visits were made to the fishery during the assessment.

A summary of the consultation meetings is presented in Section 5. Assessors were comprised of both externally contracted fishery experts and SAI Global/Global Trust internal staff (Appendix 1). Peer Reviewers were comprised of externally contracted fisheries experts (Appendix 2).

This report documents each step in the assessment process and the recommendation to the Certification Committee of SAI Global/Global Trust who presided over the certification decision, the 5th December 2013, according to the requirements of ISO/IEC Guide 65 accredited certification.

1.1 Recommendations of the Assessment Team

Recommendation of the Assessment Team

The Assessment Team recommends that the management system of the applicant fishery, the Alaska flatfish complex consisting of species distributed in the Bering Sea/Aleutian Islands (BSAI) and the Gulf of Alaska (GOA) including BSAI Alaska plaice (*Pleuronectes quadrituberculatus*), BSAI/GOA arrowtooth flounder (*Atheresthes stomias*), BSAI/GOA flathead sole (*Hippoglossoides elassodon*), BSAI Greenland turbot (*Reinhardtius hippoglossoides*), BSAI Kamchatcka flounder (*Atheresthes evermanni*), BSAI/GOA northern rock sole (*Lepidopsetta polyxystra*), GOA rex sole (*Glyptocephalus zachirus*), GOA southern rock sole (*Lepidopsetta bilineata*) and BSAI yellowfin sole (*Limanda aspera*), taken with bottom trawl gear and longline gear (Greenland Turbot only) within Alaska jurisdiction (200 nautical miles EEZ) managed by two federal agencies, the National Marine Fisheries Service (NMFS) and the North Pacific Fishery Management Council (NPFMC), is certified against the FAO-Based Responsible Fisheries Management Certification Program.

2. Fishery Applicant Details

<table>
<tr><td colspan="4">Applicant Contact Information</td></tr>
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Company Name:</td><td>Alaska Seafood Marketing Institute</td><td>Date:</td><td>April 2010</td></tr>
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E-mail Address:</td><td>rrice@alaskaseafood.org</td></tr>
</table>

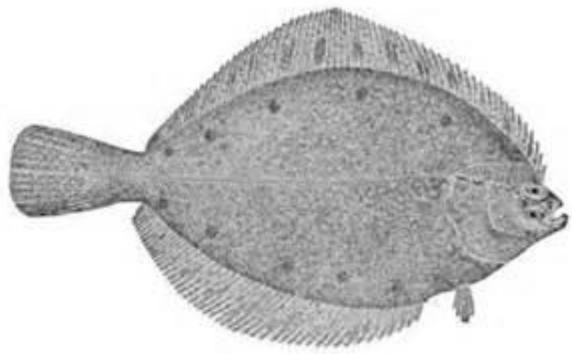
3. Background to the fishery

3.1. Species Biology

Alaska plaice (BSAI)

General Description

Alaska plaice (*Pleuronectes quadrituberculatus*) (Pallas, 1814) distribution extends through the Sea of Japan, Chukchi Sea, the Bering Sea and Aleutian Islands and the northern Gulf of Alaska. Alaska plaice are generally found along the eastern Bering Sea continental shelf, with relatively few found in the Aleutian Island region. Alaska plaice can be identified by the yellow coloring of the blind side, its small mouth and by the four prominent protuberances along the postocular ridge. Plaice are primarily caught as bycatch in directed fisheries for other members of the flatfish complex. Retention of this species has increased dramatically as new markets for plaice have been developed.



Alaska plaice (*Pleuronectes quadrituberculatus*) Picture by Bull. U.S. Bur. Fish.

Growth and Reproduction

Alaska plaice recruit to trawl fisheries at age 4, and are fully recruited by age 13. The Alaska Fisheries Science Center has determined a maximum age in excess of 30 years. Females mature between ages 7 and 12. Alaska plaice is a relatively large flatfish averaging about 32 cm in length and 390 g in weight in commercial catches. Spawning usually occurs in March and April on hard sandy substrate in the eastern Bering Sea.

Habitat and Feeding ecology

Eggs/Larvae/Juveniles: Eggs and larvae are pelagic. EFH for late juvenile Alaska plaice 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 softer substrates consisting of sand and mud.

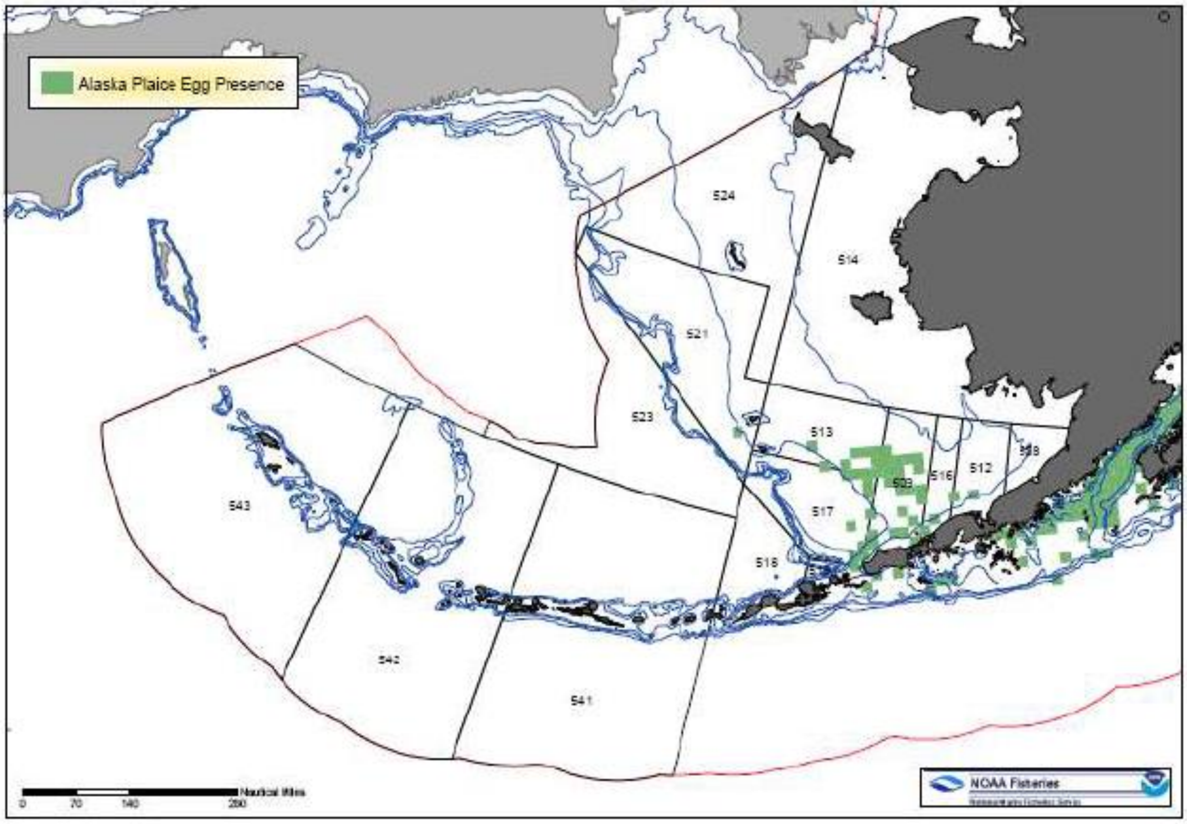


Figure 1. Egg presence for Alaska plaice in the BSAI and the GOA.

Adults: Summer distribution of adults is generally confined to depths less than 110 m, with larger fish in deeper waters and smaller juveniles in shallower coastal waters. Alaska plaice predate on polychaetes and amphipods and are prey for Pacific cod, Pacific halibut and yellowfin sole.

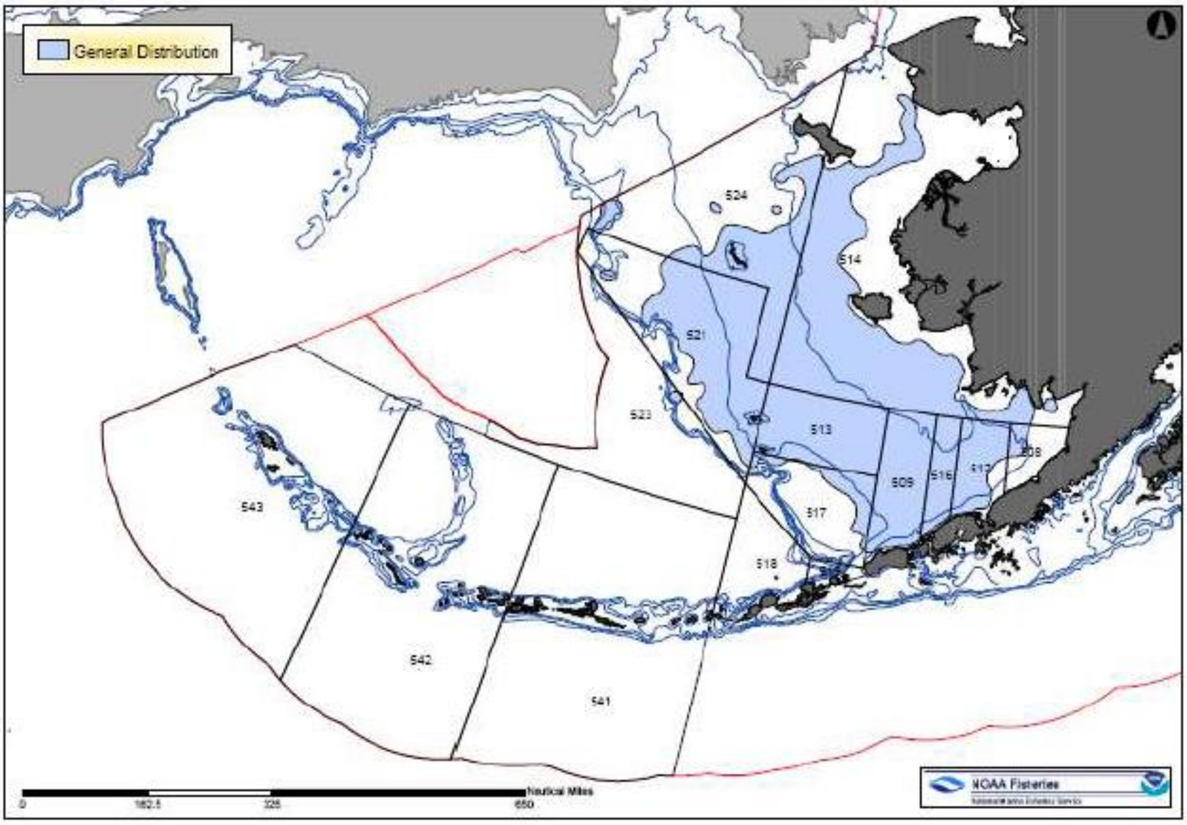


Figure 2. EFH Distribution - BSAI Alaska Plaice (Late Juveniles/Adults).

NPFMC groundfish species profiles 2011:
http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Species_Profiles2011.pdf

Fishery Management Plan for the Groundfish of the BSAI 2013:
http://www.alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf

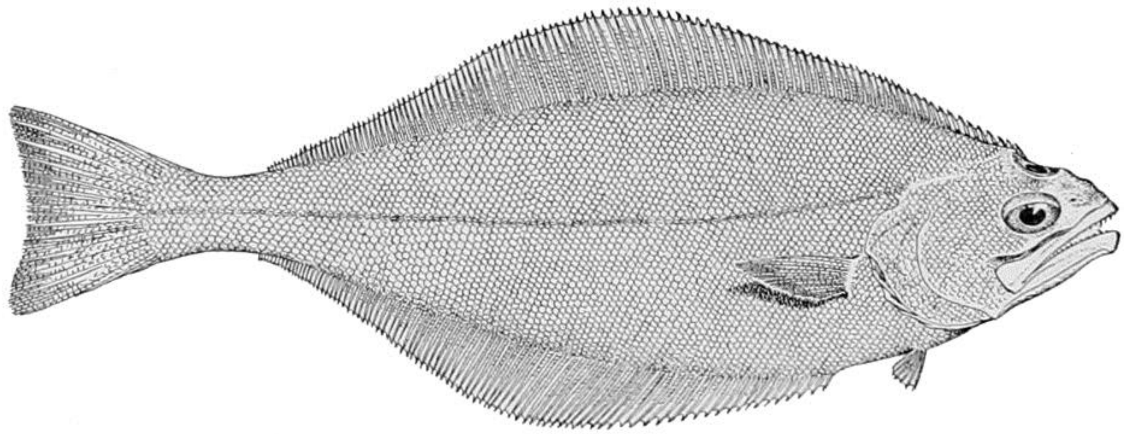
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmpAppendix613.pdf

Arrowtooth flounder (BSAI and GOA)

General Description

Arrowtooth flounder (*Atheresthes stomias*) (Jordan & Gilbert, 1880) are distributed from the Kamchatka Peninsula to the BSAI and south to central California, and currently are the most abundant fish in the Gulf of Alaska. Arrowtooth flounder are a relatively large, brownish colored flatfish with a large mouth and large teeth in two rows on upper jaw. Adults exhibit a benthic lifestyle and occupy separate winter and summer distributions on the EBS shelf. From over-winter grounds near the shelf margins and upper slope areas, adults begin a migration onto the middle and inner shelf in April or early May each year with the onset of warmer water temperatures.

Little effort has been directed to catching arrowtooth flounder due to the poor quality of their flesh. Upon landing, a proteolytic enzyme released from a myxosporean parasite causes softening of the flesh that further limits their marketability. Recently, several food grade additives have been successfully used that inhibit enzymatic breakdown. These discoveries have recently enabled a targeted fishery in the Kodiak Island area for marketable products including surimi and frozen fillets. The bulk of the harvest is a bycatch in directed fisheries for other species, although new markets are being developed.



Arrowtooth flounder (*Atheresthes stomias*) from FAO (http://www.fao.org/fishery/species/3356/en)

Growth and Reproduction

Arrowtooth flounder recruitment to the fishery begins at about 5 years, and females are fully recruited by age 9. Adult males range in size from 30-50 cm, and females range in size from 30-70 cm. The spawning period for arrowtooth flounder is protracted and variable, ranging from September through March. The age and length of 50% maturity (A_{50},$L_{50,}$ respectively) for arrowtooth flounder females is 7.6 years of age and 480 mm in body length. Stark (2012) determined that arrowtooth flounder maturation was consistent between the Gulf of Alaska and eastern Bering Sea populations.

Habitat and Feeding ecology

Larvae/Juveniles: Planktonic larvae for at least 2 to 3 months until metamorphosis occurs, juveniles usually inhabit shallow areas until about 10 cm in length. Juveniles occupy continental shelf waters until age 4, at which point their range expands onto the continental slope.

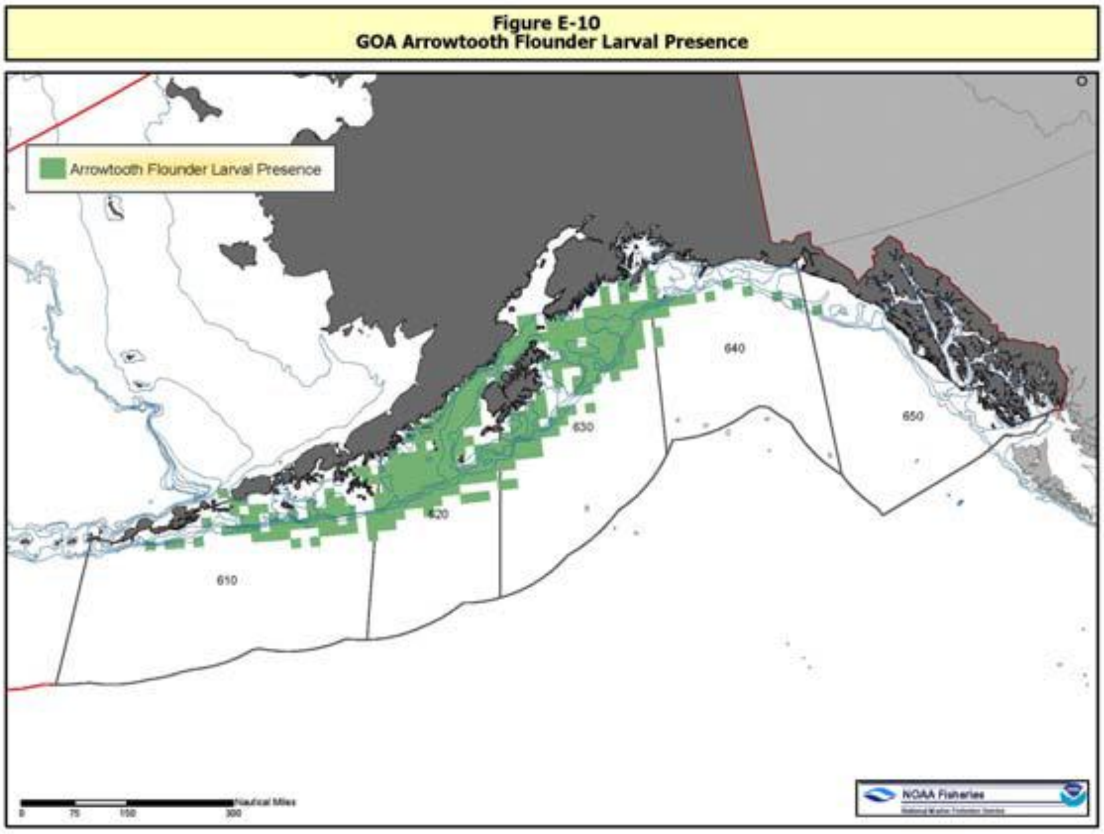


Figure 3. Larval presence for arrowtooth flounder in the GOA.

Adults: Adults migrate seasonally from shelf margins in the winter to the outer shelf in April/May with the onset of warmer waters temperatures. Arrowtooth flounder are very important as a large, aggressive and abundant predator of other groundfish species. In the Bering Sea Aleutian Islands, arrowtooth flounder predate on juvenile pollock (47%), adult pollock (19%) and euphausiids (9%). A variety of fish and marine mammals prey on arrowtooth flounder, including skates, sharks, shortspine thornyhead, halibut, orcas, toothed whales, and harbor seals. In the Gulf of Alaska, arrowtooth flounder are an important part of the diet of Steller sea lions.

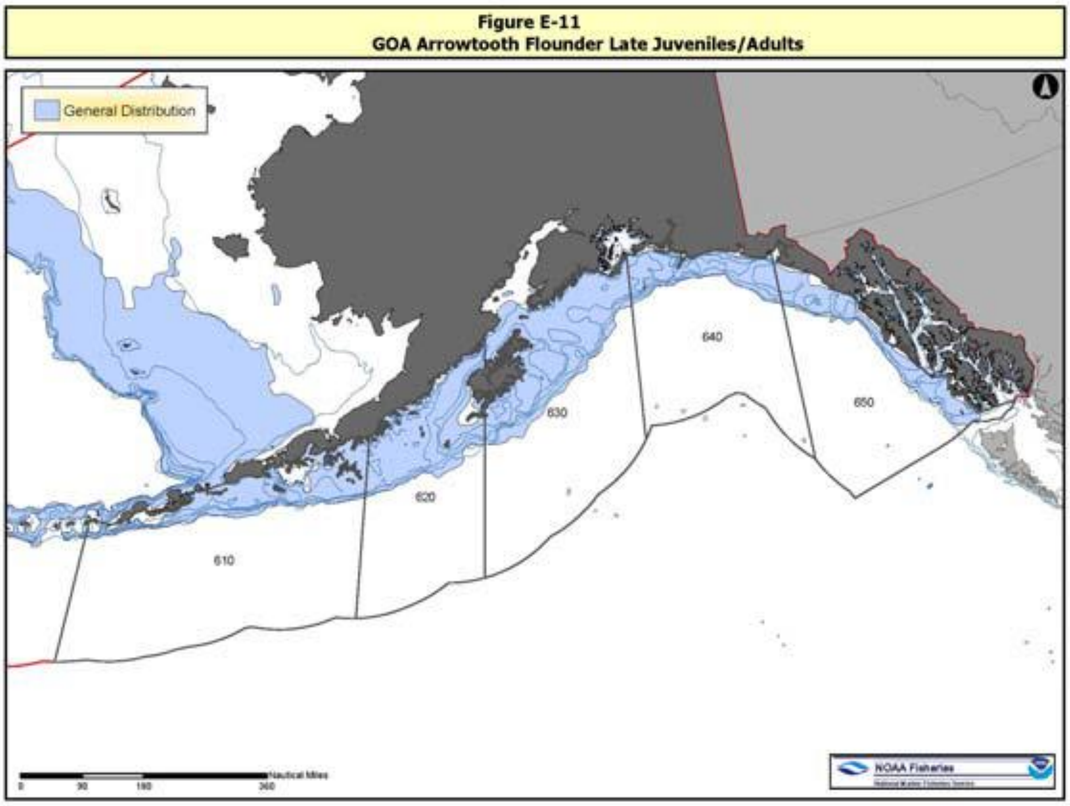


Figure 4. Late juvenile and adult presence of arrowtooth flounder in the GOA.

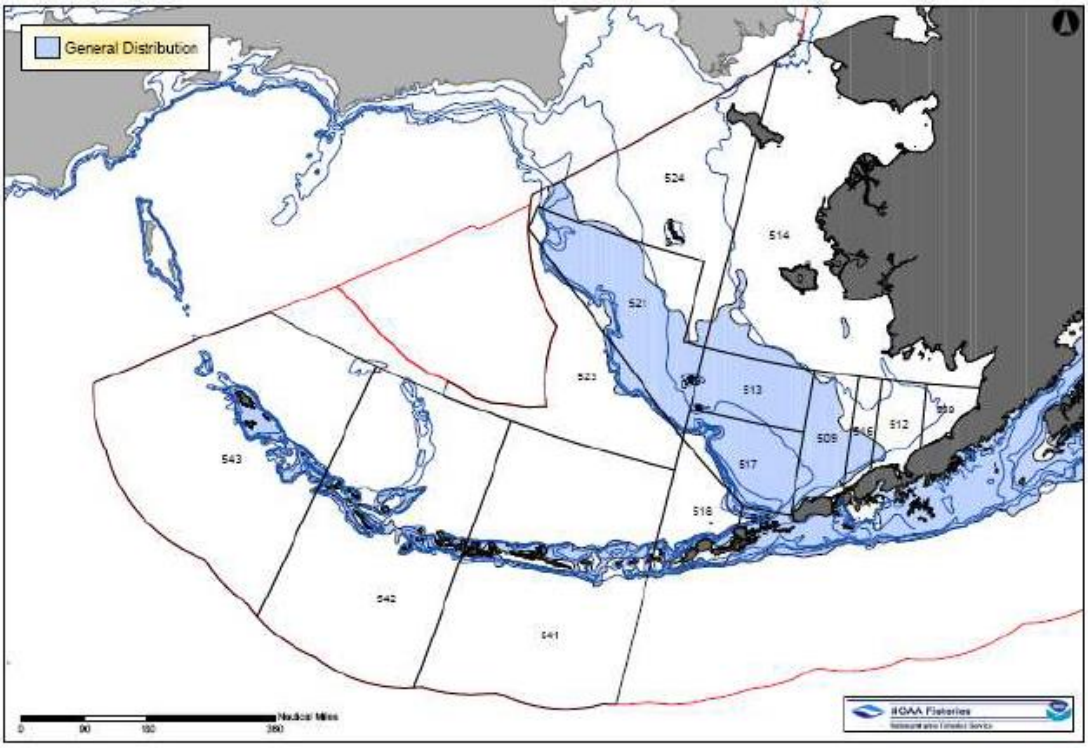


Figure 5. EFH Distribution - BSAI Arrowtooth Flounder (Late Juveniles/Adults)

NPFMC groundfish species profiles 2011:
http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Species_Profiles2011.pdf

Stark, J. W. (2012), Female maturity, reproductive potential, relative distribution, and growth compared between arrowtooth flounder (*Atheresthes stomias*) and Kamchatka flounder (*A. evermanni*) indicating concerns for management. Journal of Applied Ichthyology, 28: 226–230.
http://www.afsc.noaa.gov/species/Arrowtooth_flounder.php

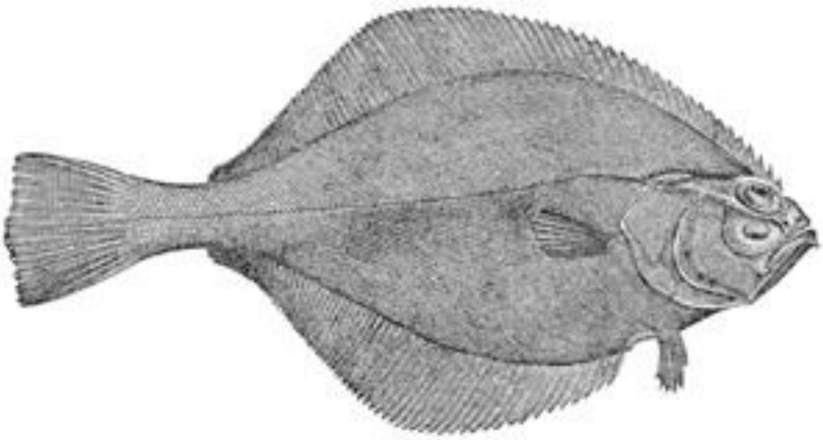
http://www.fishwatch.gov/seafood_profiles/species/flounder/species_pages/arrowtooth_flounder.htm

http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/conservation_issues/EFH/EFH5yr_rev1209_appendix2.pdf

Flathead sole (BSAI and GOA)

General Description

Flathead sole (*Hippoglossoides elassodon*) (Jordan & Gilbert, 1880) are distributed in the Kuril Islands, the Bering Sea, the Gulf of Alaska and down to northern California. Adults exhibit a benthic lifestyle and occupy separate winter spawning and summertime feeding distributions on the EBS shelf and in the GOA. In the northern part of its range, its distribution overlaps with Bering flounder. Bering flounder distribution extends from the Chukchi Sea into the western BS. Bering flounder generally represents less than 3% of the estimated survey biomass of the two species. Flathead sole are oval-shaped with a dark dorsal surface, a white ventral surface and dusky blotches in the dorsal and anal fin membranes.



Flathead sole (*Hippoglossoides elassodon*) from FAO (http://www.fao.org/fishery/species/2547/en)

Growth and Reproduction

Flathead sole recruitment to the fishery begins at age 4, and longevity extends to 32 years. Estimated length for females at 50% maturity is 32 cm, which corresponds to an age of 8.7 years. Flathead sole spawn in March and April, primarily in deeper waters near the margins of the continental shelf. Eggs are large (2.75 to 3.75 mm) and females have egg counts ranging from about 72,000 (20 cm fish) to almost 600,000 (38 cm fish). Eggs hatch in 9 to 20 days depending on incubation temperatures within the range of 2.4 to 9.8°C.

Habitat and Feeding ecology

Eggs: EFH for flathead sole eggs is the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and slope (200 to 3,000 m) throughout the BSAI in the spring.

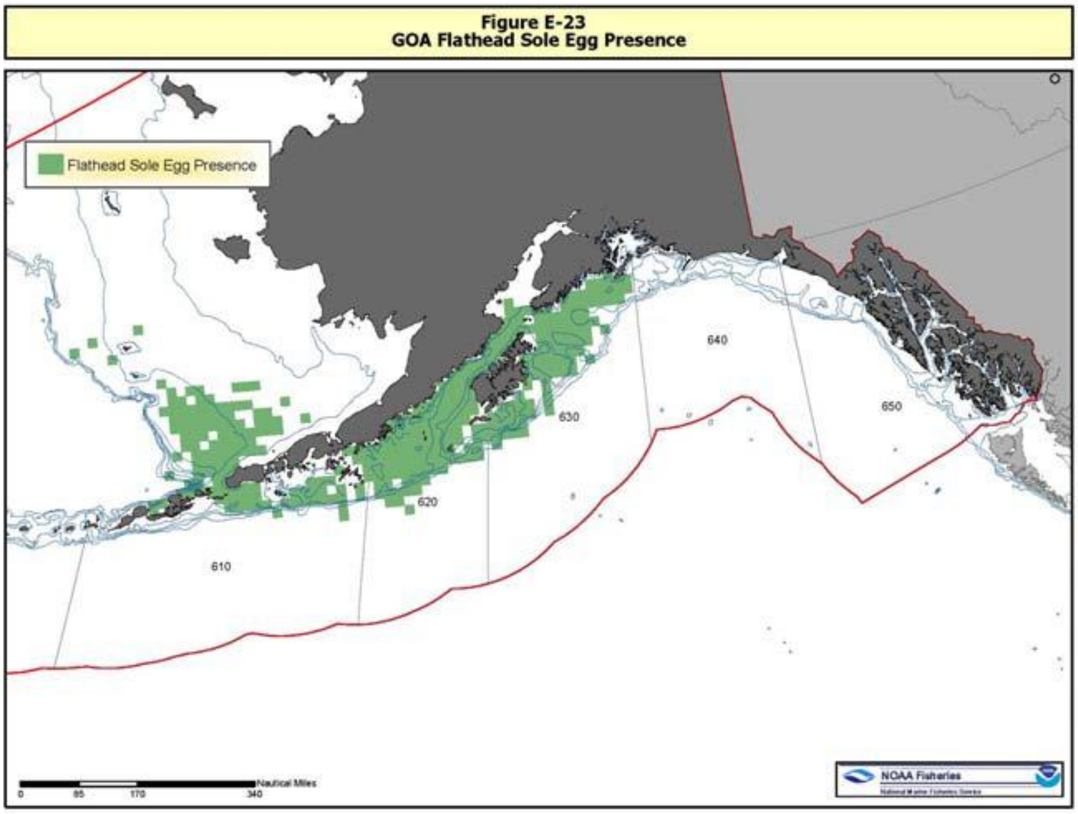


Figure 6. Egg presence for flathead sole in the GOA.

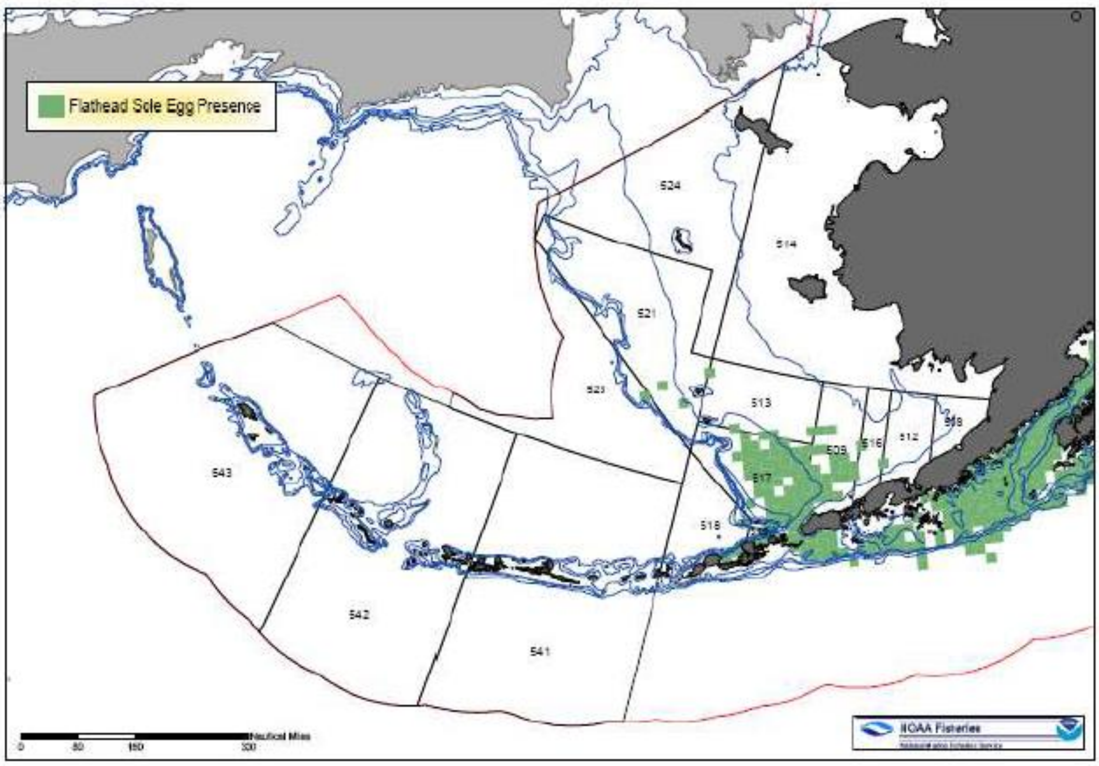


Figure 7. Egg presence for flathead sole in the BSAI.

Larvae/Juveniles: Planktonic larvae that migrate within the water column, than settle into nursery areas once they reach 40 to 50mm in size. Juveniles usually inhabit shallow areas (<100 m), preferring muddy habitats. Euphausiids and mysids constituted the most important prey items for juvenile flathead sole.

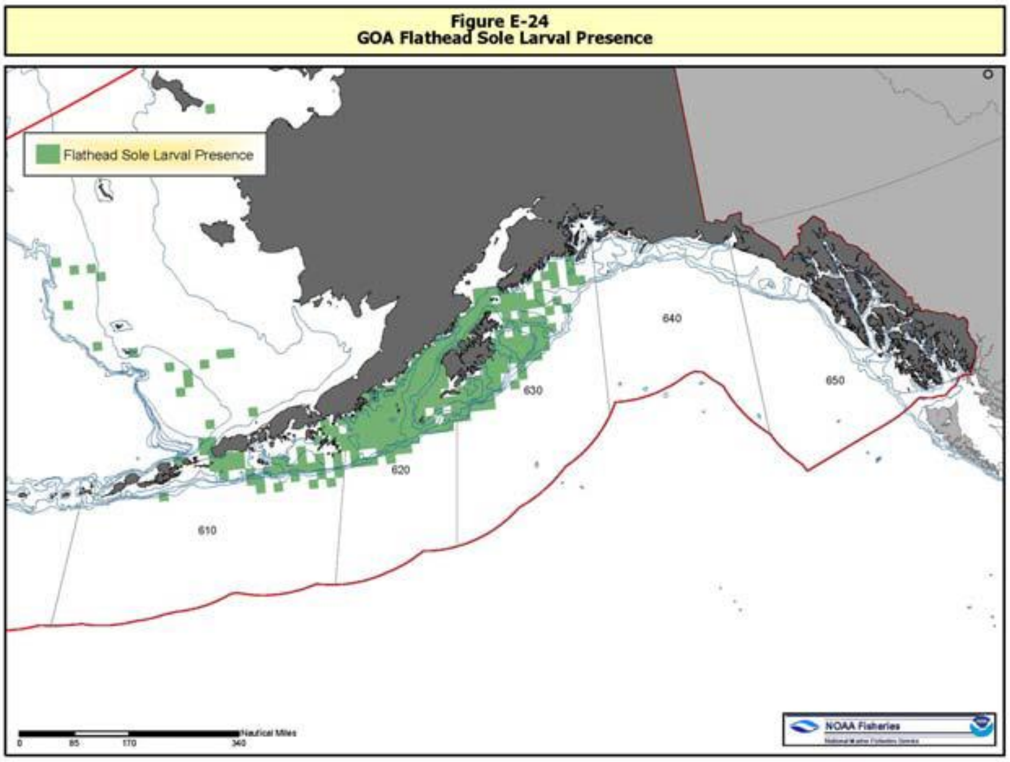


Figure 8. Larval presence for flathead sole in the GOA.

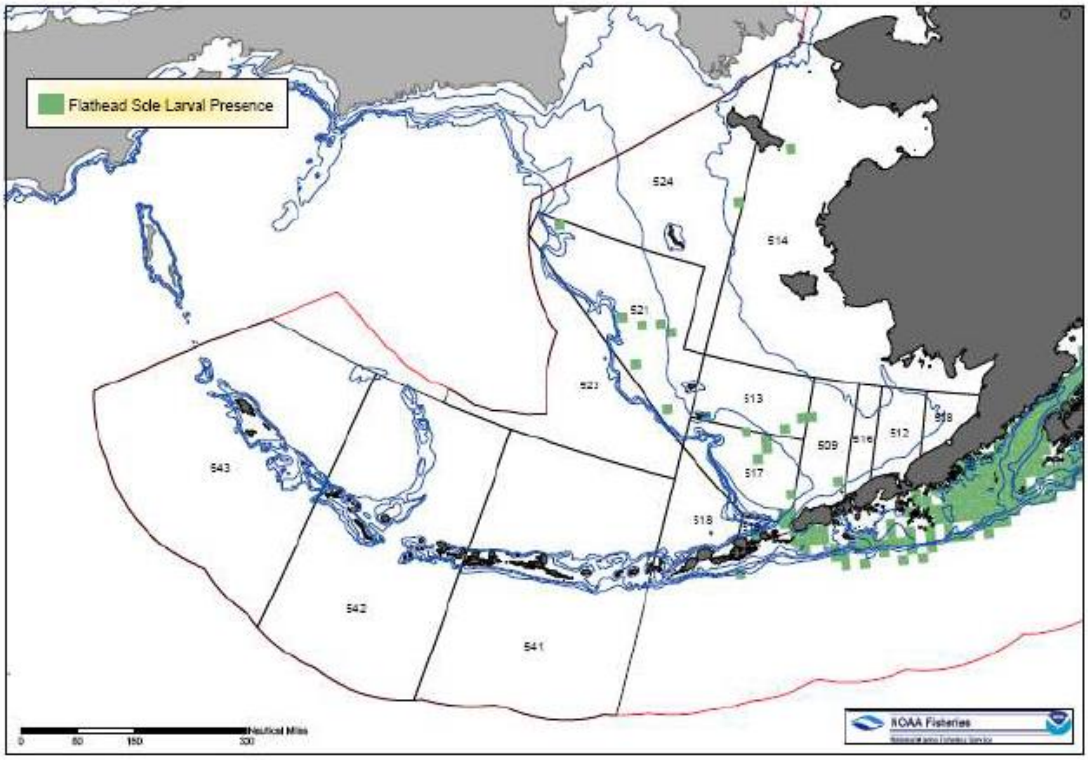


Figure 9. Larval presence for flathead sole in the BSAI.

Adults: Adult flathead sole overwinter near the shelf margins before migrating to the mid and outer continental shelf in April or May each year for feeding. Flathead sole predate on pollock, polychaetes, brittle stars and crustaceans. Important predators on flathead sole include arrowtooth flounder, walleye pollock, Pacific cod, and other groundfish (Aydin et al., 2007). Pacific cod and Pacific halibut are the major predators on adults, while arrowtooth flounder, sculpins, walleye pollock and Pacific cod are the major predators on juveniles.

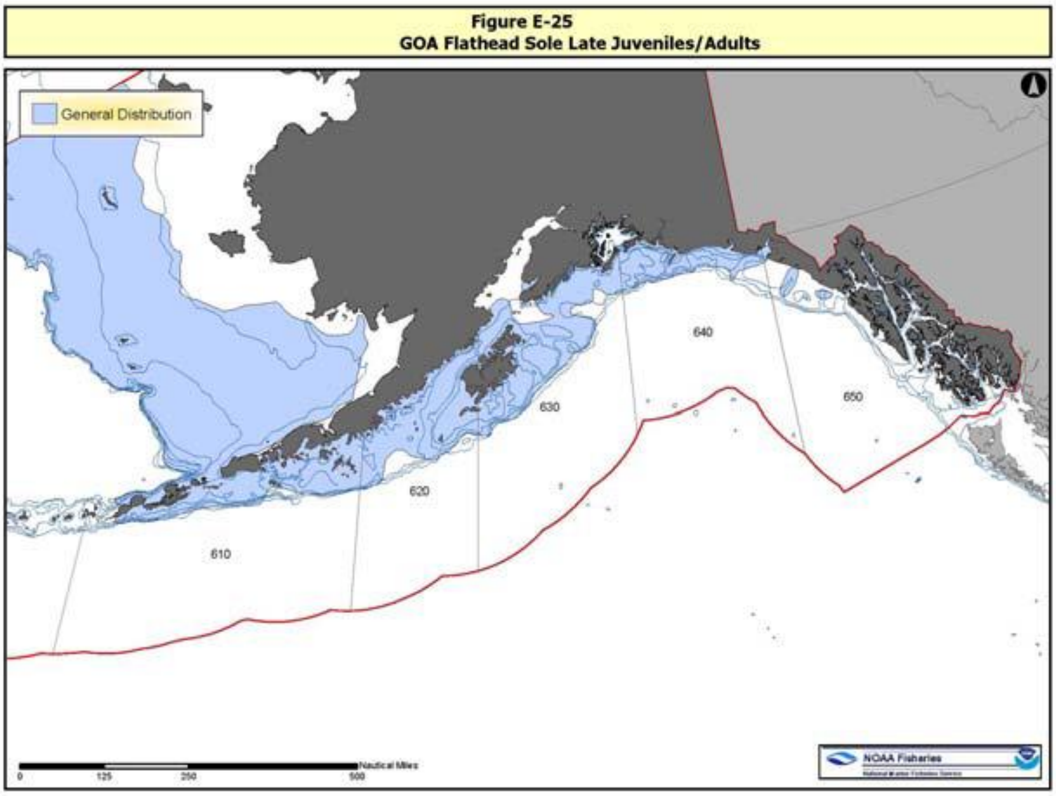


Figure 10. General distribution of flathead sole late juveniles and adults in the GOA.

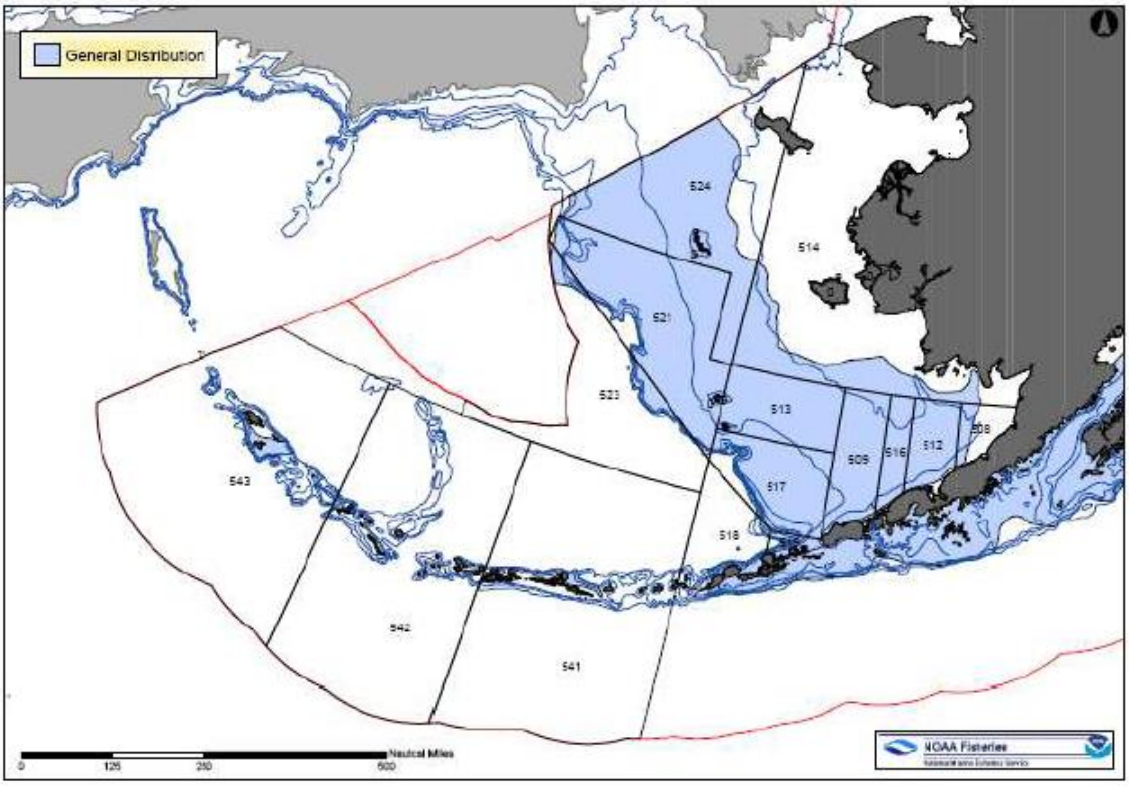


Figure 11. EFH Distribution - BSAI Flathead Sole (Late Juveniles/Adults).

NPFMC groundfish species profiles 2011:
http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Species_Profiles2011.pdf

Fishery Management Plan for the Groundfish of the BSAI 2013:
http://www.alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf

http://www.fishwatch.gov/seafood_profiles/species/sole/species_pages/flathead_sole.htm

GOA flathead sole SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOAflathead.pdf

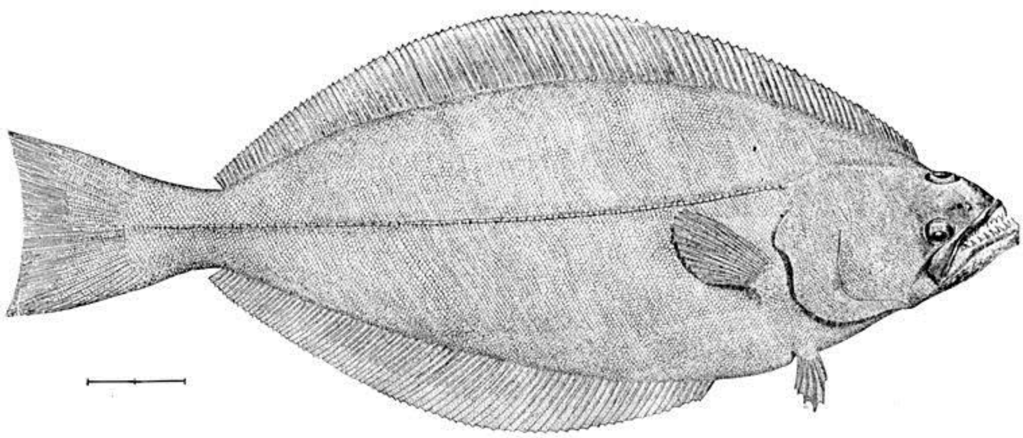
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/conservation_issues/EFH/EFH5yr_rev1209_appendix2.pdf

Aydin, K., S. Gaichas, I. Ortiz, D. Kinzey, and N. Friday. 2007. A comparison of the Bering Sea, Gulf of Alaska, and Aleutian Islands large marine ecosystems through food web modeling. U.S. Dep. Commer., NOAA NMFS Tech Memo. NMFS-AFSC-178. 298 p.

Greenland turbot (BSAI)

General Description

Greenland turbot (*Reinhardtius hippoglossoides*) (Wilbaum, 1792) has a circumpolar distribution, occurring in both the North Pacific and North Atlantic Oceans. Greenland turbot can be found in arctic and temperate waters of the northern hemisphere, including the Sea of Japan off Honshu north to Shishmaref, Alaska in the Chukchi Sea, throughout the Aleutian Islands, and southeast to northern Baja California, Mexico. The area of highest density of Greenland turbot in the Pacific Ocean is in the northern Bering Sea, straddling the border between US and Russian exclusive economic zones. Both sides of the fish are pigmented; however the left blind side is slightly lighter in color than the right side. Adults exhibit a benthic lifestyle, living in deep waters of the continental slope but are known to have a tendency to feed off the sea bottom.



Greenland turbot (*Reinhardtius hippoglossoides*), FAO (http://www.fao.org/fishery/species/2544/en)

Growth and Reproduction

Greenland turbot size at 50% maturity is around 60 cm (age 5-10). They can reach a length of 120 cm and weigh up to 17 kg. Greenland turbot are sexually dimorphic with females achieving a larger maximum size and having a faster growth rate. Greenland turbot begin to recruit to longline fisheries at about 60 cm and are fully recruited at 90 cm. Peak spawning period is from November – February in the eastern Bering Sea. Female fecundity is fairly low; females less than 83 cm release 25,000-150,000 eggs.

Habitat and Feeding ecology

Eggs/Larvae/Juveniles: The eggs, larvae, and post-larvae are all found free-floating in deep water. Metamorphosis is completed at a length of 6-8.5 cm; the young may be found then in the shallower regions inhabited by this flatfish. Juveniles inhabit shallow continental shelf waters (<200 m) for the first 3-4 years and move out to the deeper waters of the continental slope (200-1,000 m). Groundfish predators include Pacific cod, pollock, and yellowfin sole, mostly on fish ranging from 2 to 5 cm standard length (probably age 0).

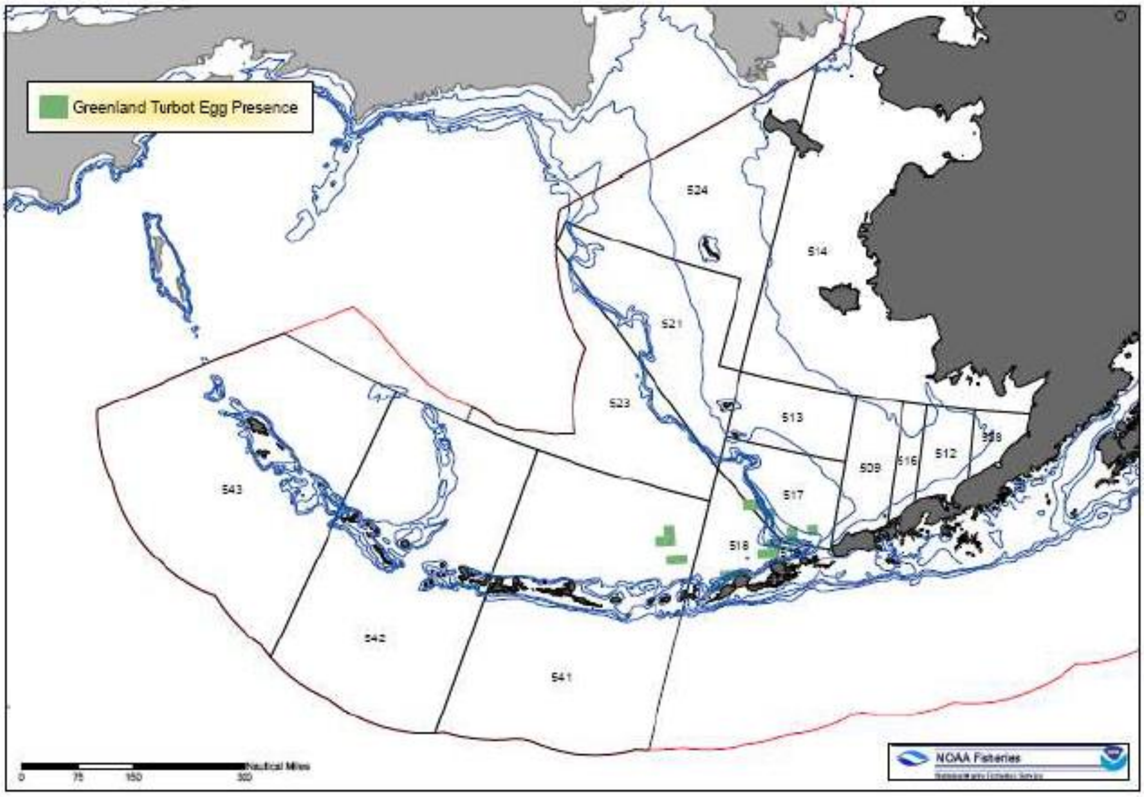


Figure 12. Egg presence of Greenland turbot in the BSAI.

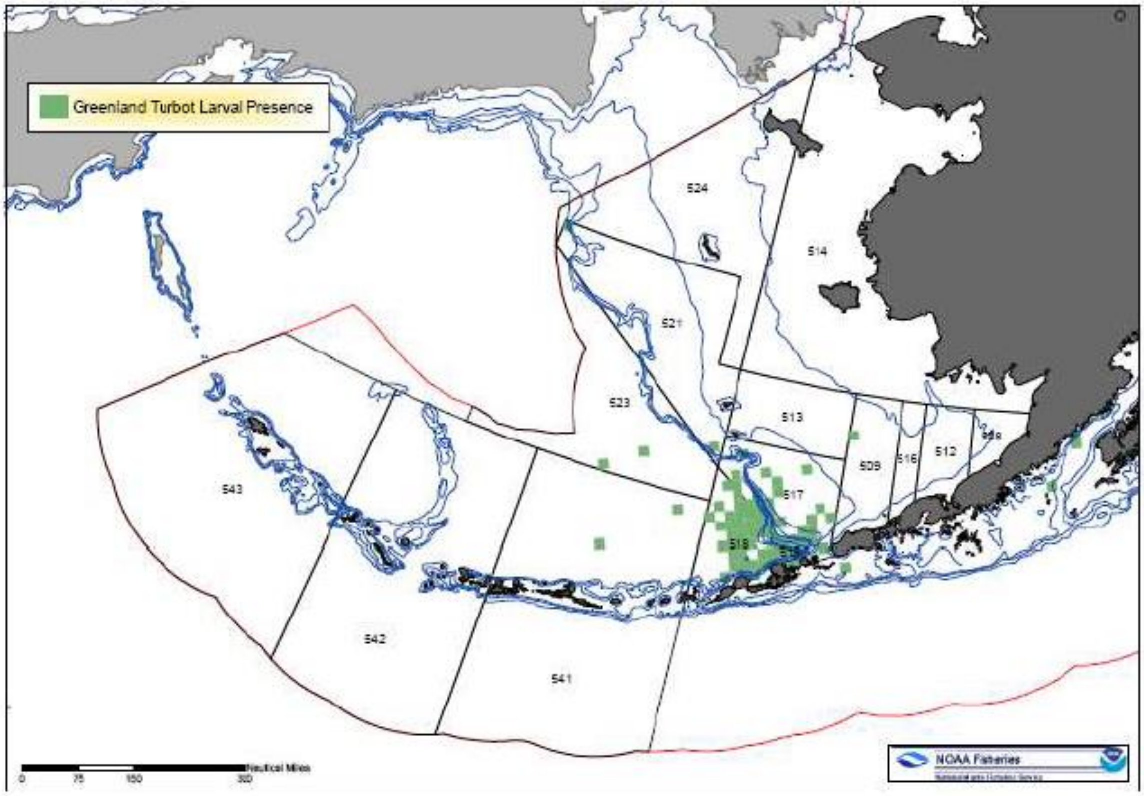


Figure 13. Larval presence of Greenland turbot in the BSAI.

Adult: EFH for late adult Greenland turbot is the general distribution area for this life stage, located in the lower and middle portion of the water column along the outer shelf (100 to 200 m), upper slope (200 to 500 m), and lower slope (500 to 1,000 m) throughout the BSAI wherever there are softer substrates consisting of mud and sandy mud. Greenland turbot predate on euphausiids, polychaetes and small fish (e.g. pollock) as they mature.

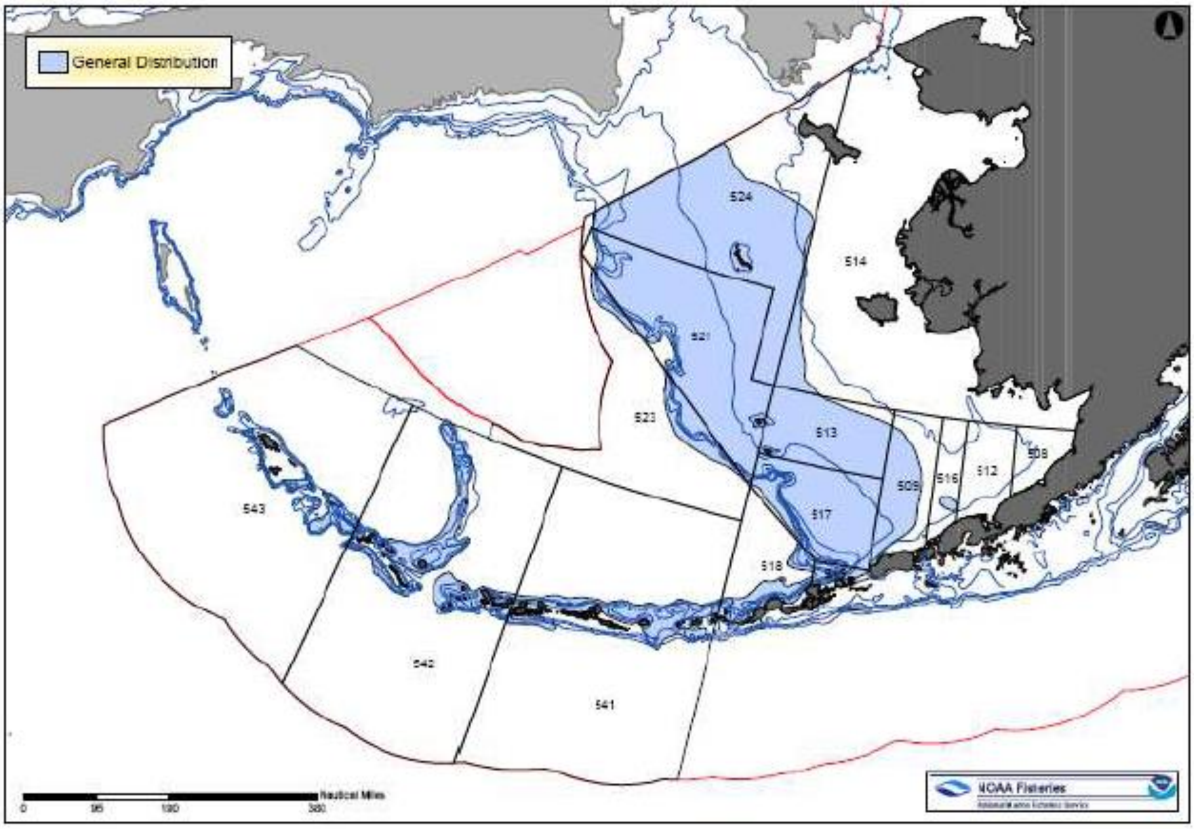


Figure 14. EFH Distribution - BSAI Greenland Turbot (Late Juveniles/Adults)

BSAI Greenland turbot SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIturbot.pdf

NPFMC groundfish species profiles 2011:
http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Species_Profiles2011.pdf

http://www.fao.org/fishery/species/2544/en

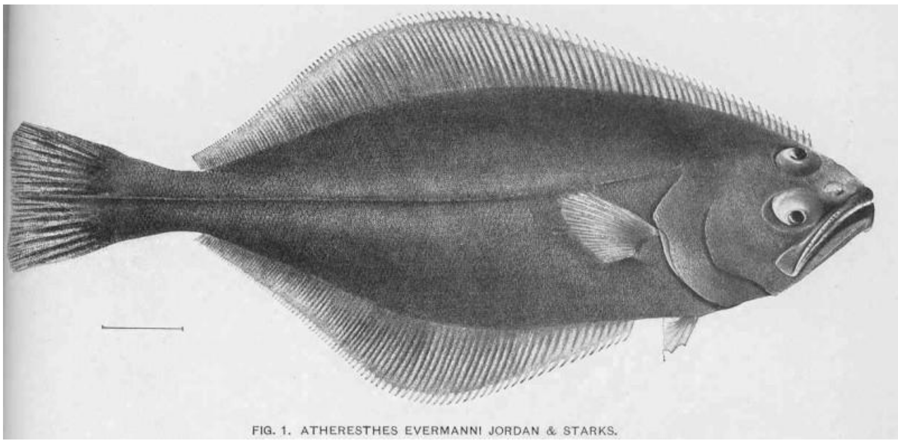
Fishery Management Plan for the Groundfish of the BSAI 2013:
http://www.alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf

http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmpAppendix613.pdf

Kamchatka flounder (BSAI)

General Description

Kamchatka flounder (*Atheresthes evermanni*) (Jordan & Starks, 1904) are distributed throughout the North Pacific: into the Sea of Japan and the Sea of Okhotsk north to the Anadyr Gulf, through the eastern Bering Sea to the Aleutian Islands and the Shelikof Strait in Alaska. In U.S. waters they are found in commercial concentrations in the Aleutian Islands where they generally decrease in abundance from west to east. From 1986 until 2011, arrowtooth and Kamchatka flounder were managed together under the "Arrowtooth Flounder" complex. In 2011, separate catch specifications were established for these species.



Kamchatka flounder (*Atheresthes evermanni*) from Univ. of Washington Libraries

Growth and Reproduction

In Kamchatka flounder females age at 50% maturity is 10.1 years of age and length at 50% maturity is 550 mm. A maximum age for this species has been reported at 33 years. The maximum size for this species is 100 cm.

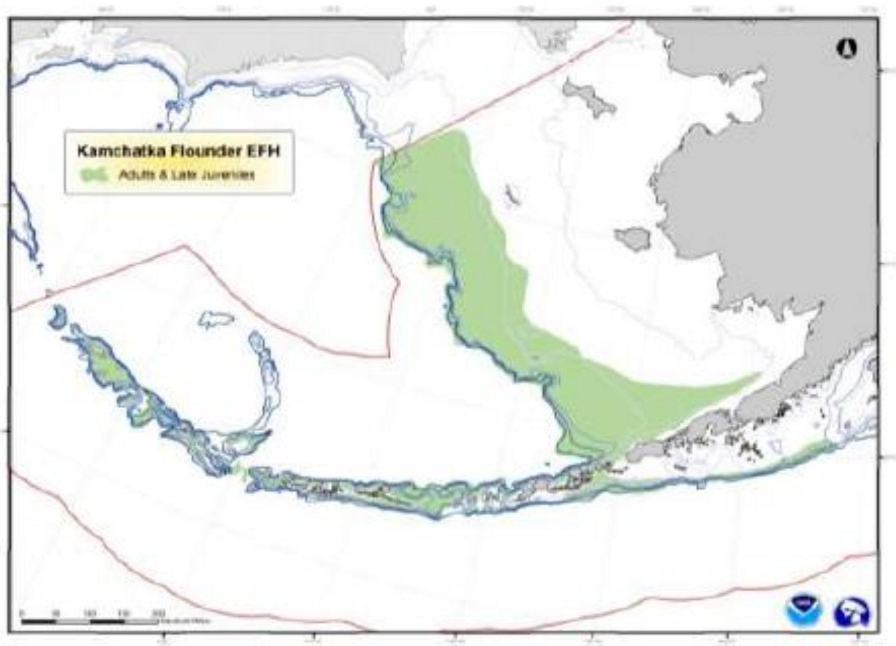


Figure 15. EFH distribution of BSAI Kamchatka flounder late juveniles and adults.

NPFMC groundfish species profiles 2011:
http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Species_Profiles2011.pdf

Stark, J. W. (2012), Female maturity, reproductive potential, relative distribution, and growth compared between arrowtooth flounder (*Atheresthes stomias*) and Kamchatka flounder (*A. evermanni*) indicating concerns for management. Journal of Applied Ichthyology, 28: 226–230.
http://www.fishbase.org/summary/Atheresthes-evermanni.html

http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmpAppendix613.pdf

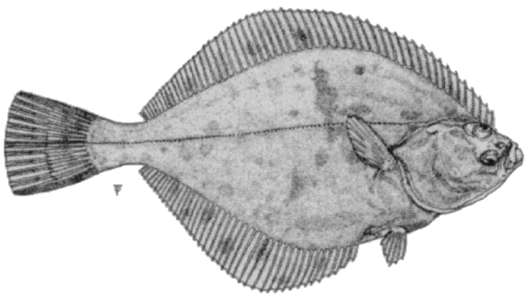
Northern rock sole (BSAI and GOA) and Southern rock sole (GOA)

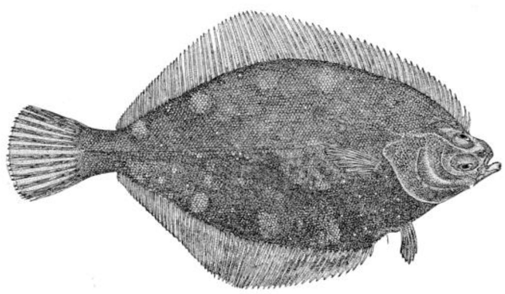
General Description

Northern rock sole (*Lepidopsetta polyxystra*) (Orr & Matarese, 2000) and Southern rock sole (*Lepidopsetta bilineata*) (Ayres, 1855) were distinguished as two species in 2000. Adults of the northern rock sole are found from Puget Sound through the Bering Sea and Aleutian Islands to the Kuril Islands, while the southern rock sole is known from the southeast Bering Sea to Baja California. Their distributions overlap from the far eastern Aleutian Islands and extreme south-eastern Bering Sea to Puget Sound. Resource assessment trawl surveys indicate that northern rock sole comprise more than 95 percent of the Bering Sea population. Adults exhibit a benthic lifestyle and, in the eastern Bering Sea, occupy separate winter (spawning) and summertime feeding distributions on the continental shelf. Northern rock sole spawn during the winter and early spring period of December through March, and the southern rock sole spawns in summer. In the springtime, after spawning, northern rock sole begin actively feeding and commence a migration to the shallow waters of the continental shelf.

The rock sole is a right-eyed flounder. Its upper surface is grey to olive to dark brown or black, lighter or darker mottling, and is sometimes marked with yellow or red spots; the underside is light. The southern rock sole's blind (non-eyed) side is white with glossy highlights, but the northern rock sole's blind side is creamy white, with no glossy highlights. Its dorsal and anal fins have dark blotches or bars, and near the tail fins may be yellowish. The caudal fin is convex. It has a small mouth with fleshy lips, and teeth are more strongly developed on the underside.

Northern rock sole are caught in bottom trawls both as a directed fishery and in the pursuit of other bottomdwelling species. Recruitment begins at about age 4 and they are fully selected at age 11. Historically, the fishery has occurred throughout the mid- and inner Bering Sea shelf during ice-free conditions and on spawning concentrations north of the Alaska Peninsula during winter for their high-value roe. They are caught as bycatch in Pacific cod, bottom pollock, yellowfin sole, and other flatfish fisheries and are caught with these species and Pacific halibut in rock sole directed fisheries.





Northern rock sole (*Lepidopsetta polyxystra*) (left) and Southern rock sole (*Lepidopsetta bilineata*) (right)

http://www.fao.org/fishery/species/3362/en

Growth and Reproduction

Rock soles grow to approximately 60 cm and can live in excess of 20 years. In the Gulf of Alaska, the northern rock sole reaches 50% maturity at 328 mm total length at an average of 7 years. In the Gulf of Alaska, the southern rock sole reaches 50% maturity at 347 mm total length at an average of 9 years. Northern rock sole spawn from December to March in two separate concentrations in the Bering Sea along the continental shelf/slope break. Fecundity varies with size and was reported to be 450,000 eggs for fish 42 cm long. Rock soles mature and ovulate all ova simultaneously within both ovaries, and spawn in a single event.

Habitat and Feeding ecology

Eggs: Adhesive eggs are laid on the bottom and hatch in 6-25 days, depending upon temperature.

Larvae/Juveniles: The larvae develop in the upper water column consuming small zooplankton. Metamorphosis occurs at about 15 mm, and small juveniles can be very abundant in shallow, near-shore waters where they consume polychaetes and small crustaceans. Groundfish predators include Pacific cod, walleye pollock, skates, Pacific halibut, and yellowfin sole, mostly on fish ranging from 5 to 15 cm standard length.

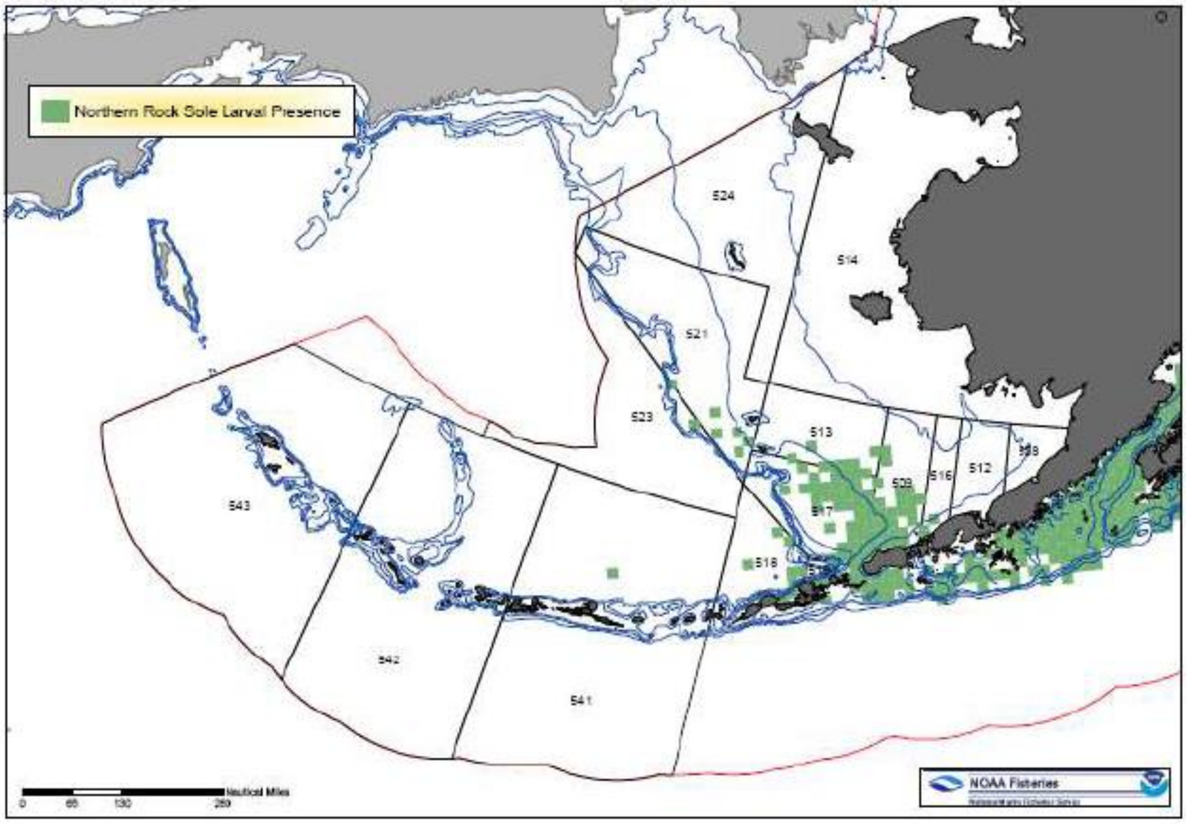


Figure 16. Larval presence of northern rock sole in the BSAI.

Adults: Adults are bottom dwellers and occupy separate winter and summer feeding ground along the continental shelf. Adults feed on more sedentary foods, such as polychaete and echiuroid worms, molluscs, echinoderms, benthic fishes, and tunicates.

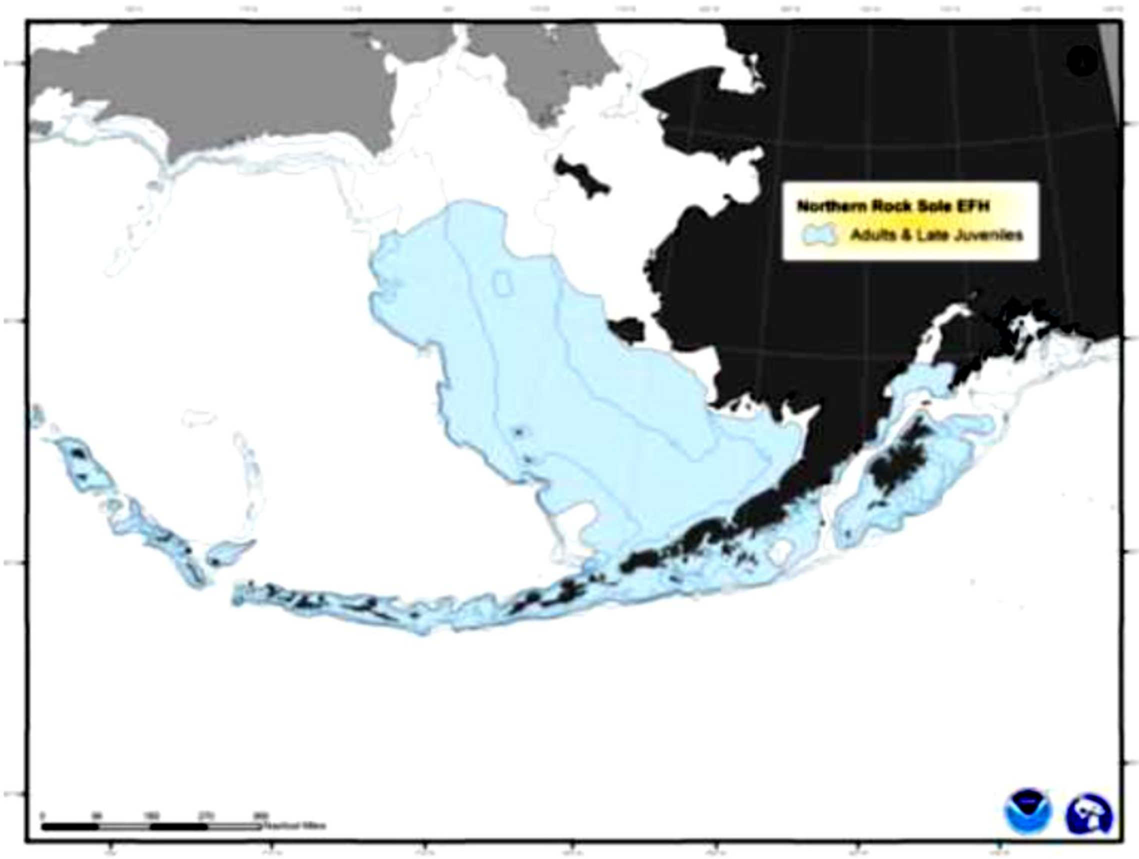


Figure 17. EFH distribution for northern rock sole adults and late juveniles in the BSAI.

NPFMC groundfish species profiles 2011:
http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Species_Profiles2011.pdf
http://www.afsc.noaa.gov/race/behavioral/rocksole_fbe.htm

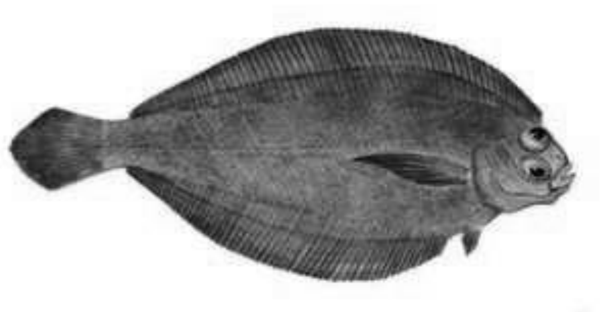
http://www.fishwatch.gov/seafood_profiles/species/sole/species_pages/rock_sole.htm

http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmpAppendix613.pdf

Rex sole (GOA)

General Description

Rex sole (*Glyptocephalus zachirus*) (Lockington, 1879) are distributed from Baja California, across the Bering Sea to the coast of Russia and the Sea of Japan and widely throughout the Gulf of Alaska. Adult rex sole are bottom dwellers and are generally found in water deeper than 300 m out to 900 m. The rex sole is a right-eyed flounder with an elongate, oval-shaped body and a small mouth. Its upper surface is uniform in color, light brown to grey, with small scales; its underside is off-white. The dorsal and ventral fins on the upper side are dark, and the pectoral fin is long and mostly black. The caudal fin is rounded. The lateral line is nearly straight.



Rex sole (*Glyptocephalus zachirus*) from e-ryby.eu

Growth and Reproduction

Female rex sole in the Gulf of Alaska had an estimated length at 50% maturity of 352 mm and the estimated age at 50% maturity in the Gulf of Alaska was 5.1 years. The Alaska Fisheries Science Center has reported a maximum ages of 27-29 years. Maximum lengths of 60 cm have been reported, but 36 cm is average. Year-round sampling of rex sole ovaries confirmed that rex sole are batch spawners and have a protracted spawning season in the Gulf of Alaska that lasts at least eight months, from October to May. During the spawning season, adult rex sole concentrate along the continental slope, but also appear on the outer shelf (Abookire and Bailey, 2007). Eggs are fertilized near the sea bed, become pelagic, and probably require a few weeks to hatch (Hosie et al. 1977).

Habitat and Feeding ecology

Eggs/Larvae/Juveniles: Rex sole larvae progressively move cross-shelf toward shore as they grow from April to September, and larvae presumably settled in coastal nursery areas in the autumn.

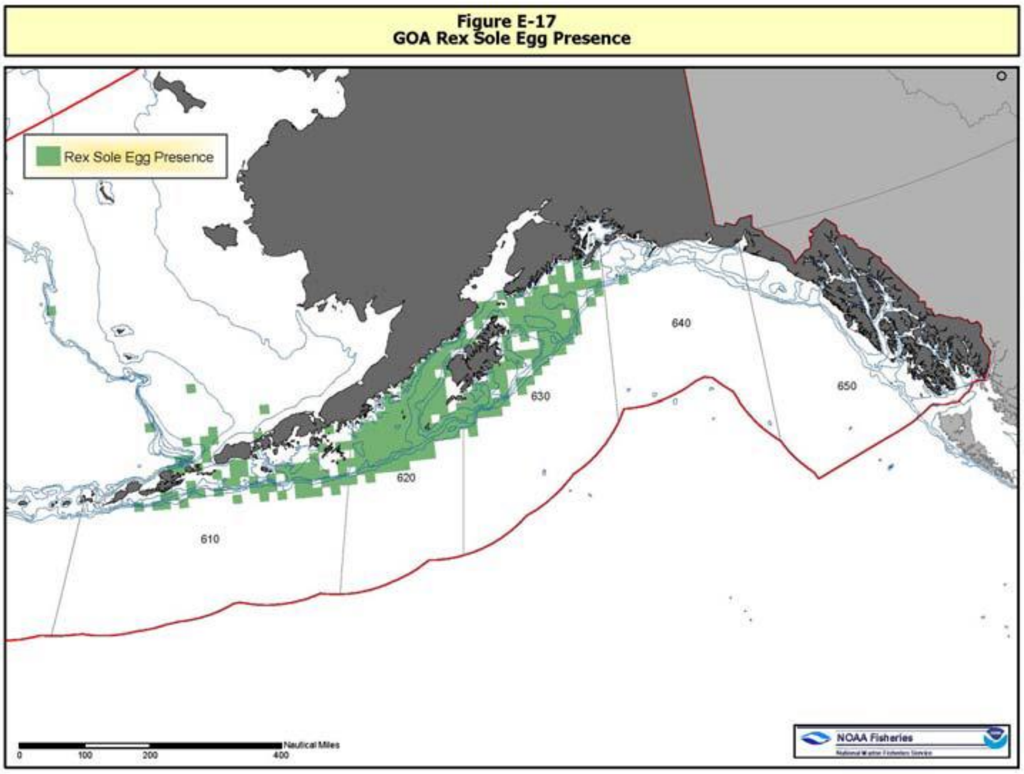


Figure 18. Egg presence for rex sole in the GOA.

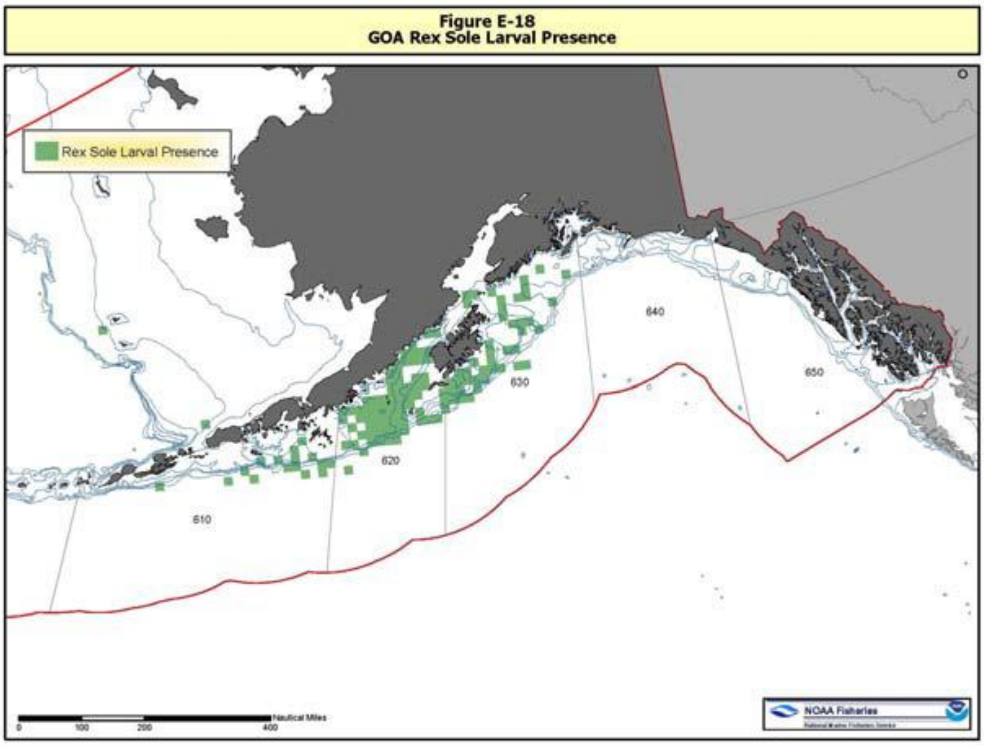


Figure 19. Larval presence for rex sole in the GOA.

Adults: EFH for adult rex sole 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 GOA wherever there are substrates consisting of gravel, sand, and mud. The rex sole's diet consists of benthos invertebrates such as crustaceans, worms, shrimps and crabs. Important predators on rex sole include longnosed skate and arrowtooth flounder.

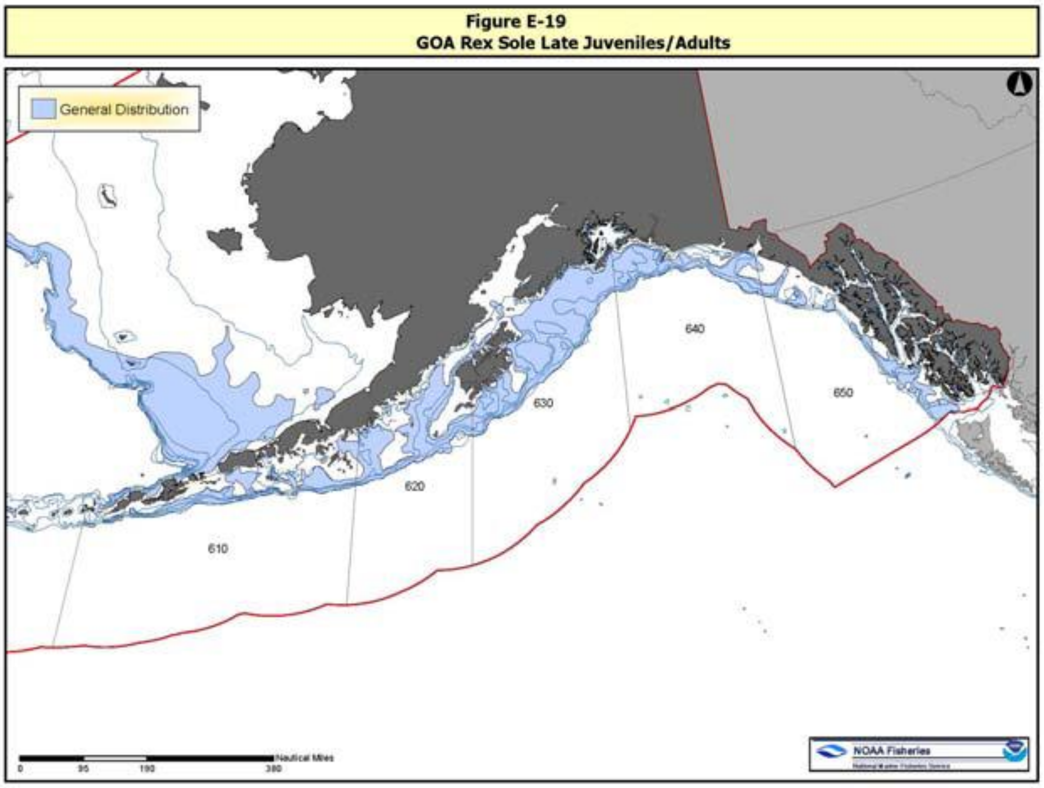


Figure 20. EFH distribution for rex sole adults and late juveniles in the GOA.

NPFMC groundfish species profiles 2011:
http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Species_Profiles2011.pdf

Fishery Management Plan for the Groundfish of the GOA 2011:
http://www.fakr.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOA.pdf

http://www.fishbase.se/Summary/speciesSummary.php?ID=4238&AT=rex+sole

Abookire, A.A. and K.M. Bailey. 2007. The distribution of life cycle stages of two deep-water pleuronectids, Dover sole (*Microstomus pacificus*) and rex sole (*Glyptocephalus zachirus*), at the northern extent of their range in the Gulf of Alaska. J. Sea Res. 57:198-208.

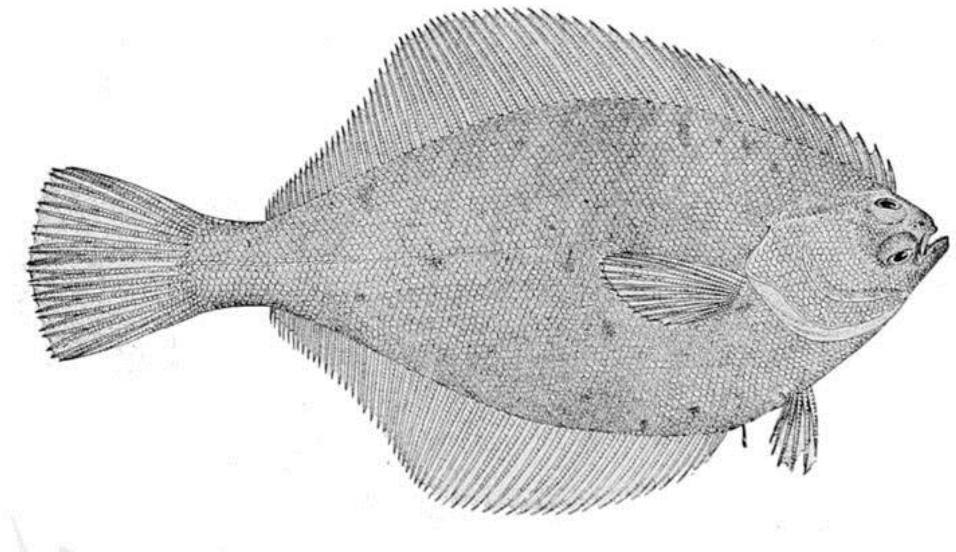
Hosie, M.J., and H.F. Horton. 1977. Biology of the rex sole, *Glyptocephalus zachirus*, in waters off Oregon. Fish. Bull. Vol. 75, No. 1, 1977, p. 51-60.

http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/conservation_issues/EFH/EFH5yr_rev1209_appendix2.pdf

Yellowfin sole (BSAI)

General Description

Yellowfin sole (*Limanda aspera*) (Pallas, 1814) are distributed in North American waters from off British Columbia, Canada, (approx.. 49° N) to the Chukchi Sea (approx. 70° N) and south along the Asian coast to about 35° N off the South Korean coast in the Sea of Japan. In Alaska, they are most abundant on the Bering Sea continental shelf. Yellowfin sole have a rounded body, with a small mouth, moderately large and closely situated eyes, and a slightly pronounced snout. The upper side of the body is olive to brown in color, with dark mottling, and dorsal and anal fins are yellowish on both sides of the body, with faint dark bars and a narrow dark line at the base. Scales are rough on both sides of the body. Adults exhibit a benthic lifestyle and occupy separate winter, spawning and summertime feeding distributions on the eastern Bering Sea shelf. From over-winter grounds near the shelf margins, adults begin a migration onto the inner shelf in April or early May each year for spawning and feeding. Recruitment begins at about age 6 and they are fully selected at age 13. Historically, the fishery has occurred throughout the mid- and inner Bering Sea shelf during ice-free conditions, although much effort has been directed at the spawning concentrations in nearshore northern Bristol Bay.



Yellowfin sole (*Limanda aspera*) from FAO

http://www.fao.org/fishery/species/3360/en

Growth and Reproduction

The maximum length of yellowfin sole is 42 cm, maximum weight is 750 grams and they have a maximum age of 35 years. About half of the female yellowfin sole mature at approximately 28 cm or at about 10 years of age.

Spawning occurs in shallow waters which subsequently serve as nursery areas for settled juveniles. Fecundity varies with size and was reported to range from 1.3 to 3.3 million eggs for fish 25 to 45 cm long.

Habitat and Feeding ecology

Larvae/Juveniles: Larvae are planktonic for at least 2 to 3 months until metamorphosis occurs. EFH for late juvenile yellowfin sole is the general distribution area for this life stage, located in the lower portion of the water column within nearshore bays and 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 mainly of sand. Larvae eat plankton (tiny floating plants and animals) and algae. Early juveniles feed on zooplankton (tiny floating animals).

Adults: Summertime spawning and feeding on sandy substrates of the EBS shelf. There is widespread distribution mainly on the middle and inner portion of the shelf. Wintertime migration to deeper waters of the shelf margin to avoid extreme cold water temperatures, feeding diminishes. Late juveniles and adults eat bivalves, polychaete worms, amphipods (small, shrimp-like crustaceans), mollusks, krill, shrimp, brittle stars, sculpins, and other miscellaneous crustaceans. Groundfish predators include Pacific cod, skates, and Pacific halibut, mostly on fish ranging from 7 to 25 cm standard length.

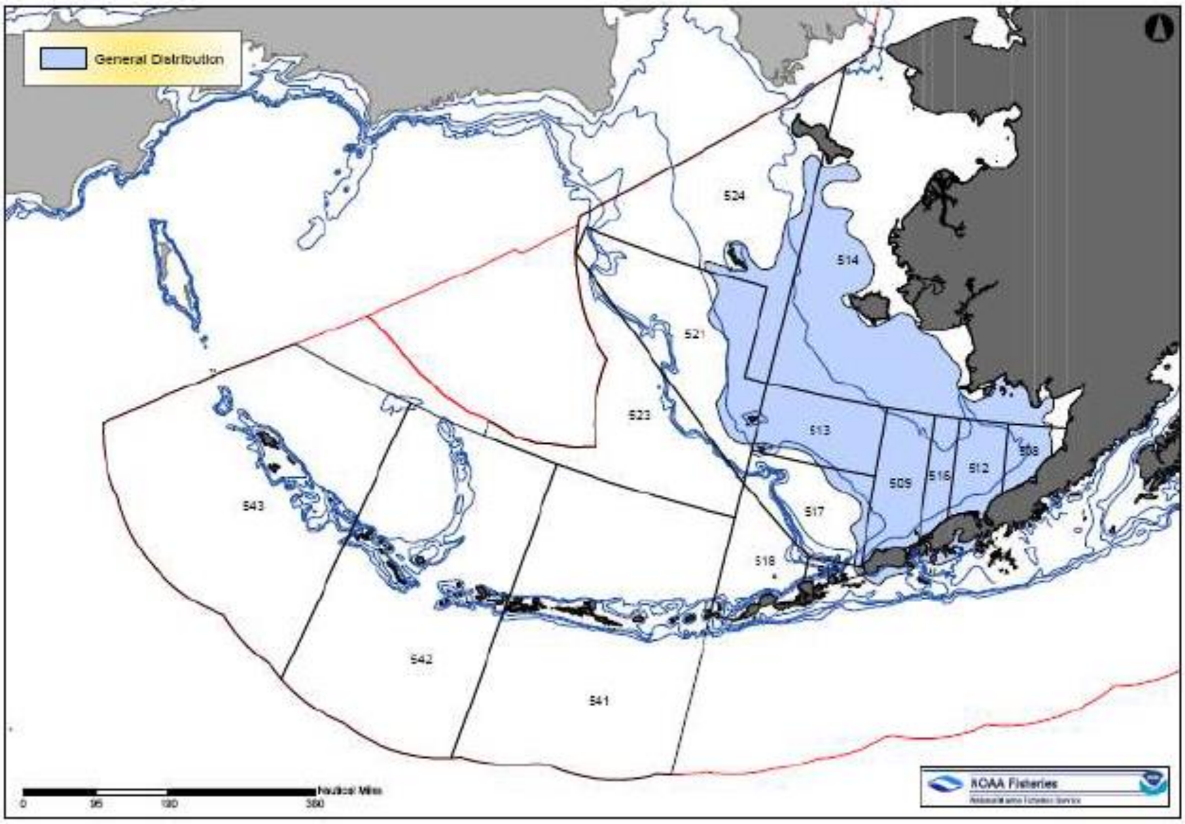


Figure 21. EFH Distribution - BSAI Yellowfin Sole (Late Juveniles/Adults)

NPFMC groundfish species profiles 2011: http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Species_Profiles2011.pdf

NOAA Yellowfin sole factsheet: http://www.afsc.noaa.gov/Education/factsheets/10_Yellowfin_fs.pdf

http://www.fishwatch.gov/seafood_profiles/species/sole/species_pages/yellowfin_sole.htm

http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmpAppendix613.pdf

3.2. Fishery Location and Method

Distribution

Federal Alaska flatfish fisheries are managed as multiple stocks in multiple locations. Geographically management is split between the Bering Sea and Aleutian Islands (BSAI) and the Gulf of Alaska (GOA). Further, some species are managed individually, some as two species units and others as multispecies units.

BSAI Flatfish

The BSAI management area encompasses the U.S. Exclusive Economic Zone (EEZ) of the eastern Bering Sea and that portion of the North Pacific Ocean adjacent to the Aleutian Islands west of 170° W. longitude. The northern boundary of the Bering Sea is the Bering Strait, defined as a straight line from Cape Prince of Whales to Cape Dezhneva, Russia.

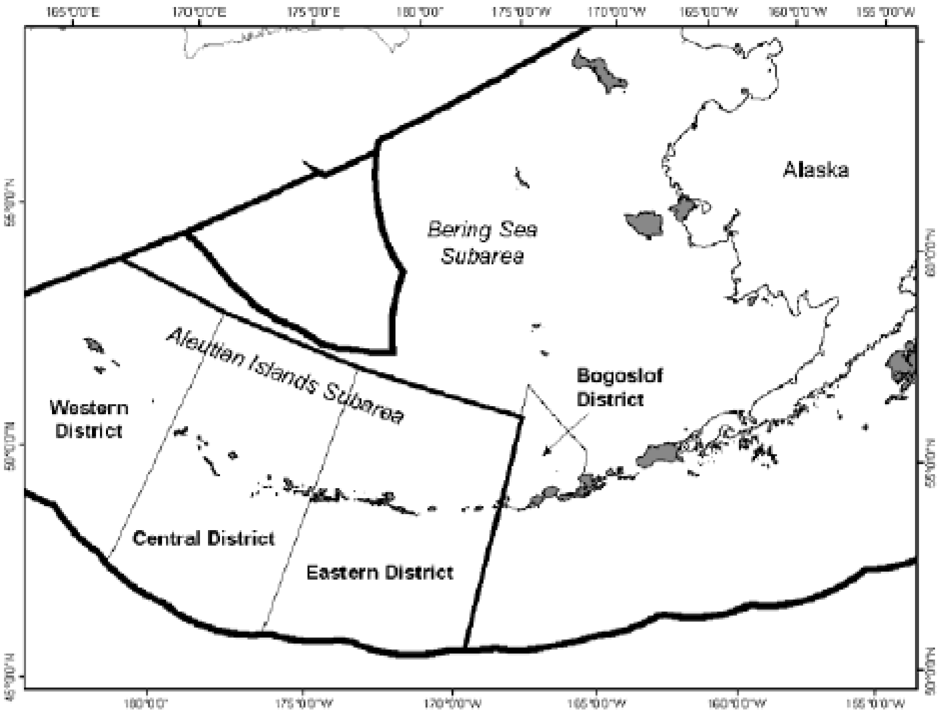


Figure 22. Management areas for the BSAI.

The management area is divided into two fishing areas, the Bering Sea subarea and the Aleutian Islands subarea. For the purpose of spatially allocating total allowable catch, the Aleutian Islands subarea is divided into three districts, the eastern district (between 170° W. and 177° W. longitude), the central district (between 177° W. longitude and 177° E. longitude), and the western district (west of 177° E. longitude). Flatfish in the BSAI are predominately found on the eastern Bering Sea continental shelf and slope, with lower abundance in the Aleutian Islands for those species whose range extends to that area. Each of the flatfish species is assessed as a single unit in the BSAI.

Fishery Management Plan for the Groundfish of the BSAI 2013:
http://www.alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf

GOA Flatfish

The GOA management area encompasses the U.S. EEZ of the North Pacific Ocean, exclusive of the Bering Sea, between the eastern Aleutian Islands at 170° W. longitude and Dixon Entrance at 132°40' W. longitude. The management area is divided into the following regulatory areas: Western (610), Central, and Eastern. The Central regulatory area is divided into two districts: Chirikof (620) and Kodiak (630). The Eastern regulatory area is also divided into two districts: West Yakutat (640) and Southeast Outside (650).

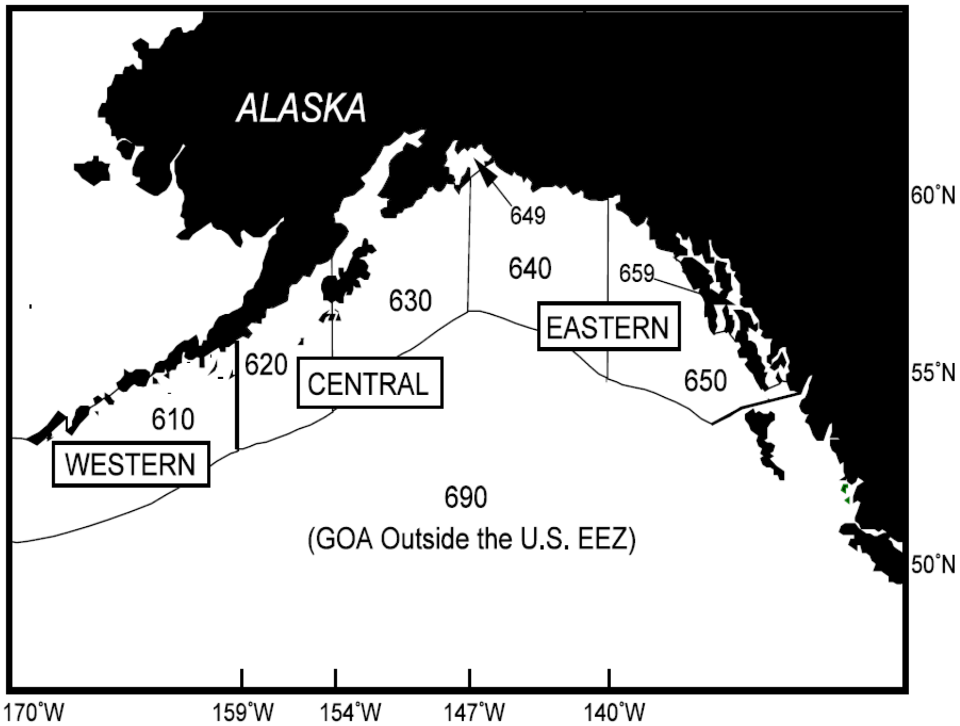


Figure 23. GOA Flatfish Complex INPFC reporting areas from NPFMC.

Fishery Management Plan for the Groundfish of the GOA 2013:
http://www.alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf

Management units

Alaskan flatfish fisheries are conducted in the GOA and the BSAI U.S. EEZ under federal fisheries management (**Figures 22 and 23**). Flatfish taken inside state waters are accounted for under federal limits.

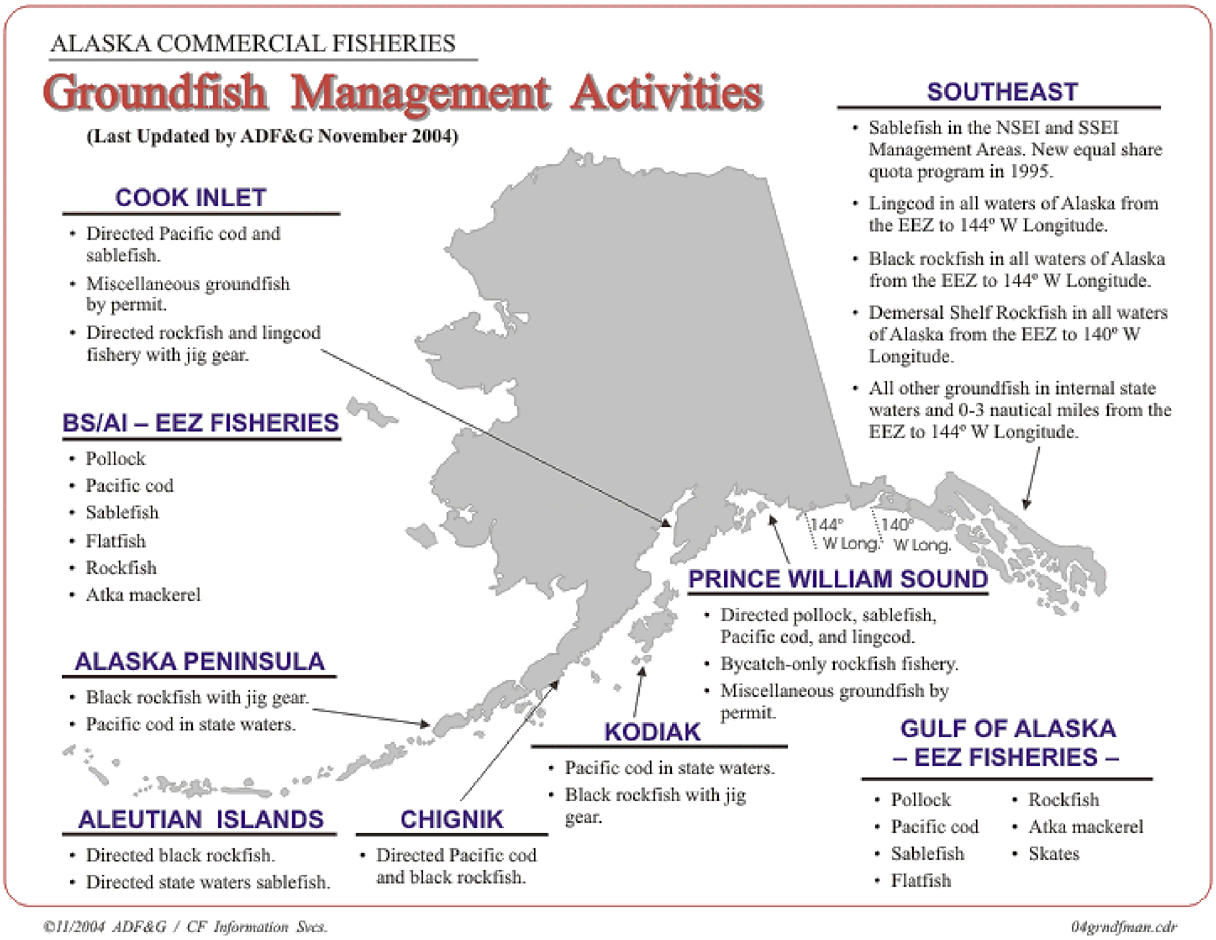


Figure 24. Map of location of major groundfish fisheries in the GOA and BSAI federal and state waters.

http://www.adfg.alaska.gov/index.cfm?adfg=CommercialByFisheryGroundfish.groundfishmaps_management

Federal waters (3-200 nm)

Federal Alaskan flatfish fisheries are managed by species and by area: stocks occurring in the Bering Sea and Aleutian Islands are managed as one unit and stocks occurring in the GOA are managed individually. Prevailing currents, temperature gradients and habitat differences all lead to the assumption that GOA and BSAI flatfish stocks do not intermingle and therefore they are managed separately. Each of these stocks is covered by a separate management plan, which describes the management area. The federal BSAI management area encompasses the U.S. Exclusive Economic Zone (EEZ) of the Eastern Bering Sea and that portion of the North Pacific Ocean adjacent to the Aleutian Islands west of 170° W. longitude. The northern boundary of the Bering Sea is the Bering Strait, defined as a straight line from Cape Prince of Whales to Cape Dezhneva, Russia.

The management area is divided into two fishing areas, the Bering Sea subarea and the Aleutian Islands subarea. The Bering Sea subarea includes a defined area known as the Bogoslof District. For the purpose of spatially allocating total allowable catch, the Aleutian Islands subarea is divided into three districts, the eastern district (between 170° W. and 177° W. longitude), the central district (between 177° W. longitude and 177° E. longitude), and the western district (west of 177° E. longitude).

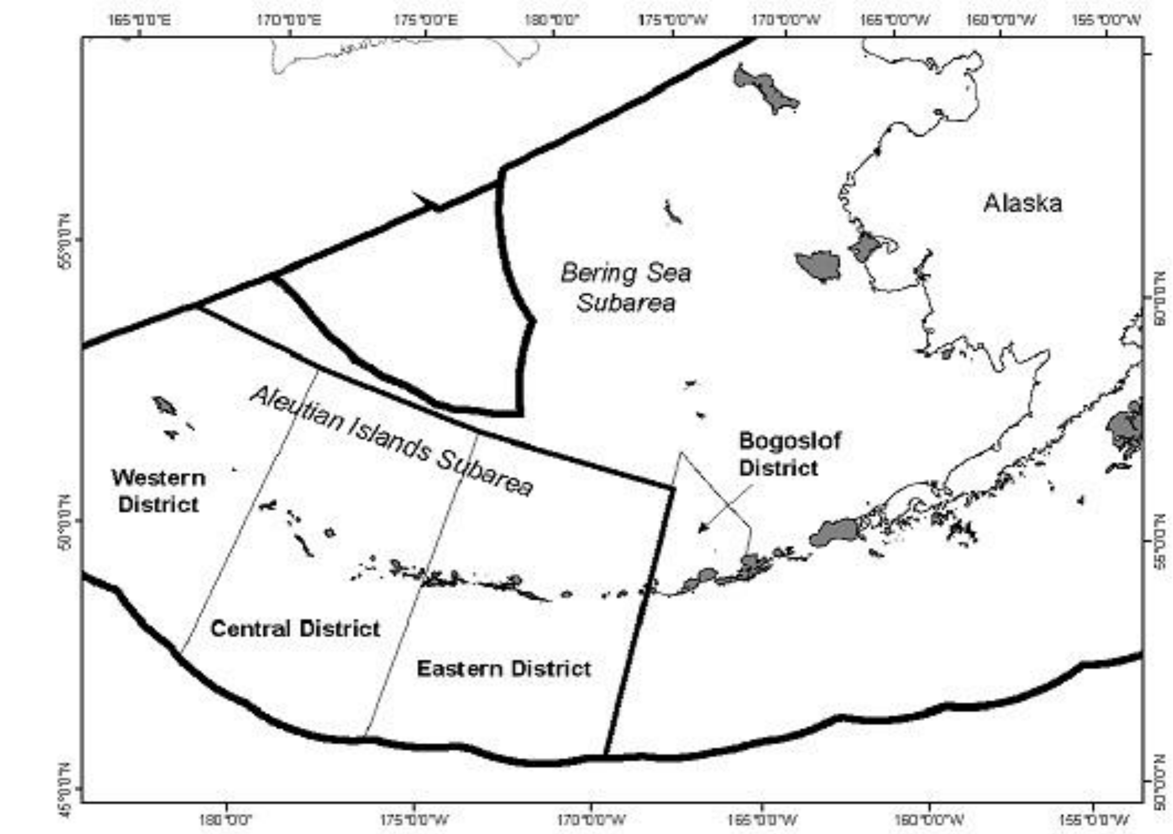


Figure 25. BSAI management area, with subareas and districts.

http://www.alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf

The federal GOA management area encompasses the U.S. EEZ of the North Pacific Ocean, exclusive of the Bering Sea, between the eastern Aleutian Islands at 170° W. longitude and Dixon Entrance at 132°40' W. longitude. The management area is divided into the following regulatory areas: Western, Central, and Eastern. The Central regulatory area is divided into two districts: Chirikof and Kodiak. The Eastern regulatory area is also divided into two districts: West Yakutat and Southeast Outside.

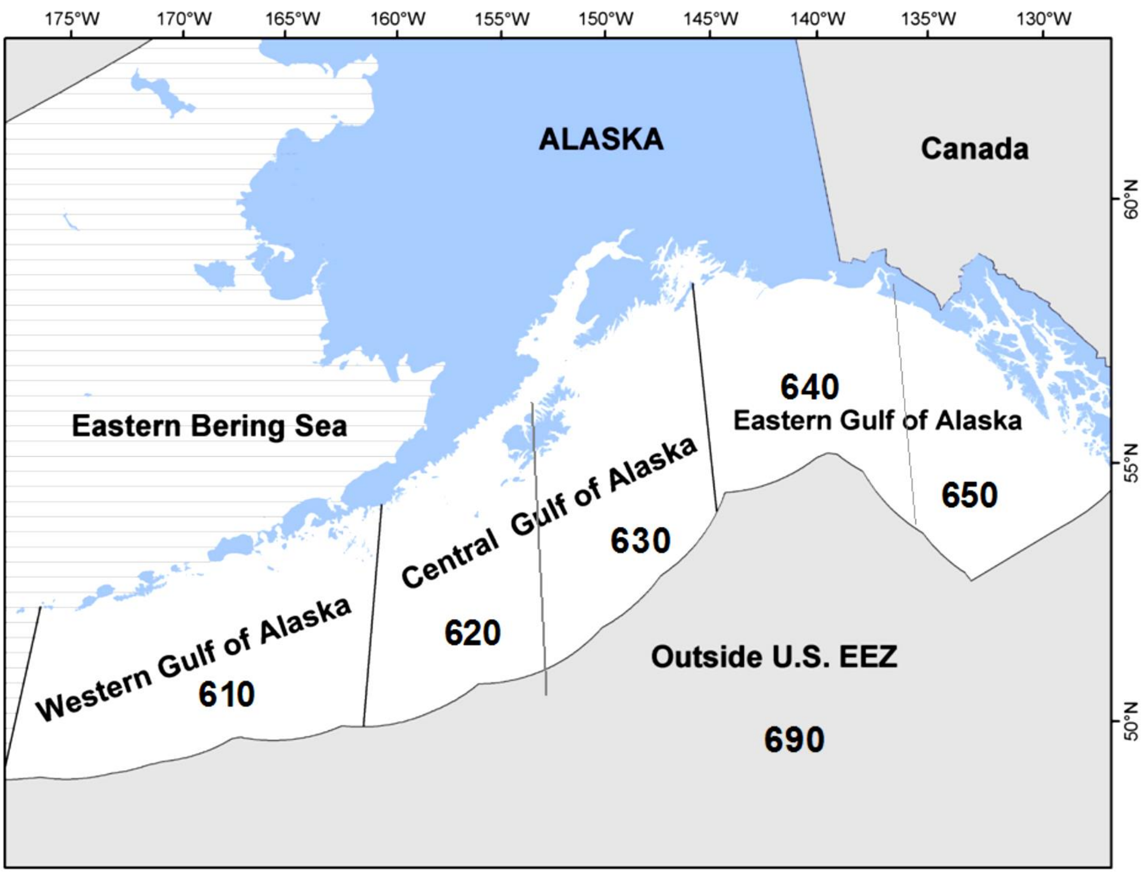


Figure 26. GOA management area, with subareas and districts.

http://www.fakr.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOA.pdf

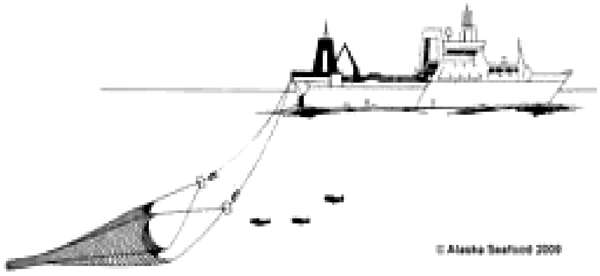
State waters (0-3 nm)

Most flatfish taken in state waters (<3nm) are managed concurrent to the federal BSAI or GOA fishery, and are referred to as parallel fisheries. ADFG issues emergency orders for state waters that duplicate NMFS management actions, except that gear or other restrictions may vary. These emergency orders establish parallel fishing seasons (termed "parallel fisheries") allowing vessels to fish for groundfish in state waters with the same seasons as the federal fisheries. The parallel fishery is managed by adopting most NMFS rules and management actions, including seasons, and catch in this fishery is counted towards federal quotas. In the BSAI, parallel fisheries occur for Greenland turbot, arrowtooth flounder, rock sole, yellowfin sole, flathead sole and an aggregated flatfish species complex.

There is a history of non-pelagic trawl closures around Kodiak Island and along the Alaska Peninsula. Generally, bays have been closed year-round since 1986. In 1999, seasonal openings along the west side of Kodiak Island were designed to allow non-pelagic trawl vessels access to flatfish resources during parallel fisheries. The state of Alaska manages minimal flatfish fisheries in state waters (in the Eastern Gulf of Alaska, Prince William Sound and Cook Inlet), either as bycatch in other fisheries or by special permit. (personal communications with ADFG managers) http://www.adfg.alaska.gov/static/home/news/pdfs/newsreleases/cf/241416353.pdf

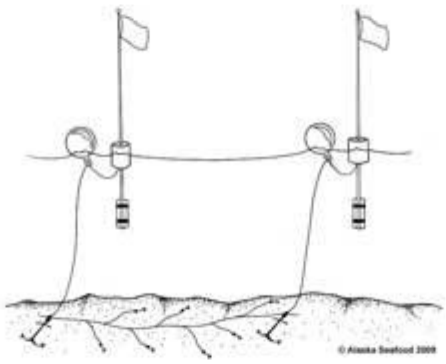
Fishing Method

Trawl gear. Virtually all of the flatfish in Alaska are caught and landed by trawlers using bottom trawl gear. A trawl is a large, bag-shaped net that is towed by a fishing vessel. The doors serve to keep the mouth of the trawl open as it moves through the water. The flatfish fisheries are prosecuted with bottom trawls typically having a headrope to footrope vertical distance rise of 1 fathoms to 3 fathoms. Nets are constructed of polyethylene webbing with codends and intermediates using 5.5” to 8” mesh. Sweeps are typically 45 fathoms and are made of combination



rope or wire. Since 2011, the use of bobbins on the trawl sweeps has been required in the BSAI, and is in the process of being implemented in the GOA. These bobbins reduce the amount of contact with the seafloor, thereby protecting habitat, reducing bycatch, and reducing the effects of trawling on invertebrates. Trawlers use sophisticated ultrasonic devices to determine bottom type and fish for species associated with that substrate. Upon locating a likely substrate for the desired species, the vessel trawls through the school and captures the fish. Electronic sensors tell the harvester exactly where the trawl is in relation to the ocean floor, while other sensors report how full the trawl becomes. The net is retrieved using huge winches and a power drum upon which the net is rolled as it is brought aboard.

Longline gear. Longliners catch bottomfish via a long line (“groundline”) that is laid on the bottom.



The freezer longline fleet in the BSAI fishes primarily for Greenland turbot with stationary lines, onto which baited hooks are attached by gangions. Most vessels use swivel gear. The ends of each set are anchored and marked with buoys. The gear is normally set in a straight line.

Greenland turbot are fished by both fixed (longline, pot) and trawl gear in a limited access, derby style fishery. Derby style fisheries are based on a certain amount of fish being available to catch by all participants, the idea is to catch the most fish possible before the overall limit is reached. The pot catch has typically been so much smaller than the longline catch, that it is considered negligible.

Flatfish Complex and Species Selected for Full Assessment

The unit of certification for this assessment includes the flatfish species with the largest tonnage and economic value in the BSAI and GOA flatfish fisheries. Within the management framework, single species stock assessments reports are provided at the single species level for the species with the highest commercial value and catch, while minor flatfish species are generally assessed in groups within the shallow, deep water and other flatfish groups. All the flatfish species were assessed originally as part of the validation report to frame the unit of certification for full assessment. The "minor" flatfish species generally tend to have catches limited to about 1000 tonnes or less and where considered for this assessment like associated catch to key target fisheries (see clause 13 on ecosystem effects of fishery), not part of the unit of certification. Here below the original tables from the validation report are presented.

Location	**Species**	**Clause evidence adequacy rating**													**Considerations (see below)**
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	
BSAI	Alaska plaice	H	H	H	H	H	H	H	H	H	H	H	H	H	Viable for Full Assessment
	Arrowtooth flounder	H	H	H	H	H	H	H	H	H	H	H	H	H	Viable for Full Assessment
	Flathead sole	H	H	H	H	H	H	H	H	H	H	H	H	H	Viable for Full Assessment
	Bering flounder	H	H	H	M	L	L	M	M	H	H	H	H	H	Aggregated species (with flathead sole), minimal catches (<1000 t), no biomass reference point
	Greenland turbot	H	H	H	H	H	M	M	H	H	H	H	H	H	Requires further analysis but maybe viable for Full Assessment
	Kamchatka flounder	H	H	H	H	H	M	M	H	H	H	H	H	H	Requires further analysis but maybe viable for Full Assessment
	Northern rock sole	H	H	H	H	H	H	H	H	H	H	H	H	H	Viable for Full Assessment
	Yellowfin sole	H	H	H	H	H	H	H	H	H	H	H	H	H	Viable for Full Assessment
	Other flatfish														
	Starry flounder	H	H	H	H	H	L	M	H	H	H	H	H	H	No biomass reference point
	Sakhalin sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Rex sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Dover sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Longhead dab	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Butter sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Arctic flounder	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Deepsea sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	English sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is

															<1,000 t
	Petrale sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Pacific sanddab	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Roughscale sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Sand sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Slender sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Curlfin sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t

Location	**Species**	**Clause evidence adequacy rating**													**Considerations (see below)**
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	
GOA	Arrowtooth flounder	H	H	H	H	H	H	H	H	H	H	H	H	H	Viable for Full Assessment
	Flathead sole	H	H	H	H	H	H	H	H	H	H	H	H	H	Viable for Full Assessment
	Rex sole	H	H	H	H	H	M	M	H	H	H	H	H	H	Requires further analysis but maybe viable for Full Assessment
	Deep-water flatfish complex														
	Dover sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Greenland turbot	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Deepsea sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Shallow flatfish complex														
	Yellowfin sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Northern rock sole	H	H	H	H	H	H	H	H	H	H	H	H	H	Viable for Full Assessment
	Southern rock sole	H	H	H	H	H	H	H	H	H	H	H	H	H	Viable for Full Assessment
	Butter sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Starry flounder	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	English sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Sand sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Alaska plaice	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t

Fleet structure

Flatfish species that are targeted in the Bering Sea are the following: yellowfin sole, flathead sole, Alaska plaice, rock sole, arrowtooth flounder, Greenland turbot, and 'other flatfish' (a management category that includes: Arctic flounder, butter sole, curlfin sole, deepsea sole, Dover sole, English sole, longhead dab, Pacific sanddab, petrale sole, rex sole, roughscale sole, sand sole, slender sole, starry flounder, Sakhalin sole).

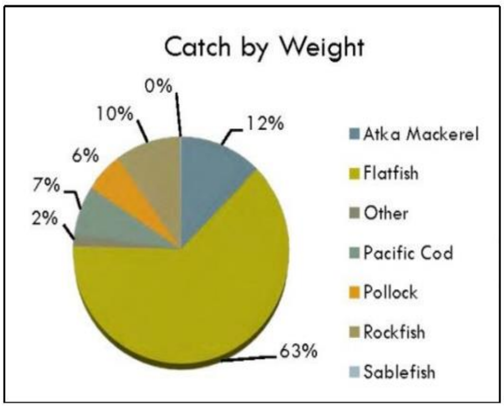
The flatfish fisheries are multispecies fisheries (mainly targeting flatfish, Pacific cod, Atka mackerel, and rockfish to smaller degrees) in which incidental catch species are often an important component of the catch. Flatfish are taken in the BSAI with both trawl and longline gears (Greenland Turbot only). The BSAI flatfish fishery is almost entirely conducted by non pelagic trawl catcher processors. Catcher processors utilize onboard equipment to process and freeze the catch. These vessels range in size from 110 to 300 feet, and carry crews of up to 50 people. There are currently 21 vessels in the Amendment 80 catcher processor fleet fishing in the BSAI and 63% of their catch by weight is flatfish. Additionally, 21 other trawl vessels make deliveries to the Amendment 80 catcher processors and shoreside fish plants. Some Amendment 80 vessels act as motherships, receiving catch from vessels fishing in the BSAI limited trawl access sector. In some cases, the same company may have vessels fishing in both sectors.
According to U.S. Coast Guard data, there are approximately 87 vessels fishing the flatfish complex in the BSAI. The longline vessels operating in the BSAI are typically freezer vessels, processing the catch at-sea. This fleet has a VMS requirement, which makes them relatively easy to track.

The majority of catch is harvested by vessels that are now in the Amendment 80. A total of 28 vessels qualified for Amendment 80, of which 24 applied for initial quota share in 2008. The remainder of the catch of flatfish species is primarily taken by other trawl vessels, with the notable exception of Greenland turbot (77% of the total BSAI Greenland turbot catch was taken by hook and line gear in 2007). There are a small number of other trawl vessels that harvest flatfish in the Bering Sea. These include vessels of the AFA (American Fisheries Act primarily targeting pollock) trawl catcher processor and the AFA trawl catcher vessel fleets, and other trawl catcher vessels that are not in an AFA cooperative. Amendment 80 sector vessels are consistently the major participants in the Bering Sea flatfish fisheries. A small number of other catcher processors regularly participate, in addition to their activities in the AFA pollock fishery. Catcher vessels have tended to participate in the Bering Sea flatfish fisheries in years of higher flatfish TACs (2000 and recent years). In both latter cases, there are a total of ten unique vessels that have retained flatfish in the Bering Sea directed flatfish fisheries since 2000.

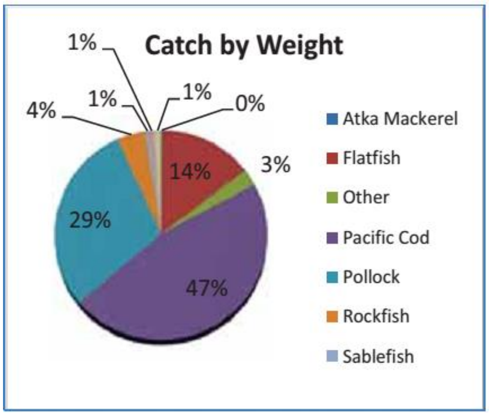
The yellowfin sole target fishery is the most important flatfish fishery by volume. While catch composition varies by month, the primary incidental catch species in the yellowfin sole fishery, by volume, are Pacific cod, Alaska plaice, pollock, and rock sole. Flathead sole, arrowtooth flounder, and other flatfish are also caught incidentally, along with very small amounts of other species. While flathead sole and rock sole are entirely allocated to the Amendment 80 sector, yellowfin sole may be targeted by vessels in the BSAI trawl limited access sector.

Targeting/Retention of Flatfish by Sector in the BSAI

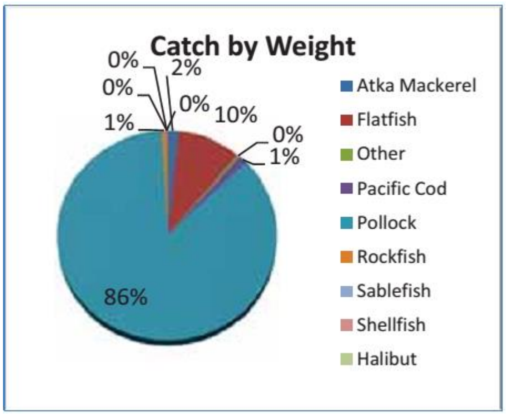
Amendment 80 Sector, 2011



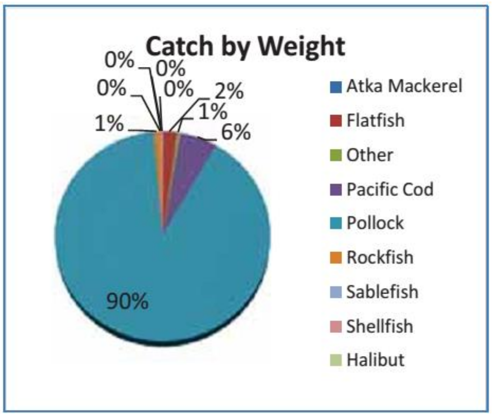
Non AFA Bering Sea Trawlers Sector, 2010



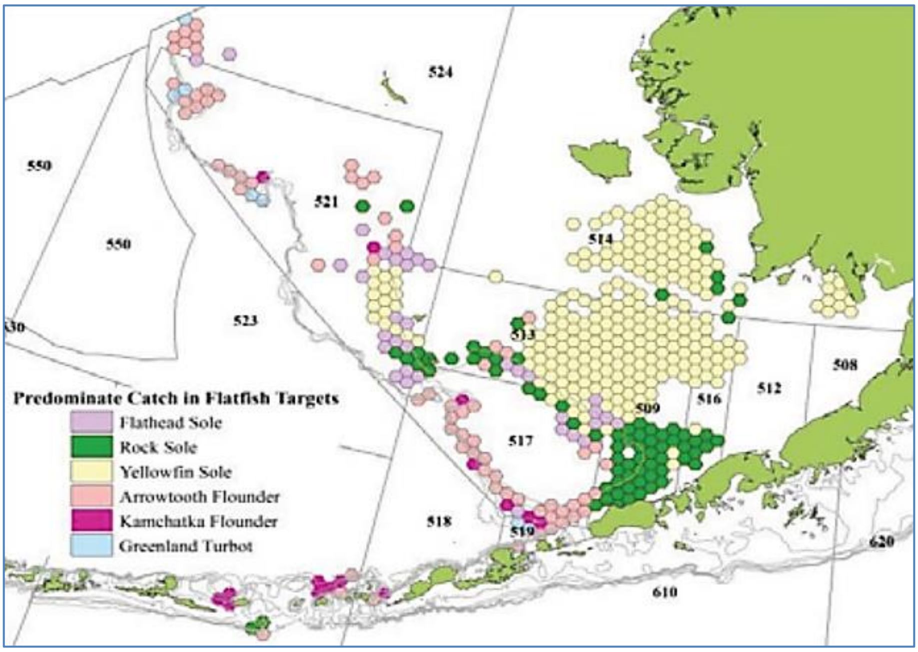
AFA Catcher Processors, 2010



AFA Catcher Vessels, 2010



Distribution of flatfish species caught by trawl gear in the BSAI, 2011



Flatfish are taken in the GOA with primarily trawl gear. Certain species may show up as bycatch on longline gear set for sablefish or Pacific halibut; however there is no directed longline fishery for flatfish. The flatfish fishery in the GOA is a combination of catcher vessels and catcher processors. The catcher vessels are generally smaller than the catcher processors and tend to deliver their catch to processing plants on shore. There are 59 vessels currently participating in the central GOA trawl fleet, by weight 34% of their overall catch is flatfish. The western GOA trawl fleet consists of 39 vessels and their combined flatfish take is 47% of their overall catch by weight. According to US Coast Guard data, there are approximately 85 vessels fishing the flatfish complex in the GOA.

The “flatfish” species complex, previous to 1990, was managed as a group in the GOA, and included the major flatfish species inhabiting the region, with the exception of Pacific halibut. In 1990, the Council divided the flatfish complex into three categories (deep-water flatfish, shallow-water flatfish, and arrowtooth flounder) due to significant differences in halibut PSC rates, biomass, and commercial value in directed fisheries for shallow-water and deep-water flatfish. Flathead sole was separated out from the deep-water flatfish complex in 1991, due to its distributional overlap between both shallow-water and deep-water groups. In 1993, rex sole was separated from the deep-water flatfish complex, due to concerns regarding Pacific ocean perch (POP) bycatch.

The shallow-water flatfish complex is comprised of eight flatfish species, which are generally harvested with trawl gear. Northern rock sole, southern rocksole, butter sole, and yellowfin sole account for the majority of the current biomass of shallow-water flatfish, with rock sole being the predominate target species in the complex. Since 1988, the majority of shallow-water flatfish harvest has occurred on the continental shelf and on the slope, east of Kodiak Island in the Central GOA.

The deep-water flatfish complex is comprised of three flatfish species. These species include Greenland turbot, Dover sole, and deep-sea sole. Dover sole constitutes the majority of the survey biomass and deepwater flatfish catch (generally over 98%). In recent years, Dover sole have been taken primarily in the Central GOA, as well on the continental slope off Yakutat Bay in the Eastern GOA. Fishing seasons are driven by seasonal halibut PSC apportionments.

GOA nonpelagic groundfish vessels participate in various targets, including flatfish, Pacific cod, pollock and rockfish, in both Central and Western GOA.

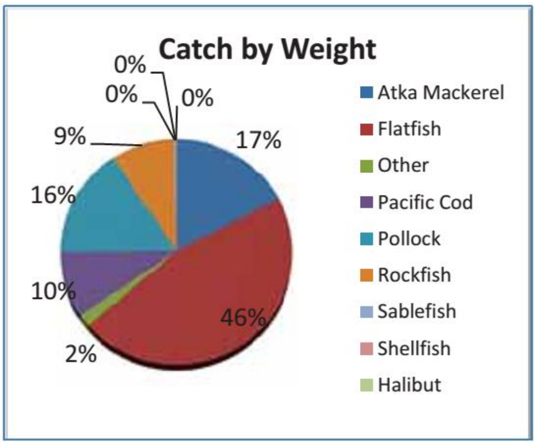
The flatfish fisheries are prosecuted by catcher processors and catcher vessels using nonpelagic trawl gear. For catcher processors, the number of vessels targeting flatfish in the Central GOA has ranged from a low of 10 vessels in 2010, to a high of 12 vessels during the 2003 through 2008 seasons. Flatfish fisheries with the largest number of catcher processors were the rex sole and arrowtooth flounder fisheries. As for the trawl catcher vessels, the number of vessels that targeted Central GOA flatfish has ranged from a low of 40 vessels in 2009, to a high of 48 vessels in 2003, although the number of catcher vessels that consistently target flatfish in the Central GOA are significantly lower. The largest number of trawl catcher vessels participated in the shallow-water flatfish and arrowtooth flounder fisheries.

The Western GOA fleet consists of small catcher vessels and large catcher processors. The smaller vessels generally use smaller sized bottom trawls that take less horsepower to tow. The fleet fishes for a wide variety of species, with targets varying across seasons. The catcher vessels begin the year by targeting Pacific cod, moving on to catch pollock, then other species. Several of the Amendment

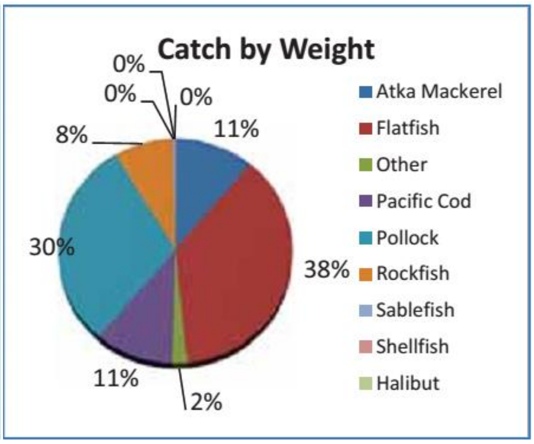
80 vessels also participate in the Western GOA fisheries, targeting flatfish, Pacific cod, and rockfish using the same gear they use in the Bering Sea. The fleet's primary targets (flatfish, Pacific cod, pollock, and rockfish in the Western GOA) had a combined value of $20.5M in 2010; gross ex-vessel value was $13.6M (catcher vessels) and wholesale value was $7.7M (catcher processors).

Targeting/Retention of Flatfish by Sector in the GOA

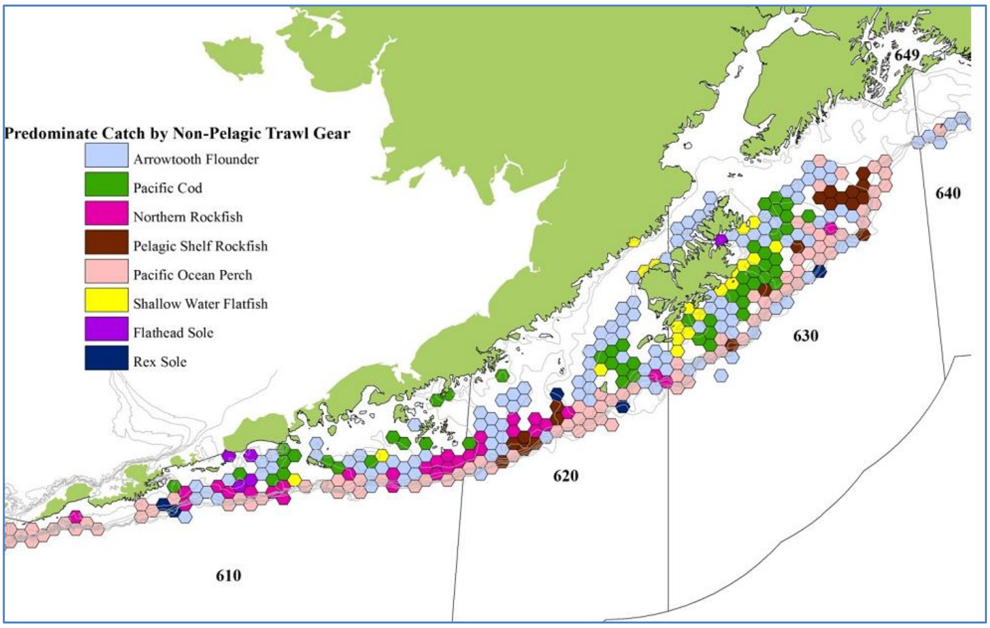
Western Goa Trawlers, 2010



Central GOA Trawlers, 2010



Distribution of the GOA nonpelagic trawl gear catch from 2007 through 2011



Evidence

http://www.adfg.alaska.gov/static/fishing/PDFs/commercial/whatkindofboat_cf.pdf
http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/FleetProfiles412.pdf
http://alaskafisheries.noaa.gov/sustainablefisheries/amds/amd89/amd89trawleariririfa.pdf
http://www.npfmc.org/wp-content/PDFdocuments/SPECS/BSFlatfishFlexPR413.pdf

Fishery Management Plan for the Groundfish of the BSAI 2013:
http://www.alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf

http://www.nmfs.noaa.gov/stories/2012/07/07_26_12trawl_gear_innovation.html

NPFMC groundfish species profiles 2011:
http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Species_Profiles2011.pdf

http://www.alaskafisheries.noaa.gov/npfmc/PDFdocuments/resources/FleetProfilesAdd1112.pdf

Fishery Management Plan for the Groundfish of the GOA 2013:
http://www.alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf

3.3. Fisheries Management and Organization

Management entities

The North Pacific Fishery Management Council

The NPFMC is one of eight regional councils established by the Magnuson Fishery Conservation and Management Act in 1976 [in short Magnuson-Stevens Act (MSA)] to oversee management of the nation's fisheries. The NPFMC recommends regulations to govern the directed flatfish complex fisheries in the Alaska's EEZ. NPFMC management measures for the flatfish complex include seasonal and spatial allocation of Total Allowable Catch (TAC), time and area restrictions (i.e. protected/conservation areas), bycatch reduction programs, Prohibited Species Catch (PSC) Limits, reporting and observer requirements etc... In 1992 the Council created the Western Alaska Community Development Quota (CDQ) Program, to provide western Alaska communities an opportunity to participate in the BSAI fisheries. The CDQ Program allocates approximately 10.7% of all BSAI quotas for groundfish, prohibited species, halibut, and crab to over 65 eligible communities.

The National Marine Fisheries Service

The NOAA's NMFS is responsible for the management, conservation, and protection of living marine resources within the US EEZ. The NMFS Alaska Regional Office oversees fisheries in federal waters (3-200 nm) that produce about half the fish caught in US waters, with responsibilities covering 842,000 square nautical miles off Alaska. NOAA's Alaska Fisheries Science Center (AFSC) conducts stock assessment and biological studies. NMFS also works closely with the NPFMC, and are responsible for developing, implementing, and enforcing regulations pertaining to management of the flatfish resources in US waters. In addition to biological studies, monitoring surveys and stock assessment reports, NMFS is charged with carrying out the federal mandates of the U.S. Department of Commerce with regard to commercial fisheries such as approving and implementing Fishery Management Plans (FMP) and FMP amendments recommended by the Council. The U.S. Coast Guard partners the NMFS's Office for Law Enforcement (OLE) for monitoring, control and enforcement of fisheries regulations.

ADFG BSAI report 2011: http://www.adfg.alaska.gov/FedAidpdfs/FMR11-28.pdf
Fishery Management Plan for the Groundfish of the BSAI 2013:
http://www.alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf
Fishery Management Plan for the Groundfish of the GOA 2013:
http://www.alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf
http://alaskafisheries.noaa.gov/npfmc/index.html
http://alaskafisheries.noaa.gov/
http://www.nmfs.noaa.gov/ole/
http://www.dps.alaska.gov/awt/Marine.aspx

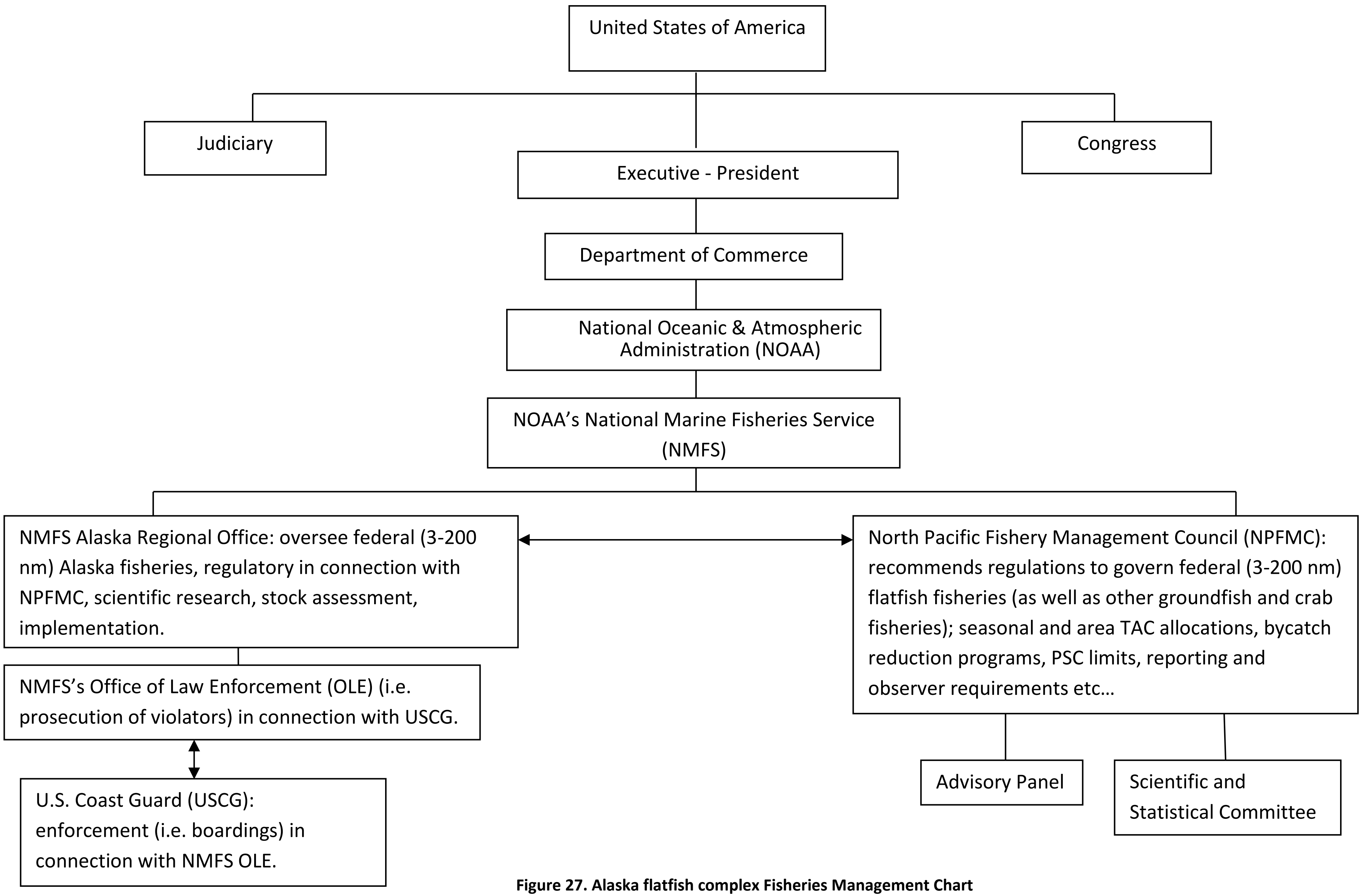


Figure 27. Alaska flatfish complex Fisheries Management Chart

Important dates relevant to the management of the Alaska flatfish fisheries

1978. The GOA Groundfish Fishery Management Plan was implemented.

1982. The BSAI Groundfish Fishery Management Plan was implemented.

1986. Foreign fishing in the U.S. EEZ ends and is replaced by joint venture fisheries.

1988. The fishery is restricted to domestic vessels only.

1990. Management measures were implemented to protect the Stellar Sea Lions.

1992. The NPFMC create the Western Alaska Community Development Quota (CDQ). The CDQ Program allocates a percentage of all BSAI quotas for groundfish to eligible communities.

1996. The NPFMC adopt a License Limitation Program (LLP) for Alaska groundfish and crab fleet. The LLP limits the number, size and specific operation of the vessels. The LLP was approved in 1997 and implemented in 2000.

1997. Seabird avoidance measures were implemented for Alaska groundfish fisheries (i.e. longline).

1998. The NPFMC approved requiring 100% retention (Improved Retention/Improved Utilization) of shallow water flatfish in the GOA fisheries, beginning on the 1st January 2003.

1998. Trawl gear was prohibited in the East Yakutat/Southeast subareas.

2003. The Groundfish Retention Standard (GRS) for BSAI flatfish fisheries was approved by the NPFMC in June in conjunction with the Amendment 79, published as a final rule in 2007, and became effective in 2008.

2006. The Amendment 80 was adopted by the NPFMC. This action allocates several BSAI non-pollock trawl groundfish among trawl fishery sectors.

2013. The NMFS published a regulatory amendment, effective in March, to modify the GRS program in the BSAI management area.

BSAI Flatfish complex fisheries management

Flatfish complex species are regulated under the BSAI groundfish Fishery Management Plan (FMP) via regulatory areas, stock assessments that set an annual catch quotas (TAC), an overall optimum yield (OY) for the BSAI, closures, permits, limited entry, seasons, in-season adjustments, gear restrictions, closed waters, bycatch limits and rates, record keeping, reporting requirements and observer monitoring. Annual TACs are set for individual species including yellowfin sole, Greenland turbot, arrowtooth flounder, Kamchatka flounder, northern rock sole, flathead sole, Alaska plaice and other flatfish (15 species included).

In 2008, the NPFMC instituted annual allocations of several species and the formation of harvesting cooperatives (Amendment 80). Included on this list were yellowfin sole, flathead sole, northern rock sole, and other groundfish species. The Amendment 80 sector was allocated up to 100% of the rock sole and flathead sole allocation. This new system allows up to 90% retention in the multi-species fishery. Instituted in 2011, vessels fishing in the trawl flatfish fishery are required to use Bering Sea Flatfish Trawl Gear; this gear utilizes strategically placed bobbins to elevate the trawl sweeps and footrope off of the seafloor. The gear has been developed to reduce habitat impacts on the fishing grounds and to reduce the bycatch of bottom-dwelling invertebrates such as crab and soft corals.

Evidence

Fishery Management Plan for the Groundfish of the BSAI 2013:
http://www.alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf

http://www.nmfs.noaa.gov/stories/2012/07/07_26_12trawl_gear_innovation.html

NPFMC groundfish species profiles 2011:
http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Species_Profiles2011.pdf

http://www.alaskafisheries.noaa.gov/npfmc/PDFdocuments/resources/FleetProfilesAdd1112.pdf

GOA Flatfish complex fisheries management

Flatfish complex species are regulated under the GOA groundfish Fishery Management Plan (FMP) via regulatory areas, stock assessments that set an annual catch quotas (TAC), an overall optimum yield (OY) for the GOA, closures, permits, limited entry, seasons, in-season adjustments, gear restrictions, closed waters, bycatch limits and rates, record keeping, reporting requirements and observer monitoring. Annual TACs are set for individual species including flathead sole, arrowtooth flounder, rex sole, deep-water flatfish (Dover sole, Greenland turbot and deepsea sole) and shallow-water flatfish (8 species including northern and southern rock sole).

Evidence

NPFMC groundfish species profiles 2011:
http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Species_Profiles2011.pdf

Fishery Management Plan for the Groundfish of the GOA 2013:
http://www.alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf

http://www.alaskafisheries.noaa.gov/npfmc/PDFdocuments/resources/FleetProfilesAdd1112.pdf

3.4. Stock assessment activities

Stock assessments are conducted annually for the BSAI flatfish complex species and biennially for the GOA flatfish complex species (current exception in N/S rock sole) in Alaskan waters. The assessments contain current and historical data on catch biomass, catch size composition, catch age composition, and fishery independent (from bottom trawl surveys) indices of abundance and population age composition collected by the NMFS. Assessment outputs include historical estimates of population abundance, spawning stock biomass, recruitment, population age composition and fishing mortality. Catch projections are used to estimate future fishery yields under pre-agreed harvest rules in accordance with national standards, as well as to estimate the impact of these catches on the populations. The historical time series are used to evaluate the performance of the management regime in relation to management objectives.

Three reference points are used for management of groundfish fisheries in the North Pacific. The overfishing level (OFL) is the catch limit which should never be exceeded. It is based on the fishing mortality rate associated with producing the maximum sustainable yield (MSY) on a continuing basis. The acceptable biological catch (ABC) is the annual sustainable catch limit, and is set lower than the OFL. The buffer between these reference points allows for scientific uncertainty in single species stock assessments, ecosystem considerations, and operational management of the fishery. The total allowable catch (TAC) is the annual catch target that incorporates economic considerations and management uncertainty. The fishery management plans prescribe that TAC may equal but never exceed ABC, such that TAC<ABC<OFL. The sum of TACs for all groundfish stocks must also remain within the optimum yield range defined in the FMP. In the BSAI, the upper limit is 2 million mt, which can be a constraint to some fisheries. TAC may be set lower than ABC for a variety of reasons, such as to remain under the 2 million mt optimum yield limit; to increase a rebuilding rate or address other conservation issues; to limit incidental bycatch; or to account for state water removals. Fisheries are managed in-season to achieve the TACs without exceeding the ABC or OFL. All catch taken in directed fisheries or caught incidentally in other fisheries, whether retained or discarded, accrues towards the TAC.

The catch limits are specified annually through an established public process. The annual process of determining OFL and ABC specifications begins with the assignment of each stock to one of six “tiers” based on the availability of information about that stock. Stocks in Tier 1 have the most information available, and those in Tier 6, the least. Application of a control rule for each tier prescribes the resulting OFL and maximum ABC for each stock. For many groundfish stocks, the estimate of $F_{40\%}$ is used as a surrogate for F_{ABC}. $F_{40\%}$ is the fishing mortality rate at which the spawning biomass per recruit is reduced to 40% of its value in the equivalent unfished stock. The control rules for Tiers 1-3 also provide for automatic rebuilding, because if a stock falls below target biomass levels, ABC and OFL are proportionally reduced.

Scientists prepare an assessment of the status of each stock (or stock complex), and include alternate model simulations and tier assignments to arrive at recommendations for OFLs and ABCs. The Groundfish Plan Teams compile these assessments into Stock Assessment and Fishery Evaluation (SAFE) reports, develop their own OFL and ABC recommendations (which may or may not agree with the stock assessment author), and present this information to the Council and its Scientific and Statistical Committee (SSC) and Advisory Panel (AP). The SSC is responsible for setting the Council's OFL and ABC limits, using the SAFE reports and Plan Team recommendations. The SSC retains the flexibility to adjust ABC and OFL values from the control rule, based on factors such as multispecies interactions, ecosystem considerations, and additional scientific uncertainty. The Council then sets the TAC levels at or below the ABC levels, incorporating recommendations from the Advisory Panel and industry stakeholders. All of the current and archived SAFE reports are available online.

NPFMC groundfish species profiles 2011:
http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Species_Profiles2011.pdf

http://www.afsc.noaa.gov/refm/stocks/assessments.htm

Model characteristics

The National Standard Guidelines for Fishery Management Plans published by the National Marine Fisheries Service (NMFS) require that a stock assessment and fishery evaluation (SAFE) report be prepared and reviewed annually for each fishery management plan (FMP). The SAFE report summarizes the best available scientific information concerning the past, present, and possible future condition of the stocks, marine ecosystems, and fisheries that are managed under Federal regulation. It provides information to the Councils for determining annual harvest levels for each stock, documenting significant trends or changes in the resource, marine ecosystems, and fishery over time, and assessing the relative success of existing state and Federal fishery management programs.
This Stock Assessment section of the SAFE report for groundfish fisheries is compiled by the BSAI Groundfish Plan Team or the GOA Groundfish Plan Team from chapters contributed by scientists at NMFS Alaska Fisheries Science Center (AFSC). These chapters include a recommendation by the author(s) for overfishing level (OFL) and acceptable biological catch (ABC) for each stock and stock complex managed under the FMP for the next two fishing years. The OFL and ABC recommendations by the Plan Team are reviewed by the Scientific and Statistical Committee (SSC), which may confirm the Plan Team recommendations. The Plan Team and SSC recommendations, together with social and economic factors, are considered by the Council in determining total allowable catches (TACs) and other measures used to manage the fisheries. Neither the author(s) of the SAFE reports, Plan Team, nor SSC recommends TACs.

Detailed assessments are produced annually for nine of these species while detailed assessments for GOA flathead sole, arrowtooth flounder and rex sole are produced every two years. Also, northern and southern Rock sole were assessed separately for the first time in 2012.

Stock Assessment information for Units of Certification

Bering Sea Aleutian Islands Alaska plaice stock assessment. Since the sex-specific weight-at-age for Alaska plaice diverges after the age of maturity (about age 10 for 50% of the stock) with females growing larger than males, the assessment model is configured to accommodate the sex-specific aspects of the population dynamics of Alaska plaice. The model is coded to allow for the input of sex-specific estimates of fishery and survey age composition and weight-at-age and provides sex-specific estimates of population numbers, fishing mortality, selectivity, fishery and survey age composition and allows for the estimation of sex-specific natural mortality and catchability. The catch-at-age population dynamics model was used to obtain estimates of several population variables of the Alaska plaice stock, including recruitment, population size, and catch. This catch at age model was developed with the software program Automatic Differentiation Model Builder (ADMB; Fournier et al. 2012).

Natural mortality

A value of M = 0.13 was used to model natural mortality for both males and females in this assessment.

Catchability

This assessment incorporates a herding effect into the stock assessment model by fixing survey catchability (q) at 1.2, close to the mean value from the combined flatfish species in survey herding experiments.

Variability in length at age and in estimated age, and Weight at length

Alaska plaice exhibit sex-specific dimorphic growth after the age of sexual maturity with females attaining a larger size than males. The combination of the length-weight relationship and the von Bertalanffy growth curve produces an estimated weight-at-age relationship that is similar to that used in previous Alaska plaice assessments. A conversion matrix was derived from the von Bertalanffy growth relationship, and used to convert the modeled numbers at age into modeled numbers at length.

Maturity

The estimated maturity at age for female Alaska plaice is shown below.

age	proportion mature
3	0
4	0
5	0
6	0.08
7	0.2
8	0.43
9	0.58
10	0.79
11	0.88
12	0.95
13	0.97
14	0.98
15	0.99
16	1
17	1
18	1
19	1
20	1
21	1
22	1
23	1
24	1
25	1

Parameters estimated independently

The parameters estimated independently include the natural mortality (M) and survey catchability (q_srv).

In past assessments, M was fixed at 0.25 based on an earlier analysis of natural mortality. In the 2010 assessment, M for Alaska plaice was re-estimated using 3 methods (based on the life history characteristics of maximum life span, average age, and the relationship between growth and maximum length). The results suggest a range of M values from 0.08 and 0.13 for males and from 0.08 to 0.29 for females. The stock assessment model was run for different combinations of male and female M to discern what value provides the best fit to the data components in term of log-likelihood. The best fit to the observable population characteristics occurred close to M = 0.13 for both sexes.

Parameters estimated conditionally

Parameter estimation is facilitated by comparing the model output to several observed quantities, such as the age compositions of the fishery and survey catches, the survey biomass, and the fishery catches. The general approach is to assume that deviations between model estimates and observed quantities are attributable to observation error and can be described with statistical distributions. Each data component provides a contribution to a total log-likelihood function, and parameter values that maximize the log-likelihood function are selected.

Bering Sea Aleutian Islands arrowtooth flounder stock assessment

This stock assessment utilizes AD Model Builder software to model the population dynamics of Bering Sea and Aleutian Islands arrowtooth flounder. The model is a length-based approach where survey and fishery length composition observations are used to calculate estimates of population numbers-at-age by the use of a length-age (growth) matrix. The model simulates the dynamics of the population and compares the expected values of the population characteristics to those observed from surveys and fishery sampling programs. This is accomplished by the simultaneous estimation of the parameters in the model using the maximum likelihood estimation procedure. The fit of the simulation values to the observed characteristics is optimized by maximizing the likelihood function given some distributional assumptions about the observed data.

The suite of parameters estimated by the base model are classified by the following likelihood components:

Data Component	Distribution assumption
Trawl fishery size composition	Multinomial
Shelf survey population size composition	Multinomial
Slope survey population size composition	Multinomial
Shelf survey age composition (1996 and 1998)	Multinomial
Trawl survey biomass estimates and S.E.	Log normal

The total likelihood is the sum of the log-likelihood for each data component. The model allows for the individual likelihood components to be weighted by an emphasis factor.

Natural mortality

For this assessment, model runs were again made with female natural mortality fixed at 0.2 for a range of values for males. The run with male M = 0.35 is the preferred run since it provides a reasonable fit to all the data components and is consistent with the hypothesis that differences in sex ratios observed from trawl surveys are the result of differential sex specific natural mortality and not availability.

Catchability

The catchability equation has two parts. The e^{α} term is a constant or time independent estimate of q. The model estimate of $\alpha = -0.52$ indicates that $q > 1$ suggesting that arrowtooth flounder are herded into the trawl path of the net which is consistent with the experimental results for other flatfish species. The second term, $e^{\beta T}$ is a time-varying (annual) q which relates to the metabolic aspect of herding or distribution (availability) which can vary annually with bottom water temperature. In 2012, the temperature anomaly was the lowest it has been since 1999; resulting in a similarly low estimate of q.

Weight at length

Based on 282 observations during a AFSC survey in 1976, the length (mm)-weight (gm) relationship for arrowtooth flounder (sexes combined) is described by the equation:

$W = 5.682 \times 10^{-6} * L^{3.1028}$

Maturity

Arrowtooth flounder male and female weight-at-age (kg) and proportion of females mature at age.

age	female weight at age	male wt at age	female maturity at age (previous)	female maturity at age (Stark 2008)
1	0.02	0.01	0	0
2	0.04	0.04	0	0.01
3	0.11	0.09	0	0.02
4	0.22	0.17	0.02	0.04
5	0.36	0.27	0.39	0.12
6	0.55	0.39	0.84	0.28
7	0.76	0.52	0.97	0.54
8	0.99	0.66	1.00	0.78
9	1.25	0.80	1.00	0.91
10	1.52	0.94	1	0.97
11	1.80	1.08	1	0.99
12	2.08	1.21	1	1
13	2.35	1.34	1	1
14	2.61	1.45	1	1
15	2.83	1.56	1	1
16	3.01	1.66	1	1
17	3.16	1.75	1	1
18	3.27	1.83	1	1
19	3.37	1.91	1	1
20	3.44	1.98	1	1
21	3.53	2.04	1	1

Parameters estimated independently

Catchability

Attempts to estimate catchability by profiling over fixed q values in a previous assessment were unsuccessful as estimated values always reached the upper bounds placed on the parameter. The results indicated q values as high as 2.0 which suggest that more fish are caught in the survey trawl than are present in the "effective" fishing width of the trawl. Results from the experiments conducted in 1994 indicated a trawl catch of flatfish was composed of fish which were directly in the trawl path as well as those which moved into the trawl path because of the mud cloud disturbance (herding). Although arrowtooth flounder were not one of the seven species considered in this experiment, it seems to assume that they also exhibit this same behaviour, and should be included in the catchability model. Examination of BS shelf survey biomass estimates indicate that some of the annual variability in catchability seemed to positively co-vary with bottom water temperature.

Parameters estimated conditionally

Year class strengths

The population simulation specifies the number-at-age in the beginning year of the simulation, the number of recruits in subsequent years, and the survival rate for each cohort as it moves through the population calculated from the population dynamics equations.

Fishing Mortality

The fishing mortality rates (F) for each age and year are calculated to approximate the catch weight by solving for F while still allowing for observation error in catch measurement. A large emphasis (300) was placed on the catch likelihood component.

Selectivity and sex ratio

Survey results indicate that fish less than about 4 years old (< 30 cm) are found only on the Bering Sea shelf. Males from 30-50 cm and females 30-70 cm are found in shelf and slope waters, and males > 50 cm and females > 70 cm are mainly found on the slope. Sex specific "domed-shaped" selectivity was freely estimated for males and females in the shelf survey. Stock assessors assumed an asymptotic selectivity pattern for both sexes in the slope surveys and the Aleutian Islands surveys.

Bering Sea Aleutian Islands flathead sole stock assessment

The assessment for flathead sole is conducted using a split-sex, age-based model with length-based formulations for fishery and survey selectivity. The model structure was developed following Fournier and Archibald's (1982) methods for separable catch-at-age analysis, with many similarities to Methot (1990). The assessment model simulates the dynamics of the stock and compares expected values of stock characteristics with observed values from survey and fishery sampling programs in a likelihood framework, based on distributional assumptions regarding the observed data. Model parameters are estimated by minimizing an associated objective function (the negative total loglikelihood plus imposed penalty functions) that describes the error structure between model estimates and observed quantities.

Natural mortality

The natural mortality rates M_x were fixed at 0.2 for both sexes, consistent with previous assessments.

Catchability

The log-scale mean survey catchability parameter α_q was fixed at 0.0, producing a mean survey catchability of 1.0.

Variability in estimated age

The ageing error matrix was taken directly from the Stock Synthesis model used in assessments prior to 2004 (Spencer et al., 2004).

Variability in length at age

Sex-specific length-at-age curves were previously estimated from survey data using a procedure designed to reduce potential sampling-induced biases (Spencer et al., 2004). Mean lengths-at-age did not exhibit consistent temporal trends, so sex-specific von Bertalanffy growth curves were fit to mean length-at-age data using all years available at the time (1982, '85, '92, '94, '95 and 2000).

Weight at length

A length–weight relationship of the form $W = a\ L^b$ was fit to survey data from 1982-2004, with parameter estimates a = 0.00326 and b = 3.3 applying to both sexes (weight in g, length in cm).

Application of the length-weight relationship to the predicted size-at-age from the von Bertalanffy relationships yielded weight-at-age relationships for the fishery and survey.

Maturity

The maturity ogive for flathead sole was based on Stark (2004), who found a length at 50% maturity of 320.2 mm using a logistic curve.

Likelihood components

Parameter estimates are obtained by minimizing the overall sum of a weighted set of negative log-likelihood components derived from fits to the model data described above and a set of penalty functions used to improve model convergence and impose various constraints. Fits to observed annual fishery size and age compositions, as well as survey biomass estimates and size and age compositions are included among the set of likelihood components. A likelihood component based on recruitment deviations from the mean or the assumed stock-recruit function is also included. Penalties are imposed to achieve good fits to annual fishery catches (biomass) and the assumed historic fishery catch.

Bering Sea Aleutian Islands Greenland turbot stock assessment

A version of the stock synthesis program (Methot 1990) has been used to model the eastern Bering Sea component of Greenland turbot since 1994. The software and assessment model configuration has changed over time, particularly in the past five years as newer versions have become available.

Total catch estimates from 1960 to 2011 were used in the model. Model parameters were estimated by maximizing the log posterior distribution of the predicted observations given the data. The model included two fisheries, those using fixed gear (longline and pots) and trawls, together with three surveys covering various years. Three new modeling approaches as well as the 2011 Reference model configuration were examined in this year’s assessment. The new models configurations primarily differ in how recruitment prior to 1975 was modeled. All continue to use the Beverton-Hold curve, but in two (Models 2 and 3) the early recruitment series is carried back to 1945 and in one (Model 4) the time-series is truncated to 1977. The results from these models were similar.

There was a major revision of the Greenland turbot stock assessment model and data for this year. The changes in the weight at age and selectivities had the net effect of reducing the current biomass estimate while increasing the reference points for this species. In addition to changes to the assessment model and data, there was a input error in 2009-2011 projection models that resulted in underestimates of the initial female spawning biomass (B100%), and therefore all biomass reference points. From the 2012 Authors’ preferred reference model (Model 2) this year’s estimate for B100% of 119,217 t is more than double last year’s estimate of 53,900 t, but similar to the 2008 estimate of 109,328 t. The 2012 status of the stock is B21%, much lower than last year’s projected status for 2012 of B89% and the 2008 estimate of B52%. The change in status was mostly due to fixing the input error and improvements in the shapes of the selectivity curves chosen in 2012. Due to these changes the stock is now in Tier 3b and therefore the ABC and OFL recommendations were further reduced by the descending portion in the control rule. The 2013 recommended ABC is only 26% of the projected 2013 ABC from last year's model. However, the projected 2013 estimated total biomass in this year's model is higher than projected from the 2011 Reference model. This is due to strong 2008 and an especially large 2009 year classes observed in both the survey and fisheries size composition data. These two year classes are expected to be larger than any other recruitment event since the 1970's and will begin to have an increasing influence on spawning stock biomass starting in 2014. Model 2 estimated that the BSAI Greenland turbot fishery is not overfishing the stock, that the stock is not currently overfished, and that the stock is not approaching an overfished condition. It should be noted however, that Model 3 in this assessment estimates that the BSAI Greenland turbot stock is in an Overfished condition. The only difference between Model 3 and Model 2 is the inclusion of autocorrelation in the recruitment deviations. Model 3 is the best fitting model and the only reason this model was not selected by the stock assessment authors is due to the fact that inclusion of autocorrelation in SS3 has not yet been thoroughly vetted. The biomass trajectory for Model 3 indicates overfishing is occurring, but the TAC for 2013 should prevent further stock decline.

Natural mortality

The natural mortality of Greenland turbot was assumed to be 0.112 based on Cooper et al. (2007).

Catchability

In the 2011 Reference Model, and in Model 1 for this year, catchability (q) for the slope survey was fixed at q_{slope}= 0.75 and the shelf survey (q_{shelf}) was fit with an uninformative log uniform prior with a starting value of -0.6938. In this year's three candidate models AFSC scientists explored loosening the assumption on the Slope survey catchability and tightening them on the shelf survey. In Model 2 and Model 3 the Shelf survey was fit with a lognormal prior (log(q) = -0.6938, log SD = 0.4) and an informative lognormal prior on the slope survey (log(q) = -0.28768, log SD = 0.1). For Models 4 the slope survey catchability remained the same, but they tightened the prior on q_{shelf} with a log SD = 0.1 to help with model stability. For all of the new models there was a tipping point for the catchabilities, when a more diffuse prior was allowed, the model tended to fit at unrealistically low catchability values (q < 0.001) and biomass estimates were therefore greatly inflated.

There was focused effort to explore appropriate selectivity curves for the 2012 assessment. The main difference between the 2011 Reference model selectivity and the 2012 candidate model selectivities is in how the male and female selectivity curves were allowed to differ. A new method for fitting curves that differ between male and females was implemented in the latest version of SS3 (V 2.24).

Variability in length at age

Re-analyses of age structures suggest that Greenland turbot live beyond 30 years (Gregg et al. 2006). Parameters describing length-at-age are estimated within the model. Length at age 1 is assumed to be the same for both sexes and the variability in length at age 1 was assumed to have an 8% CV while at age 21 a CV of 7% was assumed. This appears to encompass the observed variability in length-at-age.

Fishery length composition data were treated differently this year than in previous years. The raw Trawl and Longline fishery length composition data were proportioned to catch numbers by haul to obtain a more accurate representation of the catch composition.

Weight at length

A new weight at length relationship has been devised using the combined data from all surveys conducted by the Alaska Fisheries Science Center in the Bering Sea and Aleutian Islands. Last year's model used the same weight at length relationship for males and females ($w = 2.44 \times 10^{-6} L^{-3.34694}$, where L = length in cm, and w = weight in kilograms). Given the great deal of sexual dimorphism observed in this species it was thought that having separate weight at length relationships for males and females would better capture the diversity in this stock. This year's models use $w = 2.43 \times 10^{-6} L^{3.325}$ for females and $w = 3.40 \times 10^{-6} L^{3.2189}$ for males. This relationship is similar to the weight at length relationship observed by Ianelli et al. (1993) and used in the Greenland turbot stock assessment prior to 2002. The weight at length analysis was presented at the September 2012 Plan team and October 2012 SSC meetings.

Maturity

For this analysis, a logistic maturity-at-size relationship was used with 50% of the female population mature at 60 cm; 2% and 98% of the females are assumed to be mature at about 50 and 70 cm respectively. This is based on an approximation from D'yakov's (1982) study.

Parameters estimated conditionally

The name of key parameters estimated and number of parameters within the four candidate models were:

	Model 1	Model 2	Model 3	Model 4
Recruitment				
Early Rec. Dev.s	0	(1945-1974) 30	(1945-1974) 30	(1977-1988) 12
Main Rec. Dev.s	(1970-2010) 41	(1975-2010) 38	(1975-2010) 38	(1989-2011) 23
Late Rec. Dev.s	(2011-2012) 2	(2011-2012) 2	(2011-2012) 2	(2011-2012) 2
Future Rec. Dev.s	(2013-2014) 2	(2013-2014) 2	(2013-2014) 2	(2013-2014) 2
R_0	1	1	1	1
Early R_0 adjust	1	0	0	0
R_1 offset	1	1	1	1
Growth				
L_{min} (M and F)	2	2	2	2
L_{max} (M and F)	2	2	2	2
Von Bert K (M and F)	2	2	2	1
Catchability				
q_{Shelf}	1	1	1	1
q_{Slope}	0	1	1	1
Selectivity				
Trawl Fishery	12	21	21	21
Longline Fishery	8	7	7	7
Shelf Survey	18	17	17	17
Slope Survey	12	2	2	2
ABL Longline Survey	7	2	2	2
Total Parameters	112	129	129	96

Bering Sea Aleutian Islands Kamchatka flounder assessment

The assessment for BSAI Kamchatka flounder is presently a Tier 5 assessment reliant upon trawl survey biomass from the Bering Sea shelf, slope and the Aleutian Islands and an estimate of natural mortality. This model incorporates fishery data and fishery independent data from the NMFS EBS shelf and slope bottom trawl surveys and the Aleutian bottom trawl survey. Kamchatka flounder fall under Tier 5 of the ABC/OFL control rules.

Natural mortality

The natural mortality rate of Kamchatka flounder was evaluated from 4 separate methods for this assessment and was re-estimated at a lower value (0.13) than in 2011 (0.2).

Length-weight, maximum age

Length-weight measurements collected in 1999 from 193 fish indicate that males and females grow by accumulating the same weight for a given size. Age at length calculations from a small sample collected in 1991 indicate that males and females exhibit divergent growth after about age 5-6 with female growing larger than males. Both sexes have been found in relatively equal numbers and the oldest fish have been aged at 33 years indicating that Kamchatka flounder are similar in life history to other Bering Sea flatfish.

Bering Sea Aleutian Islands northern rock sole stock assessment

The abundance, mortality, recruitment and selectivity of rock sole were assessed with a stock assessment model using the AD Model builder software. The conceptual model is a separable catch-age analysis that uses survey estimates of biomass and age composition as auxiliary information (Fournier and Archibald 1982). The model simulates the dynamics of the population and compares the expected values of the population characteristics to the characteristics observed from surveys and fishery sampling programs. This is accomplished by the simultaneous estimation of the parameters in the model using the maximum likelihood estimation procedure. The fit of the simulated values to the observable characteristics is optimized by maximizing a log (likelihood) function given some distributional assumptions about the data.

Since the sex-specific weight-at-age for northern rock sole diverges after about age 6, with females growing larger than males, the current assessment model is coded to accommodate the sex-specific aspects of the population dynamics of northern rock sole. The model allows for the input of sex-specific estimates of fishery and survey age composition and weight-at-age and provides sex-specific estimates of population numbers, fishing mortality, selectivity, fishery and survey age composition and allows for the estimation of sex-specific natural mortality and catchability. The model retains the utility to fit combined sex data inputs.

The parameters estimated in the stock assessment model are classified by three likelihood components:

Data Component	Distribution assumption
Trawl fishery catch-at-age	Multinomial
Trawl survey population age composition	Multinomial
Trawl survey biomass estimates and S.E.	Log normal

The total log-likelihood is the sum of the likelihood of each data component. The likelihood components may be weighted by an emphasis factor, however, equal emphasis was placed on fitting each likelihood component in the rock sole assessment except for the catch weight which was weighted more/less.

Natural mortality

Assessments for rock sole in other areas assume M = 0.20 for rock sole on the basis of the longevity of the species. In a past BSAI assessment, a model was used to entertain a range of M values to evaluate the fit of the observable population characteristics over a range of natural mortality values (Wilderbuer and Walters 1992). The best fit occurred at M = 0.18 with the survey catchability coefficient (q) set equal to 1.0. In this assessment natural mortality was estimated for both sexes as free parameters with values of 0.159 and 0.19, for males and females respectively, when survey catchability was fixed at 1.5.

Catchability

Experiments conducted in recent years on the standard research trawl used in the annual trawl surveys indicate that rock sole are herded by the bridles (in contact with the seafloor) from the area outside the net mouth into the trawl path (Somerton and Munro 2001). Rock sole survey trawl catchability was estimated at 1.4 from these experiments (standard error = 0.056) which indicate that the standard area-swept biomass estimate from the survey is an overestimate of the rock sole population biomass. The SAFE document authors have also accounted for temperature effects on rock sole catchability within their analysis.

Weight-at-age and Maturity-at-age

The 2012 assessment again re-analyzed the time trend of size-at-age and weight-at-age available from the survey data. Northern rock sole growth (mean length-at-age) indicates that males and females grow similarly until about age 6 after which females grow faster and larger than males. The length-at-age time series exhibits periods of slow and fast growth from 1982-2011. Accordingly, the length-at-age time series was partitioned into periods of faster (1982-1991, 2004-2008) and slower (1992-2003) growth to capture the time-varying differences in growth. In order to produce a growth matrix which was not too abrupt between change point years (1991-1992 and 2003-2004) a three year running average of weight-at-age was used, working backwards from 2008. Predicted and observed biomasses match better (does not underestimate the 1980s biomass or overestimate the 1992-2003 biomass) compared to previous assessments which used the average weight-at-age from all years.

The maturity schedule for northern rock sole was updated in the 2009 assessment from a histological analysis of 162 ovaries collected from the Bering Sea fishery in February and March 2006 (Stark 2012). Compared to the maturity curve from anatomical scans used previously, the length-based model of Stark indicates nearly the same age at 50% maturity (7.8 years) but has a higher proportion of females spawning at ages older than the age of 50% maturity and a lower proportion spawning at ages younger than the age of 50% maturity.

Weight at length

The following parameters have been calculated for the length (cm)-weight (g) relationship:

$$W = a * L^{b}$$

Males		Females	
a	b	a	b
0.005056	3.224	0.006183	3.11747

Parameters estimated independently

Rock sole maturity schedules were estimated independently as discussed above as were length at age and length-weight relationships.

Parameters estimated conditionally

Year class strengths

The population simulation specifies the number-at-age in the beginning year of the simulation, the number of recruits in each subsequent year, and the survival rate for each cohort as it progresses through the population using the population dynamics equations.

Selectivity

Fishery and survey selectivity was modelled separately for males and females using the two parameter formulation of the logistic function. The model was run with an asymptotic selectivity curve for the older fish in the fishery and survey, but still was allowed to estimate the shape of the logistic curve for young fish.

Fishing mortality

F for each age, sex and year are calculated to approximate the catch weight by solving for F while still allowing for observation error in catch measurement. A large emphasis (300) was placed on the catch likelihood component, which results in predicted catches closely matching observed catches.

Natural mortality

See previous section.

Survey catchability

Unusually low estimates of flatfish biomass were obtained for BS shelf flatfish species during the very cold year 1999 and again in 2009, another cold year. These results may suggest a relationship between the bottom water temperature and the trawl survey catchability, which are documented for the yellowfin sole; flathead sole and arrowtooth flounder in the BSAI SAFE document.

Bering Sea Aleutian Islands yellowfin sole stock assessment

The abundance, mortality, recruitment and selectivity of yellowfin sole were assessed with a stock assessment model using the AD Model Builder language (Ianelli and Fournier 1998). The conceptual model is a separable catch-age analysis that uses survey estimates of biomass and age composition as auxiliary information (Fournier and Archibald 1982). The assessment model simulates the dynamics of the population and compares the expected values of the population characteristics to the characteristics observed from surveys and fishery sampling programs. This is accomplished by the simultaneous estimation of the parameters in the model using the maximum likelihood estimation procedure. The fit of the simulated values to the observable characteristics is optimized by maximizing a log(likelihood) function given some distributional assumptions about the observed data.

The suite of parameters estimated by the model are classified by three likelihood components:

Data component	Distributional assumption
Trawl fishery catch-at-age	Multinomial
Trawl survey population age composition	Multinomial
Trawl survey biomass estimates and S.E.	Log normal

The total likelihood is the sum of the likelihood for each data component. The likelihood components may be weighted by an emphasis factor; however, equal emphasis was placed on fitting each likelihood component in the yellowfin sole assessment except for the catch.

Natural mortality

Natural mortality (M) was initially estimated by a least squares analysis where catch-at-age data were fitted to Japanese pair trawl effort data while varying the catchability coefficient (q) and M simultaneously. The best fit to the data (the point where the residual variance was minimized) occurred at an M value of 0.12 (Bakkala and Wespestad 1984). This was also the value which provided the best fit to the observable population characteristics when M was profiled over a range of values in the stock assessment model using data up to 1992 (Wilderbuer 1992). Since then, natural mortality has been estimated as a free parameter in some of the stock assessment model runs which have been evaluated for the past five years. A natural mortality value of 0.12 is used for both sexes in the base model presented in this assessment.

Catchability

To better understand how water temperature may affect the catchability of yellowfin sole to the survey trawl, catchability was estimated for each year in the stock assessment model as:

$$q = e^{-\alpha + \beta T}$$

where q is catchability, T is the average annual bottom water temperature anomaly at survey stations less than 100 m, and α and β are parameters estimated by the model. The catchability equation has two parts. The e -α term is a constant or time-independent estimate of q. The model estimate of α = -0.132 indicates that q > 1 suggesting that yellowfin sole are herded into the trawl path of the net which is consistent with the experimental results for other flatfish species. The second term, $e^{\beta T}$ is a time-varying (annual) q which responds to metabolic aspects of herding or distribution (availability) which can vary annually with bottom water temperature.

Variability in length at age

In this assessment the reanalyzed growth data were incorporated and growth was modelled as time-varying and temperature-dependent functions input into an age-structured stock assessment model and then comparing the results with the base model that uses time-invariant growth. Four growth models were developed as follows: Mean age-specific somatic body mass (here referred to as weight-at-age) is modelled as a von Bertalanfy growth function in the initial year of the stock assessment (1954) and projected forward such that the model expected mean weight at age *j* in year *i* for a given sex is constant over the projection (Model 0). In Model 1 the annual observed population mean weight-at-age (time varying) is used in the stock assessment model. Model 2 is a fit to the data used in Model 1 by the estimation of year and age specific parameters and Model 3 estimates annual weight-at-age as a function of annual May sea surface temperature anomalies.

Weight at length and Weight-at-age

A sex-specific length-weight relationship was calculated from the survey database using the usual function, a and b are parameters estimated to provide the best fit to the data.

	a	b	n
males	0.00854	3.081	2,701
females	0.0054	3.227	3,662

The estimates of weight at length were applied to the annual trawl survey estimates of population length at age averaged over all years, by sex, to calculate the weight at each age.

Maturity

Maturity information collected from yellowfin sole females during the 1992 and 1993 eastern Bering Sea trawl surveys is used in this assessment (Table 4.10). Nichol (1995) estimated the age of 50% maturity at 10.5 years based on the histological examination of 639 ovaries. In the case of most north Pacific flatfish species, including yellowfin sole, sexual maturity occurs well after the age of entry into the fishery. Yellowfin sole are 90% selected to the fishery by age 11 whereas females have been found to be 61% mature at this age.

Parameters estimated independently

M was initially estimated by a least squares analysis where catch-at-age were fitted to Japanese pair trawl effort data while varying the catchability coefficient (q) and M simultaneously. The best fit to the data occurred at M value of 0.12.

Parameters estimated conditionally

Year class strengths

The population simulation specifies the number-at-age in the beginning year of the simulation, the number of recruits in each subsequent year, and the survival rate for each cohort as it progresses through the population using the population dynamics equations.

Selectivity

Fishery and survey selectivity was modelled separately for males and females using the two parameter formulation of the logistic function. The model was run with an asymptotic selectivity curve for the older fish in the fishery and survey, but was still allowed to estimate the shape of the logistic curve for young fish.

Fishing mortality

F for each age, sex and year are calculated to approximate the catch weight by solving for F while still allowing for observation error in catch measurement. A large emphasis (300) was placed on the catch likelihood component, which results in predicted catches closely matching observed catches.

Survey catchability

See previous section.

Spawner-recruit estimation

Annual recruitment estimates were constrained to fit Ricker (1958) form of the stock recruitment relationship. The spawner-recruit fitting is estimated in a later phase after initial estimates of survival, number-at-age and selectivity are obtained.

Gulf of Alaska arrowtooth flounder stock assessment

The model structure is developed following Fournier and Archibald's (1982) methods, with many similarities to Methot (1990). They implemented the model using automatic differentiation software developed as a set of libraries under C++ (ADModel Builder). ADModel Builder can estimate a large number of parameters in a non-linear model using automatic differentiation software extended from Greiwank and Corliss (1991) and developed into C++ class libraries. This software provides the derivative calculations needed for finding the objective function via a quasi-Newton function minimization routine (e.g., Press et al. 1992). The model implementation language (ADModel Builder) gives simple and rapid access to these routines and provides the ability to estimate the variance-covariance matrix for all parameters of interest.

Weights used on the likelihood values were 1.0 for the survey length, survey age data and the survey biomass (simply implying that the variances and sample sizes specified for each data component were approximately correct). A weight of 0.25 was used for the fishery length data. The fishery length data is essentially from bycatch and in some years has low sample sizes. A lower weight on the fishery length data allows the model to fit the survey data components better. The estimated length at age relationship is used to convert population age compositions to estimated size compositions. The current model estimated size compositions using a fixed length-age transition matrix estimated from the 1984 through 2005 survey data combined. The distribution of lengths within ages was assumed to be normal with cv's estimated from the length at age data of 0.06 for younger ages and 0.10 for older ages. Size bins were 2 cm starting at 24 cm, 3 cm bins from 40 cm to 69 cm, one 5 cm bin from 70 cm to 74 cm, then a 75+cm bin. There were 13 age bins from 3 to 14 by 1 year interval, and ages over 15 accumulated in the last bin, 15+.

Parameters estimated independently

Natural mortality, Age of recruitment, and Maximum age

Natural Mortality with a maximum age of 14 years for males and 20 years for females was estimated at 0.30 and 0.21 respectively using Hoenig's method.

Age at recruitment was set at three in the model due to small number fof fish caught at younger ages.

Growth

Growth was estimated from length and age data from 1984 to 2005 surveys. L_{inf} was estimated as 81.9 cm for females and 49.7 cm for males. The length at age 2 (L_2) for both sexes was estimated at 21 cm and k was 0.102 for females and 0.236 for males.

$$L_{age} = L_{\inf} + (L_2 - L_{\inf}) * \exp(-k(age - 2)) .$$

The mean length at age data from the surveys for older females increases from 1984 to the mid-1990s then decreases in 2005 for females. Mean length at age is used to construct the age-length transition matrix for fitting length composition data for the fishery and the survey length data. The mean length at age for age 15 females is about 6 cm (about 4 cm for males) lower (in the current assessment model) than the mean length at age for 15 year-olds used in the 2005 assessment model.

Weight at length

The weight-length relationship for arrowtooth flounder is, $W = .003915 L^{3.2232}$, for both sexes combined where weight is in grams and length in centimeters.

Maturity

Length at 50% mature was estimated at 47 cm with a logistic slope of -0.3429 from arrowtooth sampled in hauls that occurred in September from the 1993 bottom trawl survey (Zimmerman 1997).

Parameters estimated conditionally

Recent recruitments

Higher recruitment in the 2011 assessment in the years 2004-2008, compared to past assessments was due to the addition of the 2007 and 2009 survey data and the 2011 survey.

Selectivity

Separate fisheries selectivity were estimated for each age, however the shape of the selectivity curve was constrained to be a smooth function. Survey selectivities were modelled using a two parameter ascending logistic function. The selectivities by age were estimated separately for females and males. The differential M and selectivities by sex resulted in a predicted fraction female of about 0.70, which is close to the fraction female in the fishery and survey length and age data.

Gulf of Alaska flathead sole stock assessment

The assessment was conducted using a split-sex, age-structured model with parameters evaluated in a maximum likelihood context. The model structure (Appendix A) was developed following Fournier and Archibald's (1982) methods, with many similarities to Methot (1990). They implemented the model using automatic differentiation software developed as a set of libraries under C++ (ADModel Builder). ADModel Builder can estimate a large number of parameters in a non-linear model using automatic differentiation software extended from Greiwank and Corliss (1991) and developed into C++ class libraries. This software provides the derivative calculations needed for finding the minimum of an objective function via a quasi-Newton function minimization routine (e.g., Press et al. 1992). It also gives simple and rapid access to these routines and provides the ability to estimate the variance-covariance matrix for all parameters of interest.

The current assessment model covers 1984-2011. Age classes included in the model run from age 3 to 20.

<u>Parameters estimated independently</u>

Natural mortality

Natural mortality (*M*) was fixed at 0.2 yr^{-1} for both sexes in all age classes. This value was based on a maximum observed age for flathead sole of 22 years (Spencer et al., 1999). Although maximum observed age has increased to 31 years in the Bering Sea, an analysis of independent estimates of natural mortality for flathead sole is not inconsistent with continued use of this value (Stockhausen, et al. 2010b).

Growth

Individual growth was incorporated in the model using sex-specific age-length transition matrices. These were identical to those used in the previous assessment (Stockhausen et al., 2009). In terms of the von Bertalanffy growth equation, L_{inf} was estimated at 44.37 cm for females and 37.36 cm for males. The length at age 2 (L_2) was estimated at 10.17 cm for males and 13.25 cm for females. The growth parameter *k* was estimated at 0.157 for females and 0.204 for males. Length at age *t* was modeled as:

$$L_t = L_{\inf} + (L_2 - L_{\inf})e^{-k(t-2)}$$

Weight at length

The weight-length relationship used for flathead sole was: $W = 0.00428\ L^{3.2298}$ for both sexes combined (weight in grams and length in centimeters). Weight-at-age was estimated using the mean length-at-age and the weight-length relationship.

Maturity

The maturity schedule for Gulf of Alaska flathead sole was estimated using histological analysis of ovaries collected in January 1999 (Stark, 2004). Size at 50% mature was estimated to be 33.3 cm with a slope of 0.52 cm^{-1} from a sample of 208 fish. Age at 50% mature was 8.74 years with a slope of 0.773 yr^{-1}. Size at 50% mature was estimated at 32.0 cm for Bering Sea flathead sole (not significantly different from the GOA results), however, age at 50% mature was 9.7 due to slower growth in the Bering sea.

Survey catchability

Based on results from the 2003 assessment (Turnock et al., 2003a), which indicated that estimating survey catchability was problematic, overall survey catchability in the model was fixed to a value of 1

<u>Parameters estimated conditionally</u>

Parameters estimated conditionally included those having to do with recruitment, annual fishing mortality, and age-specific survey catchability.

Gulf of Alaska northern and southern rock sole stock assessment

The stock assessment model is a two species two sex mixed fishery statistical catch-at-age population dynamics model using maximum likelihood estimation built with AD Model Builder (ADMB Project, 2009).

Seven new model configurations were evaluated, differentiated by the data used in the model. The model evaluation criteria included how well the model estimates fit to the survey estimates of biomass, the survey numbers-at-age, the annual U/N/S rock sole catch and the scaled fractions of shallow-water flatfish catch that is N and S rock sole, reasonable curves for fishery selectivity-at-length (logistic versus exponential), reasonable values for annual fishing mortality so that the catch did not come primarily from one species, reasonably smooth changes over time in annual fishing mortality, and that the model estimated the variance-covariance matrix.

<u>Parameters estimated independently</u>

The growth and maturity parameters used in the model are from Stark and Somerton, 2002.

<u>Northern rock sole</u>

- Males: L_∞=382 mm, k=0.261, t_0=0.160;
- Females: L_∞=429 mm, k=0.236, t_0=0.387, L_{T50} = 328 mm.

<u>Southern rock sole</u>

- Males: L_∞=387 mm, k=0.182, t_0=-0.962;
- Females: L_∞=520 mm, k=0.120, t_0=-0.715, L_{T50} = 347 mm.

<u>Parameters estimated conditionally</u>

There were several structural changes made to the 2011 model configuration in order to address selectivity and recruitment issues. An overview of these changes was presented to the GOA groundfish Plan Team in September 2012. The fishery selectivity was changed from 1 to 3 periods to allow for changes over time in fishing; the three periods are pre-1990, 1990-1999, and 2000 on. The selectivity curves for the first two selectivity periods for both fishery and survey selectivity have been changed from species- and sex-specific to sex-specific only, as most of the data for the fishery and all of the data for the survey for these two periods are for undifferentiated (U) rock sole. A penalty was added to the likelihood to restrict recruitment for southern (S) rock sole for 1974-1983 in order to address the high recruitment in 1979 in last year's results. The weight on fitting to the survey biomass indices was changed from 5.0 to 1.0 and the weight on fitting to the fishery observer catch-at-length data was changed from 0.5 to 1.0, as the extrapolated fishery observer data represent on average 20% on the shallow-water flatfish catch, not less than 1%, which the sampled fishery observer data represent.

Parameters that can be estimated in the model include:

- median and initial age-2 recruitment by species;
- steepness by species, if the Beverton-Holt or Ricker stock-recruitment relationship is selected;
- annual recruitment deviations by species;
- median fishing mortality by species;
- annual fishing mortality deviations by species;
- initial fishing mortality by species and sex;
- fishery selectivity-at-length by period, species, and sex;
- survey catchability by survey period and species;
- survey selectivity-at-length by survey period, species, and sex;
- growth parameters by species and sex;
- deviations from natural mortality by species and sex; and
- deviations from fishing mortality by species and sex.

Gulf of Alaska rex sole stock assessment

Current stock levels were estimated for 2011 and projected for 2012-2013 using the "base" model formulation as in 2009: a split-sex, age-structured model with parameters evaluated in a maximum likelihood context. The model structure was developed following Fournier and Archibald's (1982) methods, with many similarities to Methot (1990). The model was implemented using automatic differentiation software developed as a set of libraries under C++ (ADModel Builder). ADModel Builder can estimate a large number of parameters in a non-linear model using automatic differentiation software extended from Greiwank and Corliss (1991) and developed into C++ class libraries. This software provides the derivative calculations needed for finding the minimum of an objective function via a quasi-Newton function minimization routine (e.g., Press et al. 1992). It also gives simple and rapid access to these routines and provides the ability to estimate the variance-covariance matrix for all parameters of interest.

<u>Parameters estimated independently</u>

Natural mortality

Natural mortality (*M*) was fixed at 0.17 yr-1 for both sexes in all age classes. This value was based on maximum observed age of 27 years for rex sole (Turnock et al., 2005).

Growth

The model estimates size compositions using fixed sex-specific age-length conversion matrix. Sex-specific parameters values for the von Bertalanffy equation were estimated from mean length-at-age data collected during the 1984, 1987, 1990, 1993 and 1996 groundfish surveys. The estimates values are:

Sex	L_∞	k	t_0
Males	39.5	0.38	0.79
Females	44.9	0.31	0.69

Catchability

For the assessment, survey catchability was fixed at 1.

Weight at length

Weight-at-length was modeled using the equation $W = aL^b$, with L in centimeters and W in grams. The parameters values for this equation, estimated from survey data, are:

Sex	a	b
Males	1.0770E-06	3.30571
Females	4.7933E-07	3.44963
Combined	5.9797E-07	3.41049

Maturity

Abookire (2006) modeled female rex sole size-at-maturity using a logistic model, obtaining a value for size at 50% maturity of 351.7 mm with a slope of 0.0392 mm^{-1}. About half of the maturity samples were obtained from fishery catches and half from research trawls during 2000-2001. Using the mean length-at-age relationship estimated from the 1984-1996 survey data, the age at 50%-maturity was estimated at 5.6 years.

<u>Parameters estimated conditionally</u>

A total of 89 parameters were estimated in the final model, including parameters on the recruitment of rex sole to the population (48 parameters total, including ones determining the initial age composition) and values related to annual fishing mortality (31 parameters total). The separable age component of fishing mortality was modeled using ascending logistic functions estimated separately for males and females (4 parameters total). The same approach was also used to estimate relative age-specific survey selectivity (4 parameters total). They also estimated the Tier 3 values for F_{ABC} and F_{OFL}: F40% and F35% (2 parameters).

Assessment results

Amendment 56 to the BSAI and the GOA Groundfish Fishery Management Plan defines the "overfishing level" OFL, the fishing mortality rate used to set OFL (F_{OFL}), the maximum permissible ABC, and the fishing mortality rate used to set the maximum permissible ABC (F_{ABC}). Because the reliable estimates of reference points related to the Maximum Sustainable Yield (MSY) are currently not available but reliable estimates of reference points related to spawning per recruit are available, Pacific cod in the BSAI and the GOA have generally been managed under the Tier 3 of the Amendment 56. Tier 3 uses the following reference points: $B_{40\%}$ equal to 40% of the equilibrium spawning biomass that would obtained in the absence of fishing; $F_{35\%}$ equal to fishing mortality rate that reduces the equilibrium level of spawning per recruit to 35% of the level that would be obtained in the absence of fishing; and $F_{40\%}$ equal to the fishing mortality rate that reduces the equilibrium level of spawning per recruit to 40% of the level that would be obtained in the absence of fishing.

The BSAI and GOA flatfish stocks are not overfished and are not approaching an overfishing condition.

<u>BSAI federal fishery</u>

BSAI Alaska Plaice

The 2012 age 3+ biomass is estimated at 588,500 mt for the BSAI. MSY reference points are not available for Alaska plaice. Catch specifications from 2012 were as follows: OFL=55,800 mt, F_{OFL}=0.19, ABC=55,200 mt, TAC=20,000 mt.

Table 1. Principal results of the 2012 BSAI Alaska plaice stock assessment, based on the authors' (of the SAFE report) preferred model, and compared with the results of the 2011 model. Biomass and catch figures are in metric tons. From the 2012 BSAI groundfish.

	Last year		This year	
Quantity/Status	2012	2013	2013	2014
M (natural mortality)	0.13	0.13	0.13	0.13
Specified/recommended Tier	3a	3a	3a	3a
Projected biomass (ages 3+)	606,000	599,500	588,500	580,400
Female spawning biomass (t)				
Projected	260,800	259,800	260,500	253,600
$B_{100\%}$	376,300		380,000	
$B_{40\%}$	150,500		152,000	
$B_{35\%}$	131,700		133,000	
F_{OFL}	0.19	0.19	0.19	0.19
$maxF_{ABC}$ (maximum allowable = F40%)	0.151	0.151	0.158	0.158
Specified/recommended F_{ABC}	0.151	0.151	0.158	0.158
Specified/recommended ABC (t)	53,400	54,000	55,200	67,000
Specified/recommended OFL (t)	64,600	65,000	55,800	60,200
Is the stock being subjected to overfishing?	No	No	No	No
Is the stock currently overfished?	No	No	No	No
Is the stock approaching a condition of being overfished?	No	No	No	No

BSAI Alaska plaice SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIplaice.pdf

BSAI Arrowtooth flounder

Arrowtooth flounder fall under Tier 3a of the ABC/OFL control rules. The 2012 age 1+ biomass is estimated at 1,021,060 mt for the BSAI. Fisheries falling under the Tier 3 management scheme use $B_{35\%}$ and/or $_{B40\%}$ as a surrogate for MSY. Clark (1991) has shown that calculations made with life history parameters typical of demersal fish and a range of realistic spawner-recruit relationships show that yield will be at least 75% of maximum sustainable yield so long as the spawning biomass is maintained in the range of about 20-60% of the unfished level. Catch specifications from 2012 were as follows: OFL=131,985 mt, F_{OFL}=0.21 ABC=111,204 mt, TAC=25,000 mt.

Table 2. Principal results of the 2012 BSAI arrowtooth flounder stock assessment, based on the authors' (of the SAFE report) preferred model, and compared with the results of the 2011 model. Biomass and catch figures are in metric tons. From the 2012 BSAI groundfish SAFE report, arrowtooth flounder section.

	Last year		This year	
Quantity/Status	2012	2013	2013	2014
M (natural mortality)	0.35, 0.2	0.35, 0.2	0.35, 0.2	0.35, 0.2
Specified/recommended Tier	3a	3a	3a	3a
Projected biomass (ages 1+)	1,127,050	1,129,760	1,021,060	1,014,250
Female spawning biomass (t)				
Projected	818,286	811,932	638,377	642,518
$B_{100\%}$	702,721	–	616,191	–
$B_{40\%}$	281,088	–	246,476	–
$B_{35\%}$	245,852	–	215,667	–
F_{OFL}	0.27	0.27	0.21	0.21
$maxF_{ABC}$ (maximum allowable = F40%)	0.22	0.22	0.17	0.17
Specified/recommended F_{ABC}	0.22	0.22	0.17	0.17
Specified/recommended OFL (t)	181,000	186,000	131,985	134,443
Specified/recommended ABC (t)	150,000	152,000	111,204	112,484
Is the stock being subjected to overfishing?	no	no	no	no
Is the stock currently overfished?	no	no	no	no
Is the stock approaching a condition of being overfished?	no	no	no	no

BSAI arrowtooth flounder SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIatf.pdf

Clark, W.G. 1991. Groundfish exploitation rates based on life history parameters. Can. J. Fish. Aquat. Sci. 48: 734-750.

BSAI Flathead sole

BSAI flathead sole fall under Tier 3a of the ABC/OFL control rules. The 2012 age 3+ biomass is estimated at 748,454 mt for the BSAI. Fisheries falling under the Tier 3 management scheme use $B_{35\%}$ and/or $_{B40\%}$ as a surrogate for MSY. Catch specifications from 2012 were as follows: OFL=81,535 mt, F_{OFL}=0.348 ABC=67,857 mt, TAC=22,699 mt.

Table 3. Principal results of the 2012 BSAI flathead sole stock assessment, based on the authors' (of the SAFE report) preferred model, and compared with the results of the 2011 model. Biomass and catch figures are in metric tons. From the 2012 BSAI groundfish SAFE report, flathead sole section.

Quantity	As estimated or specified last year (2011)		As estimated or specified this year (2012)	
	2012	2013	2013	2014
M (natural mortality)	0.2	0.2	0.2	0.2
Specified/recommended tier	3a	3a	3a	3a
Total biomass (Age 3+; t)	810,936	814,898	748,454	747,838
Female Spawning Biomass (t)	250,224	244,283	245,175	236,009
$B_{100\%}$	333,610	333,610	320,714	320,714
$B_{40\%}$	133,444	133,444	128,286	128,286
$B_{35\%}$	116,763	116,763	112,250	112,250
$F_{OFL} = F_{35\%}$	0.340	0.340	0.348	0.348
$max\ F_{ABC} = F_{40\%}$	0.279	0.279	0.285	0.285
$recommended\ F_{ABC}$	0.279	0.279	0.285	0.285
OFL (t)	84,500	83,100	81,535	80,069
max ABC (t)	70,377	69,180	67,857	66,657
ABC (t)	70,400	69,200	67,857	66,657
Status	As determined last year (2011) for:		As determined this year (2012) for:	
	2010	2011	2011	2012
Overfishing	no	n/a	no	n/a
Overfished	n/a	no	n/a	no
Approaching overfished	n/a	no	n/a	no

BSAI flathead sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIflathead.pdf

Greenland turbot

The Greenland turbot assessment utilizes the stock synthesis program to model the population dynamics of this species. This model incorporates fishery data and fishery independent data from the NMFS EBS shelf and slope bottom trawl surveys, the Auke Bay Laboratory longline survey and the Aleutian bottom trawl survey. Greenland turbot fall under Tier 3a of the ABC/OFL control rules. The 2012 age 1+ biomass is estimated at 80,989 mt for the BSAI. Fisheries falling under the Tier 3 management scheme use $B_{35\%}$ and/or $_{B40\%}$ as a surrogate for MSY. Clark (1991) has shown that calculations made with life history parameters typical of demersal fish and a range of realistic spawner-recruit relationships show that yield will be at least 75% of maximum sustainable yield so long as the spawning biomass is maintained in the range of about 20-60% of the unfished level. Catch specifications from 2012 were as follows: OFL=2,539 mt, F_{OFL}=0.14 ABC=2,064 mt, TAC=2,060 mt.

Table 4. Principal results of the 2012 BSAI Greenland turbot stock assessment, based on the authors' (of the SAFE report) preferred model, and compared with the results of the 2011 model. Biomass and catch figures are in metric tons. From the 2012 BSAI groundfish SAFE report, Greenland turbot section.

	As estimated or *specified last* year for:		As estimated or *recommended this* year for:	
Quantity	2012	2013	2013	2014
M (natural mortality rate)	0.112	0.112	0.112	0.112
Tier	3a	3a	3b	3b
Projected total (age 1+)	76,850	73,910	80,989	94,752
Female spawning biomass (t)				
Projected	47,687	41,441	23,485	26,537
$B_{100\%}$	53,900	53,900	119,217	119,217
$B_{40\%}$	21,560	21,560	47,686	47,686
$B_{35\%}$	18,870	18,870	41,726	41,726
F_{OFL}	0.453	0.453	0.14	0.16
$maxF_{ABC}$	0.367	0.367	0.12	0.13
F_{ABC}	0.367	0.367	0.12	0.13
OFL (t)	11,658	9,697	2,539	3,266
maxABC (t)	9,660	8,029	2,064	2,655
ABC (t)	9,660	8,029	2,064	2,655
EBS	7,226	6,006	1,612	2,074
Aleutian Islands	2,434	2,023	452	581
	As determined *last* year		As determined *this* year	
Status	2010	2011	2011	2012
Overfishing	No	n/a	No	n/a
Overfished	n/a	No	n/a	No
Approaching overfished	n/a	No	n/a	No

BSAI Greenland turbot SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIturbot.pdf

Kamchatka flounder

The assessment for BSAI Kamchatka flounder is presently a Tier 5 assessment reliant upon trawl survey biomass from the Bering Sea shelf, slope and the Aleutian Islands and an estimate of natural mortality. This model incorporates fishery data and fishery independent data from the NMFS EBS shelf and slope bottom trawl surveys and the Aleutian bottom trawl survey. Kamchatka flounder fall under Tier 5 of the ABC/OFL control rules. The 2012 age 3+ biomass is estimated at 748,454 mt for the BSAI. MSY reference points are not available for Kamchatka flounder due to the lack of more detailed data. Catch specifications from 2012 were as follows: OFL=16,300 mt, F_{OFL}=0.13 ABC=12,200 mt, TAC=10,000 mt.

Table 5. Principal results of the 2012 BSAI Kamchatka flounder stock assessment, based on the authors' (of the SAFE report) preferred model, and compared with the results of the 2011 model. Biomass and catch figures are in metric tons. From the 2012 BSAI groundfish SAFE report, Kamchatka flounder section.

Quantity	As estimated or *specified last* year for: 2012	2013	As estimated or *recommended this* year for: 2013	2014
M (natural mortality rate)	0.2	0.2	0.13	0.13
Tier	5	5	5	5
Biomass (t)	125,200	125,200	108,800	108,800
F_{OFL}	0.2	0.2	0.13	0.13
$maxF_{ABC}$	0.15	0.15	0.098	0.098
F_{ABC}	0.15	0.15	0.098	0.098
OFL (t)	24,800	24,800	16,300	16,300
maxABC (t)	18,600	18,600	12,200	12,200
ABC (t)	18,600	18,600	12,200	12,200
Status	As determined *last* year for: 2012	2013	As determined *this* year for: 2013	2014
Overfishing	n/a	n/a	n/a	n/a

BSAI Kamchatka flounder SAFE 2012:
http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIkamchatka.pdf

BSAI Northern Rock Sole

The abundance, mortality, recruitment and selectivity of northern rock sole were assessed with a stock assessment model using the AD Model builder software. The conceptual model is a separable catch-age analysis that uses survey estimates of biomass and age composition as auxiliary information. This model incorporates fishery data and fishery independent data from the NMFS EBS shelf bottom trawl survey. BSAI northern rock sole fall under Tier 1a of the ABC/OFL control rules. The 2012 age 6+ biomass is estimated at 1,465,600 mt for the BSAI. Catch specifications from 2012 were as follows: OFL=241,000 mt, F_{OFL}=0.164 ABC=214,000 mt, TAC=92,380 mt.

Table 6. Principal results of the 2012 BSAI Northern rock sole stock assessment, based on the authors' (of the SAFE report) preferred model, and compared with the results of the 2011 model. Biomass and catch figures are in metric tons. From the 2012 BSAI groundfish SAFE report, northern rock sole section.

	As estimated or *specified last* year for:		As estimated or *recommended this* year for:	
Quantity	2012	2013	2013	2014
M (natural mortality rate)	0.15	0.15	0.15	0.15
Tier	1a	1a	1a	1a
Projected total (age 6+)	1,857,000	1,841,400	1,465,600	1,393,200
Female spawning biomass (t)	605,600	622,800	628,300	638,300
Projected				
B_0	683,400		694,500	
B_{MSY}	255,000	255,000	260,000	260,000
F_{OFL}	0.146	0.146	0.164	0.164
$maxF_{ABC}$	0.131	0.131	0.146	0.146
F_{ABC}	0.131	0.131	0.146	0.146
OFL (t)	231,000	216,700	241,000	229,000
maxABC (t)	208,000	195,500	214,000	204,000
ABC (t)	208,400	195,500	214,000	204,000
	As determined *last* year for:		As determined *this* year	
Status	2010	2011	2011	2012
Overfishing	No	No	No	No
Overfished	No	No	No	No
Approaching overfished	No	No	No	No

BSAI Northern rock sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIrocksole.pdf

Yellowfin sole

The abundance, mortality, recruitment and selectivity of yellowfin sole were assessed with a stock assessment model using the AD Model Builder language. The conceptual model is a separable catch-age analysis that uses survey estimates of biomass and age composition as auxiliary information. This model incorporates fishery data and fishery independent data from the NMFS EBS shelf bottom trawl survey. BSAI yellowfin sole fall under Tier 1a of the ABC/OFL control rules. The most recent CIE review for the yellowfin sole assessment was in 2012. The 2012 age 6+ biomass is estimated at 1,963,000 mt for the BSAI. Catch specifications from 2012 were as follows: OFL=220,000 mt, F_{OFL}=0.112 ABC=206,000 mt, TAC=198,000 mt.

Table 7. Principal results of the 2012 BSAI yellowfin sole stock assessment, based on the authors' (of the SAFE report) preferred model, and compared with the results of the 2011 model. Biomass and catch figures are in metric tons. From the 2012 BSAI groundfish SAFE report, yellowfin sole section.

Quantity	As estimated or *specified last* year for: 2012	2013	As estimated or *recommended this* year for: 2013	2014
M (natural mortality rate)	0.12	0.12	0.12	0.12
Tier	1a	1a	1a	1a
Projected total (age 6+) biomass (t)	1,945,000	1,985,000	1,963,000	1,960,000
Female spawning biomass (t)				
Projected	592,700	604,900	582,300	601,000
B_0	954,100		966,900	
B_{MSY}	341,000		353,000	
F_{OFL}	0.114	0.114	0.112	0.112
$maxF_{ABC}$	0.104	0.104	0.105	0.105
F_{ABC}	0.104	0.104	0.105	0.105
OFL (t)	222,000	226,400	220,000	219,000
maxABC (t)	203,000	206,700	206,000	206,000
ABC (t)	203,000	206,700	206,000	206,000
Status	As determined *last* year for: 2011	2012	As determined *this* year for: 2012	2013
Overfishing	No	No	No	No
Overfished	No	No	No	No
Approaching overfished	No	No	No	No

BSAI yellowfin sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIyfin.pdf

GOA federal fishery

GOA Arrowtooth flounder

This model incorporates fishery data and fishery independent data from the NMFS GOA bottom trawl survey. GOA arrowtooth flounder fall under Tier 3a of the ABC/OFL control rules. The 2011 age 3+ biomass is estimated at 2,161,690 mt for the GOA. Fisheries falling under the Tier 3 management scheme use $B_{35\%}$ and/or $_{B40\%}$ as a surrogate for MSY. Clark (1991) has shown that calculations made with life history parameters typical of demersal fish and a range of realistic spawner-recruit relationships show that yield will be at least 75% of maximum sustainable yield so long as the spawning biomass is maintained in the range of about 20-60% of the unfished level. Catch specifications from 2011 were as follows: OFL=250,100 mt, F_{OFL}=0.207, ABC=212,882 mt, TAC=103,300 mt.

Table 8. Principal results of the 2011 GOA arrowtooth flounder stock assessment, based on the authors' (of the SAFE report) preferred model, and compared with the results of the 2010 model. Biomass and catch figures are in metric tons. From the 2011 GOA groundfish SAFE report, arrowtooth flounder section.

Quantity/Status	Last year (2010 Update)		This year (2011 Assessment)	
	2011	2012	2012	2013
M (natural mortality)	0.2 females, 0.35 males	0.2 females, 0.35 males	0.2 females, 0.35 males	0.2 females, 0.35 males
Specified/recommended tier	3a	3a	3a	3a
Total biomass (Age 3+; t)	2,121,440	2,105,330	2,161,690	2,133,320
Female Spawning Biomass (t)	1,246,660	1,240,120	1,263,150	1,278,530
$B_{100\%}$	1,197,060	1,197,060	1,205,580	1,205,580
$B_{40\%}$	478,822	478,822	482,231	482,231
$B_{35\%}$	418,969	418,969	421,953	421,953
$F_{OFL} = F_{35\%}$	0.219	0.219	0.207	0.207
$max\ F_{ABC} = F_{40\%}$	0.183	0.183	0.174	0.174
recommended F_{ABC}	0.183	0.183	0.174	0.174
Specified/recommended OFL (t)	251,068	248,576	250,100	249,066
Specified/recommended ABC (t)	213,150	211,027	212,882	212,033
Status	As determined *last* year for:		As determined *this* year for:	
	2009	2010	2010	2011
Overfishing	No	No	No	n/a
Overfished	No	No	No	No
Approaching overfished	No	No	No	No

GOA arrowtooth flounder SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOAatf.pdf

GOA Flathead sole

The assessment for GOA flathead sole was conducted using a split-sex, age-structured model with parameters evaluated in a maximum likelihood context. This model incorporates fishery data and fishery independent data from the NMFS GOA bottom trawl survey. GOA flathead sole fall under Tier 3a of the ABC/OFL control rules. The 2011 age 3+ biomass is estimated at 292,189 mt for the GOA. Fisheries falling under the Tier 3 management scheme use $B_{35\%}$ and/or $B_{40\%}$ as a surrogate for MSY. Clark (1991) has shown that calculations made with life history parameters typical of demersal fish and a range of realistic spawner-recruit relationships show that yield will be at least 75% of maximum sustainable yield so long as the spawning biomass is maintained in the range of about 20-60% of the unfished level. Catch specifications from 2011 were as follows: OFL=59,380 mt, F_{OFL}=0.593, ABC=47,407 mt, TAC=30,496 mt.

Table 9. Principal results of the 2011 GOA flathead sole stock assessment, based on the authors' (of the SAFE report) preferred model, and compared with the results of the 2010 model. Biomass and catch figures are in metric tons. From the 2011 GOA groundfish SAFE report, flathead sole section.

Quantity	As estimated or specified last year (2010)		As estimated or specified this year (2011)	
	2011	2012	2012	2013
M (natural mortality)	0.2	0.2	0.2	0.2
Specified/recommended tier	3a	3a	3a	3a
Total biomass (Age 3+; t)	325,357	321,355	292,189	286,274
Female Spawning Biomass (t)	113,406	115,427	104,301	105,127
$B_{100\%}$	111,884	111,884	103,868	103,868
$B_{40\%}$	44,754	44,754	41,547	41,547
$B_{35\%}$	39,159	39,159	36,354	36,354
$F_{OFL} = F_{35\%}$	0.530	0.530	0.593	0.593
$max\ F_{ABC} = F_{40\%}$	0.406	0.406	0.450	0.450
recommended F_{ABC}	0.406	0.406	0.450	0.450
OFL (t)	61,412	63,202	59,380	60,219
max ABC (t)	49,133	50,591	47,407	48,081
ABC (t)	49,133	50,591	47,407	48,081
Status	As determined last year (2010) for:		As determined this year (2011) for:	
	2009	2010	2010	2011
Overfishing	no	n/a	no	n/a
Overfished	n/a	no	n/a	no
Approaching overfished	n/a	no	n/a	no

GOA flathead sole SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOAflathead.pdf

GOA Northern and Southern rock sole

The assessment for GOA northern and southern rock sole was conducted using a two species two sex mixed fishery statistical catch-at-age population dynamics model using maximum likelihood estimation built with AD Model Builder. This model incorporates fishery data and fishery independent data from the NMFS GOA bottom trawl survey. GOA northern and southern rock sole fall under Tier 3a of the ABC/OFL control rules, but are managed as a fraction of the shallow water flatfish complex. The most recent CIE review for the northern and southern rock sole assessment was in 2012. The 2012 age 3+ biomass is estimated at 89,300 mt (N) and 208,800 mt (S) for the GOA. Fisheries falling under the Tier 3 management scheme use $B_{35\%}$ and/or $B_{40\%}$ as a surrogate for MSY. Clark (1991) has shown that calculations made with life history parameters typical of demersal fish and a range of realistic spawner-recruit relationships show that yield will be at least 75% of maximum sustainable yield so long as the spawning biomass is maintained in the range of about 20-60% of the unfished level. Catch specifications from 2012 were as follows: OFL=11,400 mt (N) and 21,900 mt (S), F_{OFL}=0.18 (N) and 0.23 (S), ABC=9,700 mt (N) and 18,600 mt (S), TAC=37,077 mt (for the entire shallow water flatfish complex).

Table 10. Principal results of the 2012 GOA northern rock sole stock assessment, based on the authors' (of the SAFE report) preferred model, and compared with the results of the 2011 model. Biomass and catch figures are in metric tons. From the 2012 GOA groundfish SAFE report, northern and southern rock sole section.

Quantity	As estimated or *specified last* year for:		As estimated or *recommended this* year for:	
	2012	2013	2013	2014
M (natural mortality rate)	0.2,0.263*	0.2, 0.263*	0.2,0.275*	0.2, 0.275*
Tier	3a	3a	3a	3a
Projected total (age 3+) biomass (t)	86,900	75,700	89,300	80,000
Female spawning biomass (t)	43,700	37,600	42,700	36,500
Projected				
$B_{100\%}$	47,500	47,300	50,300	50,300
$B_{40\%}$	19,000	18,900	20,100	20,100
$B_{35\%}$	16,600	16,500	17,600	17,600
F_{OFL}	0.186	0.186	0.180	0.180
$maxF_{ABC}$	0.157	0.157	0.152	0.152
F_{ABC}	0.157	0.157	0.152	0.152
OFL (t)	12,600	10,800	11,400	9,900
maxABC (t)	10,800	9,300	9,700	8,500
ABC (t)	10,800	9,300	9,700	8,500
Status	As determined *last* year for: 2010	2011	As determined *this* year for: 2011	2012
Overfishing	no	n/a	no	n/a
Overfished	n/a	no	n/a	no
Approaching overfished	n/a	no	n/a	no

* for males; estimated

Table 11. Principal results of the 2012 GOA southern rock sole stock assessment, based on the authors' (of the SAFE report) preferred model, and compared with the results of the 2011 model. Biomass and catch figures are in metric tons. From the 2012 GOA groundfish SAFE report, northern and southern rock sole section.

Quantity	As estimated or *specified last* year for: 2012	2013	As estimated or *recommended this* year for: 2013	2014
M (natural mortality rate)	0.2, 0.260*	0.2, 0.260*	0.2, 0.267*	0.2, 0.267*
Tier	3a	3a	3a	3a
Projected total (age 3+) biomass (t)	220,400	198,200	208,800	192,700
Female spawning biomass (t)	93,600	84,000	82,800	72,500
Projected				
$B_{100\%}$	123,000	122,500	112,900	112,900
$B_{40\%}$	49,200	49,000	45,100	45,100
$B_{35\%}$	43,000	42,800	39,500	39,500
F_{OFL}	0.228	0.228	0.230	0.230
$maxF_{ABC}$	0.191	0.191	0.193	0.193
F_{ABC}	0.191	0.191	0.193	0.193
OFL (t)	26,700	23,600	21,900	19,300
maxABC (t)	22,700	20,000	18,600	16,400
ABC (t)	22,700	20,000	18,600	16,400

Status	As determined *last* year for: 2010	2011	As determined *this* year for: 2011	2012
Overfishing	no	n/a	no	n/a
Overfished	n/a	no	n/a	no
Approaching overfished	n/a	no	n/a	no

* for males; estimated

GOA Northern and Southern rock sole SAFE 2012:
http://www.afsc.noaa.gov/REFM/Docs/2012/GOAnsrocksole.pdf

GOA rex sole

The assessment for GOA rex sole was conducted using a split-sex, age-structured model with parameters evaluated in a maximum likelihood context. This model incorporates fishery data and fishery independent data from the NMFS GOA bottom trawl survey. The assessment authors have developed harvest recommendations for the GOA rex sole stock using a Tier 5 approach (F_{OFL}=M, F_{ABC}=0.75·M) applied to estimates of adult biomass from a Tier 3-type age-structured assessment model (rather than survey biomass). The most recent CIE review for the rex sole assessment was in 2011. The 2011 adult biomass is estimated at 87,162 mt for the GOA. Catch specifications from 2011 were as follows: OFL=12,561 mt, F_{OFL}=0.128, ABC=9,612 mt, TAC=9,560 mt.

Table 12. Principal results of the 2011 GOA rex sole stock assessment, based on the authors' (of the SAFE report) preferred model, and compared with the results of the 2010 model. Biomass and catch figures are in metric tons. From the 2011 GOA groundfish SAFE report, rex sole section.

Quantity	As estimated or specified last year (2010)		As estimated or specified this year (2011)	
	2011	2012	2012	2013
M (natural mortality)	0.17	0.17	0.17	0.17
Specified/recommended tier	5	5	5	5
Biomass (adult; t)	86,729	85,203	87,162	85,528
F_{OFL} =M	0.170	0.170	0.170	0.170
max F_{ABC} =0.75*M	0.128	0.128	0.128	0.128
recommended F_{ABC}	0.128	0.128	0.128	0.128
OFL (t)	12,499	12,279	12,561	12,326
max ABC (t)	9,565	9,396	9,612	9,432
ABC (t)	9,565	9,396	9,612	9,432
Status	As determined last year (2010) for:		As determined this year (2011) for:	
	2009	2010	2010	2011
Overfishing	no	n/a	no	n/a

GOA rex sole SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOArex.pdf

3.5. Historic Biomass and Removals in the Alaskan flatfish fisheries

Bering Sea Aleutian Islands

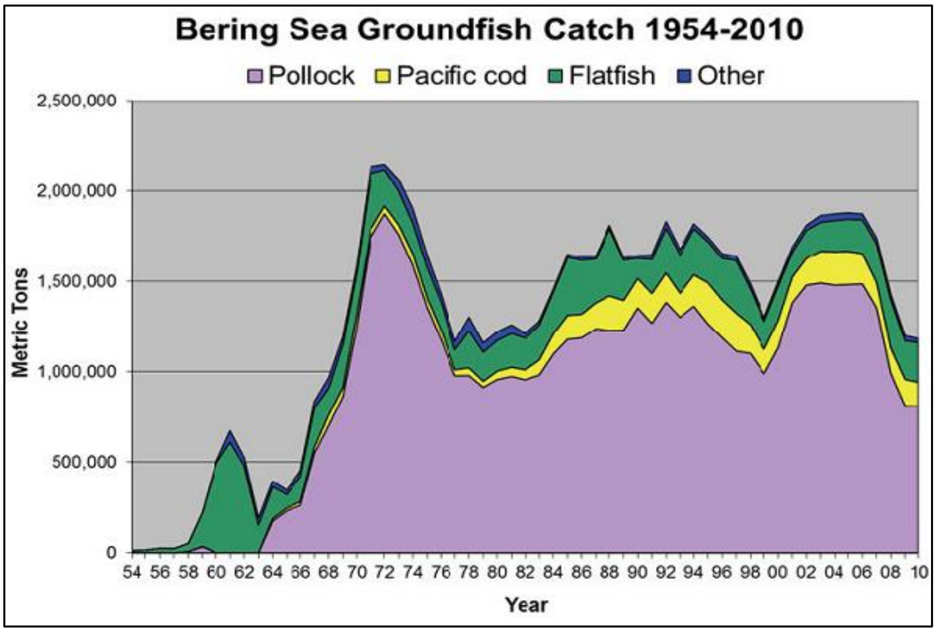


Figure 28. Bering Sea groundfish catch from 1954 to 2010.

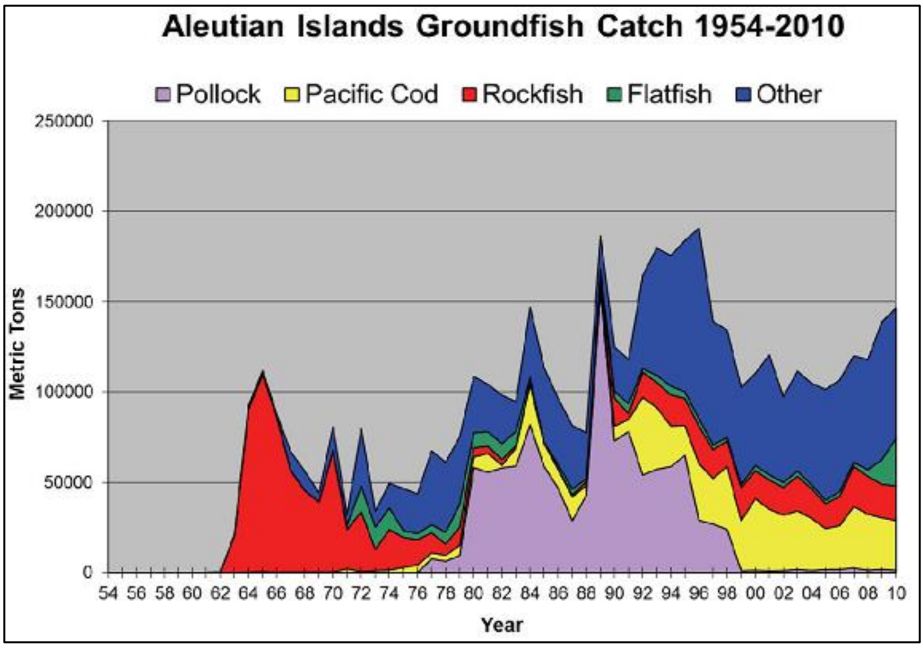


Figure 29. Aleutian Islands groundfish catch from 1954 to 2010.

NPFMC groundfish species profiles 2011:
http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Species_Profiles2011.pdf

Yellowfin sole

Yellowfin sole have annually been caught with bottom trawls on the Bering Sea shelf since the fishery began in 1954 and were overexploited by foreign fisheries in 1959-62 when catches averaged 404,000 t annually. As a result of reduced stock abundance, catches declined to an annual average of 117,800 t from 1963-71 and further declined to an annual average of 50,700 t from 1972-77. The lower yield in this latter period was partially due to the discontinuation of the U.S.S.R. fishery. In the early 1980s, after the stock condition had improved, catches again increased reaching a peak of over 227,000 t in 1985.

During the 1980s, there was also a major transition in the characteristics of the fishery. Yellowfin sole were traditionally taken exclusively by foreign fisheries and these fisheries continued to dominate through 1984. However, U.S. fisheries developed rapidly during the 1980s in the form of joint ventures, and during the last half of the decade began to dominate and then take all of the catch as the foreign fisheries were phased out of the EBS. Since 1990, only domestic harvesting and processing has occurred.

The management of the yellowfin sole fishery changed significantly in 2008 with the implementation of Amendment 80 to the BSAI Fisheries Management Plan. The Amendment directly allocated fishery resources among BSAI trawl harvesters in consideration of their historic harvest patterns and future harvest needs in order to improve retention and utilization of fishery resources by the non-AFA trawl catcher/processor fleet. This was accomplished by extending the groundfish retention standards to all H&G vessels and also by providing the ability to form cooperatives within the newly formed Amendment 80 sector. In addition, Amendment 80 also mandated additional monitoring requirements which included observer coverage on all hauls, motion-compensating scales for weighing samples, flow scales to obtain accurate catch weight estimates for the entire catch, no mixing of hauls and no on-deck sorting. The partitioning of TAC and PSC (prohibited species catch) among cooperatives has significantly changed the way the annual catch has accumulated and the rate of target catch per bycatch ton.

Yellowfin sole are usually headed and gutted, frozen at sea, and then shipped to Asian countries for further processing (see "market profile" in the 2011 economic SAFE report for details). The 1997 catch of 181,389 t was the largest since the fishery became completely domestic but it has since been at lower levels, averaging 98,100 t from 1998-2011. The 2011 catch totaled 151,164 t (77% of the ABC), the highest annual catch in the past 14 years. For 2012, the fishery caught over 70% of the total catch of 133,000 (66% of the ABC, calculated through September) during February through May, primarily from areas 509, 513 and 521. As of mid-October 2012, the fishing season is ongoing. In order to estimate the total 2012 catch for the stock assessment model, the average proportion of the 2008-2011 cumulative catch attained by the 38th week of the year (mid-September) was applied to the 2012 catch amount at the same time period and results in a 2012 catch estimate of 133,000 t.

The rate of discard has ranged from a low of 5% of the total catch in 2008 -2011 to 30% in 1992. The trend has been toward fuller retention of the catch in recent years, and with the advent of the Amendment 80 harvest practices, discarding is at its lowest level since these estimates have become available (3% in 2011). Historically, discarding primarily occurred in the yellowfin sole directed fishery, with lesser amounts in the Pacific cod, Pollock, rock sole, flathead sole, and "other flatfish" fisheries.

Table 13. Catch (t) of yellowfin sole 1964-2012. Catch for 2012 is an estimate through the end of 2012. BSAI yellowfin sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIyfin.pdf

		Domestic		
Year	Foreign	JVP	DAP	Total
1964	111,777			111,777
1965	53,810			53,810
1966	102,353			102,353
1967	162,228			162,228
1968	84,189			84,189
1969	167,134			167,134
1970	133,079			133,079
1971	160,399			160,399
1972	47,856			47,856
1973	78,240			78,240
1974	42,235			42,235
1975	64,690			64,690
1976	56,221			56,221
1977	58,373			58,373
1978	138,433			138,433
1979	99,019			99,019
1980	77,768	9,623		87,391
1981	81,255	16,046		97,301
1982	78,331	17,381		95,712
1983	85,874	22,511		108,385
1984	126,762	32,764		159,526
1985	100,706	126,401		227,107
1986	57,197	151,400		208,597
1987	1,811	179,613	4	181,428
1988		213,323	9,833	223,156
1989		151,501	1,664	153,165
1990		69,677	14,293	83,970
1991			115,842	115,842
1992			149,569	149,569
1993			106,101	106,101
1994			144,544	144,544
1995			124,740	124,740
1996			129,659	129,659
1997			181,389	181,389
1998			101,201	101,201
1999			67,320	67,320
2000			83,850	83,850
2001			63,395	63,395
2002			73,000	73,000
2003			74,418	74,418
2004			69,046	69,046
2005			94,383	94,383
2006			99,068	99,068
2007			121,029	121,029
2008			148,894	148,894
2009			107,528	107,528
2010			118,624	118,624
2011			151,164	151,164
2012			133,000	133,000

Arrowtooth flounder/ Kamchatka flounder/ Greenland Turbot

USSR and Japan targeted Greenland turbot and arrowtooth flounder during the 1960s. Catches peaked from 1974-1976 at 19,000-25,000 mt. Arrowtooth flounder, Kamchatka flounder and Greenland turbot were managed as a complex until 1985 due to their similar life history characteristics and distribution. Catches decreased following implementation of the Magnuson-Stevens Act in 1977.

Catch records of arrowtooth flounder and Greenland turbot were combined during the 1960s. The fisheries for Greenland turbot intensified during the 1970s and the bycatch of arrowtooth flounder is assumed to have also increased. In 1974-76, total catches of arrowtooth flounder reached peak levels ranging from 19,000 to 25,000 t. Catches decreased after implementation of the Magnuson Fishery Conservation and Management Act (MFCMA) and the resource has remained lightly exploited with catches (extrapolated for arrowtooth only) averaging 12,382 t from 1976-2012. This decline resulted from catch restrictions placed on the fishery for Greenland turbot and phasing out of the foreign fishery in the U.S. EEZ. The regional office started providing separate catch statistics for arrowtooth and Kamchatka flounder in 2011. Table 14 provides catch estimates for arrowtooth only. Total catch reported through October 15, 2012 is 21,189 t (well below the 2012 ABC of 149,683 t). The NMFS AKRO BLEND/Catch Accounting System reports indicate that bottom trawling accounted for 90% of the 2012 catch (3% by pelagic trawl and 4% by hook and line).

Although research has been conducted on their commercial utilization (Greene and Babbit 1990, Wasson et al. 1992, Porter et al. 1993, Reppond et al. 1993, Cullenberg 1995) and some targeting occurs in the Gulf of Alaska and the Bering Sea, arrowtooth flounder continue to be captured primarily in pursuit of higher value species and historically have been mostly discarded in the Bering Sea and the Aleutian Islands. The catch information in Table 14 reports the past annual total catch tonnage for the foreign and JV fisheries and the current domestic fisheries. The proportions of retained and discarded arrowtooth flounder in Bering Sea fisheries are estimated from observer at-sea sampling for 1985-2011 are shown in Table 15, and include Kamchatka flounder as well as arrowtooth flounder. With the advent of Amendment 80 fishing practices in 2008 the percentage of arrowtooth flounder retained in catches has increased to 92%. The largest discard amounts occur in the Pacific cod fishery and the various flatfish fisheries. The increasing trend of retention is expected to continue in the near future due to the recent changes in fishing practices. Arrowtooth flounder biomass has been steadily increasing in the BS since the early 1980s.

Table 14. All nation total combined catch (t) of arrowtooth and Kamchatka flounder in the eastern Bering Sea and Aleutian Islands region, 1970-2012. Catches since 1990 are not reported by area. Total catch of both arrowtooth and Kamchatka flounder are shown in the "combined" total, and the extrapolated total of arrowtooth only is under "ATF est".

	Eastern Bering Sea				Aleutian Islands Region				Combined	ATF est.
Year	Non-U.S. fisheries[b]	U.S. J.V.	U.S. DAH	Total	Non-U.S. fisheries	U.S. J.V.	U.S. DAH	Total	Total	Total
1970	12,598			12,598	274			274	12,872	11,971
1971	18,792			18,792	581			581	19,373	18,017
1972	13,123			13,123	1,323			1,323	14,446	13,435
1973	9,217			9,217	3,705			3,705	12,922	12,017
1974	21,473			21,473	3,195			3,195	24,668	22,941
1975	20,832			20,832	784			784	21,616	20,103
1976	17,806			17,806	1,370			1,370	19,176	17,834
1977	9,454			9,454	2,035			2,035	11,489	10,685
1978	8,358			8,358	1,782			1,782	10,140	9,430
1979	7,921			7,921	6,436			6,436	14,357	13,352
1980	13,674	87		13,761	4,603			4,603	18,364	17,079
1981	13,468	5		13,473	3,624	16		3,640	17,113	15,915
1982	9,065	38		9,103	2,356	59		2,415	11,518	10,712
1983	10,180	36		10,216	3,700	53		3,753	13,969	12,991
1984	7,780	200		7,980	1,404	68		1,472	9,452	8,790
1985	6,840	448		7,288	11	59	89	159	7,447	6,926
1986	3,462	3,298	5	6,766		78	337	415	7,181	6,678
1987	2,789	1,561	158	4,508		114	237	351	4,859	4,519
1988		2,552	15,395	17,947		22	2,021	2,043	19,990	18,591
1989		2,264	4,000	6,264			1,042	1,042	7,306	6,795
1990		660	7,315	7,975			5,083	5,083	13,058	12,144
1991									22,052	20,508
1992									10,382	9,655
1993									9,338	8,684
1994									14,366	13,360
1995									9,280	8,631
1996									14,652	13,626
1997									10,054	9,350
1998									15,241	14,174
1999									10,573	9,833
2000									12,929	12,024
2001									13,908	12,934
2002									11,540	10,732
2003									12,834	11,936
2014									17,809	16,562
2005									13,685	12,727
2006									13,309	12,377
2007									11,913	10,722
2008									21,912	14,243
2009									30,411	17,638
2010									39,416	17,737
2011									20,612	13,398
2012**									21,189	14,832

[a]Catches from data prior to 1990 are on file Alaska Fisheries Science Center, 7600 Sand Point Way N.E., Seattle, WA 98115. [b]Japan, U.S.S.R., Republic of Korea, Taiwan, Poland, and Federal Republic of Germany. [c]Joint ventures between U.S. fishing vessels and foreign processing vessels. **Catch information through 15 October, 2012 (NMFS regional office).

Table 15. Estimates of retained and discarded arrowtooth flounder catch, and the proportion of arrowtooth flounder in the total catch of 1985-2012. Beginning in 2007, when the two species were differentiated in commercial catches, catch is calculated based on values from the Observer Interface Database; prior to 2007, proportion was calculated as 0.07. BSAI arrowtooth flounder SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIatf.pdf

Year	Retained	Discarded	Total (t)	% Retained	Proportion ATF in catch
1985	17	72	89	19	0.07
1986	65	277	342	19	0.07
1987	75	320	395	19	0.07
1988	3,309	14,107	17,416	19	0.07
1989	958	4,084	5,042	19	0.07
1990*	2,356	10,042	12,398	19	0.07
1991	3,211	18,841	22,052	15	0.07
1992	675	9,707	10,382	7	0.07
1993	403	6,775	7,178	6	0.07
1994	626	13,641	14,267	4	0.07
1995	509	8,772	9,281	5	0.07
1996	1,372	13,280	14,652	9	0.07
1997	1,029	9,024	10,054	10	0.07
1998	2,896	12,345	15,241	19	0.07
1999	2,538	8,035	10,573	24	0.07
2000	5,124	7,805	12,929	60	0.07
2001	4,271	6,959	11,230	62	0.07
2002	4,039	7,501	11,540	35	0.07
2003	4,024	8,810	12,834	31	0.07
2004	4,987	12,822	17,809	28	0.07
2005	8,211	5,474	13,685	60	0.07
2006	6,921	6,388	13,309	52	0.07
2007	6,910	5,003	11,913	58	0.10
2008	14,681	7,231	21,912	67	0.35
2009	22,200	8,211	30,411	73	0.42
2010	28,380	11,036	39,416	72	0.55
2011	17,314	3,298	20,612	84	0.35
2012	19,494	1,695	21,189	92	0.30

1990 retained rate was applied to the 1985-89 reported catch
and 2012 catch is through 10/15/2012. Source: Observer Interface Dataset.

Historical Kamchatka flounder catch is combined in catch records of arrowtooth flounder and Greenland turbot from the 1960s. The fisheries for Greenland turbot intensified during the 1970s and the bycatch of arrowtooth flounder and Kamchatka flounder is assumed to have also increased. Catches of these species decreased after implementation of the MFCMA and the Kamchatka flounder resource has remained lightly exploited with the combined catches with arrowtooth flounder averaging 12,831 t from 1977-2008 (Table 16). It is estimated that only a small fraction (<10%) of this catch was Kamchatka flounder. This decline resulted from catch restrictions placed on the fishery for Greenland turbot and phasing out of the foreign fishery in the U.S. EEZ. Catches in Table 16 through 2006 are for arrowtooth flounder and Kamchatka flounder combined, catches thereafter are those estimated for Kamchatka flounder only. The total combined catch estimated for arrowtooth and Kamchatka flounder reported by the Alaska Regional Office (catches were not differentiated by species until 2011), is a blend of vessel reported catch and observer at-sea sampling of the catch. However, observers have separately identified the two species from catches aboard trawl vessels since 2007 and their sampling has indicated that the proportion of Kamchatka flounder in the combined catch has steadily increased from 10% in 2007 to 55% in 2010.

Table 16. Total combined catch (t) of arrowtooth and Kamchatka flounder in the eastern Bering Sea and Aleutian Islands region, 1991-2006. Catches from 2007 to present, when the two species were differentiated in commercial catches, is reported for Kamchatka flounder only in this table.
BSAI Kamchatka flounder SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIkamchatka.pdf

year	catch
1991	22,052
1992	10,382
1993	9,338
1994	14,366
1995	9,280
1996	14,652
1997	10,054
1998	15,241
1999	10,573
2000	12,929
2001	13,908
2002	11,540
2003	12,834
2004	17,809
2005	13,685
2006	13,309
2007	1,183
2008	6,819
2009	12,802
2010	21,153
2011	9,935
2012	9,466

Catches of Greenland turbot and arrowtooth flounder were not reported separately during the 1960s. During that period, combined catches of the two species ranged from 10,000 to 58,000 t annually and averaged 33,700 t. Beginning in the 1970s the fishery for Greenland turbot intensified with catches of this species reaching a peak from 1972 to 1976 of between 63,000 t and 78,000 t annually. Catches declined after implementation of the MFCMA in 1977, but were still relatively high in 1980-83 with an annual range of 48,000 to 57,000 t. Since 1983, however, trawl harvests declined steadily to a low of 7,100 t in 1988 before increasing slightly to 8,822 t in 1989 and 9,619 t in 1990. This overall decline is due mainly to catch restrictions placed on the fishery because of apparent low levels of recruitment. From 1990- 1995 Council set the ABC's (and TACs) to 7,000 t as an added conservation measure citing concerns about recruitment. Since 1996 the ABC levels have varied but averaged 6,540 t (with catch for that period averaging 4,468 t).

Table 16. Catch estimates of Greenland turbot by gear type (t; including discards) and ABC and TAC values since implementation of the MFCMA.
BSAI Greenland turbot SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIturbot.pdf

Year	Trawl	Longline & Pot	Total	ABC	TAC
1977	29,722	439	30,161	40,000	
1978	39,560	2,629	42,189	40,000	
1979	38,401	3,008	41,409	90,000	
1980	48,689	3,863	52,552	76,000	
1981	53,298	4,023	57,321	59,800	
1982	52,090	31.8	52,122	60,000	
1983	47,529	28.8	47,558	65,000	
1984	23,107	12.6	23,120	47,500	
1985	14,690	40.6	14,731	44,200	
1986	9,864	0.4	9,864	35,000	33,000
1987	9,551	34	9,585	20,000	20,000
1988	6,827	281	7,108	14,100	11,200
1989	8,293	529	8,822	20,300	6,800
1990	12,119	577	12,696	7,000	7,000
1991	6,245	1,617	7,863	7,000	7,000
1992	749	3,003	3,752	7,000	7,000
1993	1,145	7,323	8,467	7,000	7,000
1994	6,426	3,845	10,272	7,000	7,000
1995	3,978	4,215	8,194	7,000	7,000
1996	1,653	4,902	6,555	7,000	7,000
1997	1,209	5,989	7,199	9,000	9,000
1998	1,830	7,319	9,149	15,000	15,000
1999	1,799	4,057	5,857	9,000	9,000
2000	1,946	5,027	6,973	9,300	9,300
2001	2,149	3,163	5,312	8,400	8,400
2002	1,033	2,605	3,638	8,000	8,000
2003	908	2,605	3,513	4,000	4,000
2004	675	1,544	2,220	3,500	3,500
2005	729	1,831	2,559	3,500	3,500
2006	360	1,605	1,965	2,740	2,740
2007	429	1,400	1,829	2,440	2,440
2008	1,935	806	2,741	2,540	2,540
2009	3,080	1,417	4,196	7,380	7,380
2010	1,978	2,160	4,138	6,120	6,120
2011	1,618	2,019	3,636	6,140	5,060
2012*	2,591	1,314	3,905	9,660	8,660

*Catch estimated as of October 2012

Flathead sole

Prior to 1977, catches of flathead sole (*Hippoglossoides* spp.) were combined with several other flatfish species in an "other flatfish" management category. These catches increased from around 25,000 t in the 1960s to a peak of 52,000 t in 1971. At least part of this apparent increase was due to better species identification and reporting of catches in the 1970s. After 1971, catches declined to less than 20,000 t in 1975. Catches during 1977-89 averaged 5,286 t. Since 1990, annual catches have averaged almost 18,000 t (Table 18). The catch in 2008 (24,539 t) was the highest since 1998. The catch in 2011 (13,556 t) and 2012 (10,380 t as of Sept. 22, 2012) was substantially smaller than the average catch from 2006-2010 (20,181 t).

The majority of the catch is taken by non-pelagic trawl gear (63% in both 2011 and 2012), with a substantial fraction also taken by pelagic trawl gear (34% in 2011, 35% in 2012). Other gear types (hook and line, pot) account for a very small fraction of the total catch (<3% in both 2011 and 2012).

At present, flathead sole is 100% allocated to the Amendment 80 cooperative and limited access sectors, so directed fishing for flathead sole is prohibited in the BSAI limited access sector. Prior to the implementation of Amendment 80 in 2008, the flathead sole directed fishery was often suspended or closed prior to attainment of the TAC for exceeding halibut bycatch limits. Since the implementation of Amendment 80, the Amendment 80 Cooperative sector has never reached its in-season halibut bycatch limits. Substantial amounts of flathead sole have been discarded in various eastern Bering Sea target fisheries, although retention standards have improved since the implementation of Amendment 80 in 2008. Based on data from the NMFS Regional Office Catch Accounting System, about 30% of the flathead sole catch was discarded prior to 2008. Subsequent to Amendment 80 implementation, the average discard rate has been less than 15%.

Table 17. Harvest (t) of *Hippoglossoides* spp. from 1977-2012 (as of Sept. 22, 2012).
BSAI flathead sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIflathead.pdf

Year	total	non-CDQ	CDQ
1977	7,909	7,909	
1978	6,957	6,957	
1979	4,351	4,351	
1980	5,247	5,247	
1981	5,218	5,218	
1982	4,509	4,509	
1983	5,240	5,240	
1984	4,458	4,458	
1985	5,636	5,636	
1986	5,208	5,208	
1987	3,595	3,595	
1988	6,783	6,783	
1989	3,604	3,604	
1990	20,245	20,245	
1991	14,197	14,197	
1992	14,407	14,407	
1993	13,574	13,574	
1994	17,006	17,006	
1995	14,713	14,713	
1996	17,344	17,344	
1997	20,681	20,681	
1998	24,597	24,597	
1999	18,555	18,555	
2000	20,422	19,983	439
2001	17,809	17,586	223
2002	15,572	15,108	464
2003	14,184	13,792	392
2004	17,394	16,849	545
2005	16,151	15,260	891
2006	17,947	17,545	402
2007	18,744	17,673	1,071
2008	24,539	24,039	500
2009	19,549	19,041	508
2010	20,125	19,182	943
2011	13,556	12,882	674
2012	10,380	9,989	391

Northern rock sole

Rock sole catches increased from an average of 7,000 t annually from 1963-69 to 30,000 t from 1970-1975. Catches (t) since implementation of the MFCMA in 1977 are shown in Table 8.1, with catch data for 1980-88 separated into catches by non-U.S. fisheries, joint venture operations and Domestic Annual Processing catches (where available). Prior to 1987, the classification of rock sole in the "other flatfish" management category prevented reliable estimates of DAP catch. Catches from 1989-2012 (domestic only) have averaged 49,700 t annually. Northern rock sole are important as the target of a high value roe fishery occurring in February and March which accounted for 70% of the annual catch in 2012. Northern rock sole are usually headed and gutted, frozen at sea, and then shipped to Asian countries for further processing.

Table 18. BSAI rock sole catch (t) from 1977 - September 30, 2012. BSAI northern rock sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIrocksole.pdf

Year	Foreign	Joint-Venture	Domestic	Total
1977	5,319			5,319
1978	7,038			7,038
1979	5,874			5,874
1980	6,329	2,469		8,798
1981	3,480	5,541		9,021
1982	3,169	8,674		11,843
1983	4,479	9,140		13,619
1984	10,156	27,523		37,679
1985	6,671	12,079		18,750
1986	3,394	16,217		19,611
1987	776	11,136	28,910	40,822
1988		40,844	45,522	86,366
1989		21,010	47,902	68,912
1990		10,492	24,761	35,253
1991			60,587	60,587
1992			56,998	56,998
1993			63,953	63,953
1994			59,606	59,606
1995			58,870	58,870
1996			46,928	46,928
1997			67,564	67,564
1998			33,642	33,642
1999			40,510	40,510
2000			49,264	49,264
2001			29,255	29,255
2002			41,331	41,331
2003			35,395	35,395
2004			47,637	47,637
2005			35,546	35,456
2006			36,411	36,411
2007			36,768	36,768
2008			51,275	51,275
2009			48,649	48,649
2010			53,221	53,221
2011			60,401	60,401
2012			74,400	74,400

Gulf of Alaska

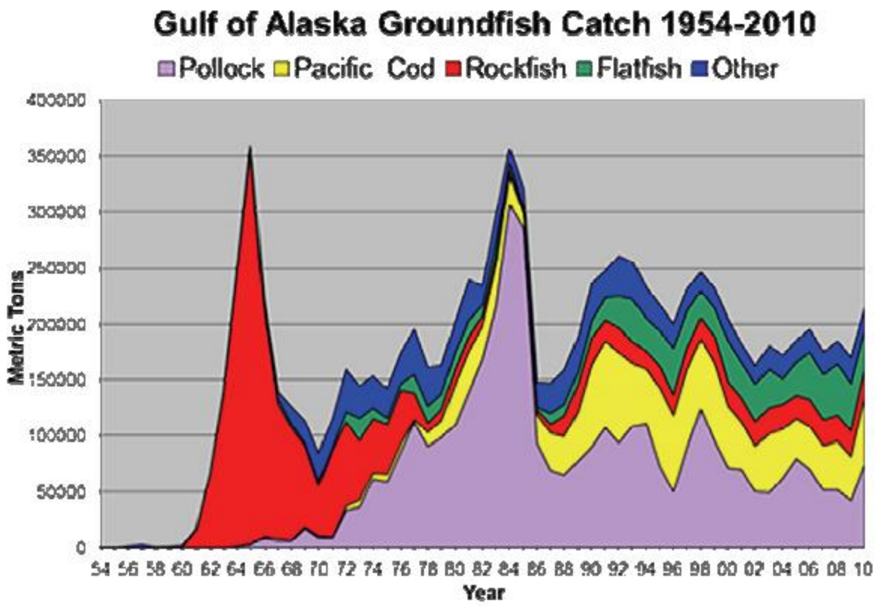


Figure 30. Gulf of Alaska groundfish catch from 1954 to 2010. NPFMC groundfish species profiles 2011: http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Species_Profiles2011.pdf

The North Pacific Fishery Management Council (NPFMC) Central Gulf management area has produced the majority of the flatfish catch from the Gulf of Alaska. Since 1988 the majority of the harvest has occurred on the continental shelf and slope east of Kodiak Island. Although arrowtooth flounder comprised about half the catch, the fishery primarily targeted on rock, rex and Dover sole.

Flatfish catch is currently reported for deep-water flatfish, shallow-water flatfish, Arrowtooth flounder, flathead sole and rex sole by management area.

Arrowtooth flounder

Prior to 1990, flatfish catch in the Gulf of Alaska was reported as an aggregate of all flatfish species. The bottom trawl fishery in the Gulf of Alaska primarily targets on rock, rex and Dover sole. The best estimate of annual arrowtooth catch since 1960 was calculated by multiplying the proportion of arrowtooth in observer sampled flatfish catches in recent years (nearly 50%) by the reported flatfish catch (1960-1977 from Murai et al. 1981 and 1978-1993 from Wilderbuer and Brown 1993) (Table 20). Substantial amounts of flatfish are discarded overboard in the various trawl target fisheries. Under current fishing practices, the percent retained has increased from below 10% in the early 1990's to 73% in 2010 and 77% in 2011.

Table 19. Catch, ABC, OFL and TAC for arrowtooth flounder in the Gulf of Alaska from 1964 to 17 September, 2011. Arrowtooth flounder ABC was separated from Flatfish ABC after 1990. GOA arrowtooth flounder SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOAatf.pdf

Year	Catch(t)	ABC	OFL	TAC
1964	514			
1965	514			
1966	2,469			
1967	2,276			
1968	1,697			
1969	1,315			
1970	1,886			
1971	1,185			
1972	4,477			
1973	10,007			
1974	4,883			
1975	2,776			
1976	3,045			
1977	9,449			
1978	8,409			
1979	7,579			
1980	7,848			
1981	7,433			
1982	4,639			
1983	6,331			
1984	3,457			
1985	1,539			
1986	1,221			
1987	4,963			
1988	5,138			
1989	2,584			
1990	7,706	343,300		
1991	10,034	340,100		20,000
1992	15,970	303,889	427,220	25,000
1993	15,559	321,287	451,690	30,000
1994	23,560	236,240	275,930	30,000
1995	18,428	198,130	231,420	35,000
1996	22,583	198,130	231,420	35,000
1997	16,319	197,840	280,800	35,000
1998	12,975	208,337	295,970	35,000
1999	16,207	217,106	308,875	35,000
2000	24,252	145,361	173,915	35,000
2001	19,964	148,151	173,546	38,000
2002	21,231	146,264	171,057	38,000
2003	29,994	155,139	181,394	38,000
2004	15,304	194,900	228,134	38,000
2005	19,770	194,900	228,134	38,000
2006	27,653	177,800	207,700	38,000
2007	25,494	184,008	214,828	43,000
2008	29,293	226,470	266,914	43,000
2009	24,937	221,512	261,022	43,000
2010	24,268	215,882	254,271	43,000
2011	23,211	213,150	251,068	43,000

Flathead sole

Historically, catches of flathead sole have exhibited decadal-scale trends (Table 21). From a high of ~2000 t in 1980, annual catches declined steadily to a low of ~150 t in 1986 but thereupon increased steadily, reaching a high of ~3100 t in 1996. Catches subsequently declined over the next three years, reaching a low of ~900 t in 1999, followed by an increasing trend through 2010, when the catch reached its highest level ever (3,842 t). As of Sept. 24, the catch in 2011 was 2,310 t. Based on the trend in weekly cumulative catch, the total 2011 catch is projected to be 2,891 t—almost one quarter less than in 2010.

Based on observer data, the majority of the flathead sole catch in the Gulf of Alaska is taken in the Shelikof Strait and on the Albatross Bank near Kodiak Island, as well as near Unimak Island. The spatial pattern of catches has been reasonably consistent over the past three years. Most of the catch is taken in the first and second quarters of the year.

Table 20. Annual catch of flathead sole in the Gulf of Alaska, from 1978 to 2011. The 2011 catch is through Sept. 24, 2011. GOA flathead sole SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOAflathead.pdf

year	total catch (t)	Western Gulf	Central Gulf	West Yakutat	Southea
1978	452				--
1979	165				--
1980	2,068				--
1981	1,070				--
1982	1,368				--
1983	1,080				--
1984	549				--
1985	320				--
1986	147				--
1987	151				--
1988	520				--
1989	747				--
1990	1,447				--
1991	1,717	42	729	1	--
1992	2,034	291	1,735	8	--
1993	2,366	581	2,238	2	--
1994	2,580	499	2,067	14	--
1995	2,181	589	1,563	29	--
1996	3,107	807	2,166	103	--
1997	2,446	449	1,938	59	--
1998	1,742	556	1,156	8	--
1999	900	186	687	16	11
2000	1,547	258	1,274	15	0
2001	1,911	600	1,311	0	0
2002	2,145	421	1,724	0	0
2003	2,425	515	1,910	0	0
2004	2,390	831	1,559	0	0
2005	2,530	611	1,919	0	0
2006	3,134	462	2,671	1	0
2007	3,163	694	2,467	2	0
2008	3,419	288	3,131	0	0
2009	3,658	303	3,355	0	0
2010	3,842	462	3,380	0	0
2011	2,339	341	1,998	0	0

Northern and Southern rock sole

Since the passage of the MFMCA in 1977, the fishery for flatfish in the Gulf of Alaska has undergone changes. Until 1981 flatfish catch was primarily taken by foreign vessels targeting other species. With the cessation of foreign fishing in 1986, joint venture fishing began to account for the majority of the catch. In 1987, the gulf-wide flatfish catch increased with the joint venture fisheries accounting for nearly all of the increase. After 1988, only domestic fleets harvested flatfish.

Shallow-water flatfish catch has fluctuated over the last 30 years (Table 22). Trawl fisheries in the Gulf of Alaska were closed due to halibut bycatch from September 3 to 14 and September 16 to 20, 2011. The flatfish fishery is likely to continue to be limited by the potential for high by-catches of Pacific halibut. Rock sole are caught in the shallow-water flatfish fishery and are not targeted specifically, as they co-occur with several other species. The rock sole species were differentiated in survey data beginning in 1996, and were differentiated in the fishery beginning in 1997. Data for more recent years have the species listed as northern, southern, or “undifferentiated” rock sole

Table 21. Estimated catch (in metric tonnes) for shallow water flatfish (SWFF) from the 2011 Stock Assessment and Fishery Evaluation (SAFE) report and SWFF and total rock sole catch from the Alaska Fisheries Information Network (AKFIN) (as of 2012-10-23).

Year	SWFF catch (2011 SAFE)	SWFF catch (AKFIN)	U/N/S rock sole catch (AKFIN)	% U/N/S rock sole
1991	5,298.0	5,224.6	0.1	-
1992	8,783.0	8,333.8	42.0	-
1993	9,715.0	9,113.7	8,112.1	89.0
1994	3,943.0	3,843.0	3,008.1	78.3
1995	5,430.0	5,436.9	3,923.9	72.2
1996	9,350.0	9,372.4	6,595.3	70.4
1997	7,775.0	7,779.6	5,466.8	70.3
1998	3,565.0	3,567.3	2,532.3	71.0
1999	2,577.0	2,578.4	1,765.4	68.5
2000	6,928.0	6,928.7	5,386.7	77.7
2001	6,162.0	6,163.3	4,771.7	77.4
2002	6,195.0	7,177.3	5,564.3	77.5
2003	4,465.0	4,648.5	3,554.6	76.5
2004	3,094.0	3,094.2	2,216.7	71.6
2005	4,769.0	4,805.1	4,130.5	86.0
2006	7,641.0	7,651.7	5,763.3	75.3
2007	8,793.0	8,719.2	6,727.4	77.2
2008	9,708.0	9,725.9	7,269.1	74.7
2009	8,483.0	8,484.9	6,538.7	77.1
2010	5,534.0	5,533.6	3,285.3	59.4
2011	3,617.0	3,992.5	3,094.4	77.5
2012		2,415.3	1,763.3	73.0

Rex sole

Catch is currently reported for rex sole by management area (Table 23). Catches for rex sole were estimated from 1982 to 1994 by multiplying the deepwater flatfish catch by the fraction of rex sole in the observed catch. Historically, catches of rex sole have exhibited decadal-scale trends. Catches increased from a low of 93 t in 1986 to a high of 5,874 t in 1996, then declined to about 3,000 t thereafter. The 2009 catch (4,753 t) was the largest since 1996. Catches have subsequently declined the past two years and is now more similar to the longterm average. In 2010 the catch was 3,636 t and in 2011 it was 2,594 t (as of Sept. 24; 2011). The rex sole resource has been moderately harvested in recent years. The fishery catches in 2009 and 2010 each represented between 40-50% of the rex sole ABC in that year. Retention of rex sole is high and has generally been over 95%.

Table 22. Annual catch of rex sole in the Gulf of Alaska, from 1982 to 2011. 2011 catch is through Sept. 24. GOA rex sole SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOArex.pdf

year	total catch (t)	Western Gulf	Central Gulf	West Yakutat	Southea
1982	959				--
1983	595				--
1984	365				--
1985	154				--
1986	93				--
1987	1,151				--
1988	1,192				--
1989	599				--
1990	1,269				--
1991	4,636				--
1992	3,000				--
1993	3,000				--
1994	3,673				--
1995	4,021				--
1996	5,874				--
1997	3,294				--
1998	2,669				--
1999	3,060				--
2000	3,591				--
2001	2,940				--
2002	2,941				--
2003	3,485	767	2,716	1	1
2004	1,464	526	936	0	0
2005	2,176	576	1,600	0	0
2006	3,294	350	2,944	0	0
2007	2,852	413	2,438	1	0
2008	2,703	185	2,518	0	0
2009	4,753	342	4,410	1	0
2010	3,636	134	3,500	2	0
2011	2,594	105	2,488	1	0

Evidence

http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Species_Profiles2011.pdf

BSAI Alaska plaice SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIplaice.pdf

BSAI arrowtooth flounder SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIatf.pdf

BSAI flathead sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIflathead.pdf

BSAI Greenland turbot SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIturbot.pdf

BSAI Kamchatka flounder SAFE 2012:
http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIkamchatka.pdf

BSAI northern rock sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIrocksole.pdf

BSAI yellowfin sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIyfin.pdf

GOA flathead sole SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOAflathead.pdf

GOA arrowtooth flounder SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOAatf.pdf

GOA rex sole SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOArex.pdf

GOA northern and southern rock sole SAFE 2012:
http://www.afsc.noaa.gov/REFM/Docs/2012/GOAnsrocksole.pdf

GOA shallow water flatfish SAFE 2011:
http://www.afsc.noaa.gov/REFM/Docs/2011/GOAshallowflat.pdf

Incidental catch in the Alaska flatfish complex fishery

Incidental catches of non target species in each year are shown in the tables below.

BSAI Flathead sole:

Eelpouts, sea pens and sea whips, and miscellaneous invertebrates were the categories of non-target (ecosystem) species catch in the directed fishery that accounted for the largest components of non-target (ecosystem) species catch by percentage across all BSAI flathead sole fisheries (18.9%, 11.4%, and 10.1%, respectively). Giant grenadier, eelpouts, and miscellaneous snails accounted for the largest components by weight (21, 13, and 12 t, respectively).

Table 23. Non-target species catch in the BSAI flathead sole fishery. BSAI flathead sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIflathead.pdf

Nontarget Species Group	Year								
	2012	2011	2010	2009	2008	2007	2006	2005	2004
Benthic urochordata	2	2	16	0	19	16	26	7	1
Birds	0	0	0	0	0	0	0	0	0
Bivalves	0	0	0	0	0	0	0	0	1
Brittle star unidentified	0	0	1	2	0	0	0	1	4
Capelin	0	0	0	0	0	0	0	0	0
Corals Bryozoans	0	0	1	0	0	0	0	0	0
Dark Rockfish	0	0	0	0	0	--	--	--	--
Deep sea smelts (bathylagidae)	--	--	--	--	--	0	0	--	0
Eelpouts	13	7	4	1	3	7	6	12	20
Eulachon	0	0	0	0	0	0	0	0	0
Giant Grenadier	21	3	0	0	11	1	0	0	2
Greenlings	0	0	0	0	0	0	0	0	0
Grenadier	0	0	0	0	0	0	0	4	50
Gunnels	0	0	--	--	0	0	--	0	0
Hermit crab unidentified	0	0	1	0	2	6	1	7	10
Invertebrate unidentified	0	1	12	8	26	2	6	17	36
Lanternfishes (myctophidae)	0	0	0	0	0	0	0	0	0
Misc crabs	0	0	0	0	1	2	1	1	1
Misc crustaceans	0	0	0	0	0	0	0	0	0
Misc deep fish	0	0	0	0	0	0	0	0	0
Misc fish	0	2	2	7	6	5	12	12	13
Misc inverts (worms etc)	0	0	0	0	0	0	0	2	2
Other osmerids	0	0	0	0	0	0	0	0	0
Pacific Sand lance	0	0	0	0	0	0	0	0	0
Pandalid shrimp	0	0	0	0	0	0	0	0	0
Polychaete unidentified	0	0	0	0	0	0	0	0	0
Scypho jellies	1	11	22	18	6	5	4	6	21
Sea anemone unidentified	4	4	18	5	12	51	8	3	43
Sea pens whips	4	0	0	0	0	0	0	0	0
Sea star	12	58	50	77	245	139	258	129	283
Snails	2	5	7	3	19	16	10	12	59
Sponge unidentified	0	0	4	0	1	0	1	0	1
Stichaeidae	0	0	0	0	0	0	0	0	0
Surf smelt	--	--	--	--	0	0	--	--	--
urchins dollars cucumbers	0	1	0	0	1	1	0	0	2

BSAI Northern rock sole:

Table 24. Non-target species catch in the northern rock sole fishery, 2003-2012. BSAI northern rock sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIrocksole.pdf

NONTARGET GROUP NAME	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Benthic urochordata	118678.21	220868.12	318778.02	105544.22	12743.01	30837.08	9764.36	58513.05	5800.61	14243.14
Birds		0	0	0	0		0	0		0
Bivalves	4700.1	338.89	205.78	364.76	396.08	299.4	288.47	477.22	383.14	170.95
Brittle star unidentified	32.28	865.38	1773.68	7290.08	1537.3	1102.53	261.76	1397.61	82.92	69.71
Capelin	1.3	388.38	24.42	4.35	6.44	22.24	43.44	102.71	316.39	56.41
Corals Bryozoans	689.8	693.16	15.88	1346.97	20.6	100.19	19.44	1983.59	104.55	303.5
Eelpouts	1000.13	4296.25	2155.67	3244.69	6894.93	135.7	149.5	4899.66	1860.63	83.87
Eulachon		14.26			1.53	3.83	2.32	33.36	92.83	3.89
Giant Grenadier					4565.52			3331.41		
Greenlings	1150.07	334.24	428.82	335.32	267.23	44.59		18.06	35.12	
Grenadier	0.01	502.51								
Hermit crab unidentified	19169.2	7150.1	7587.56	10401.32	5758	2683.38	636.88	4087.12	2307.71	3464.48
Invertebrate unidentified	105865.92	3128.94	84181.35	6938.09	24211.11	1582.26	2392.49	14526.44	6896.9	2786.48
Misc crabs	18830.36	6423.86	9293.16	6507.53	13605.15	8921.52	3262.82	6369.49	2877.41	6161.04
Misc crustaceans	380.19	151.76	45.36	499.7	198.27	180.15	257.17	1045.61	173.51	354.09
Misc fish	12857.03	16943.73	22421.71	17280.98	70905.19	25201.73	11690.28	14957.04	16735.97	17440.07
Misc inverts (worms etc)	1.44	51.71		24.14	100	8.26	11.34	121.36	16.07	10.82
Other osmerids	3715.91	63.5	725.58	267.83	184.39	627.18	82.26	22.35	124.17	39.69
Pacific Sand lance	16.11	44.72	6.95	32.67	42	30.67	104.59	15.33	6.18	7.45
Pandalid shrimp	200.89	85.94	29.59	20.26	52.6	21.5	59.3	59.84	58.4	55.19
Polychaete unidentified	1.8	7.02		1.19	102.99	21.06	19.14	15.27	4.29	12.42
Scypho jellies	257846.79	304924.73	393490.99	73281.45	94417.73	185158	233299.12	348530.19	264224.6	312587.28
Sea anemone unidentified	18449.18	13291.01	6456.26	8994.76	6338.35	6735.32	2559.5	8769.55	9462.29	4326.69
Sea pens whips		19.31	36.2	0.15		29.39	50	200.88	28.48	78.72
Sea star	1171098.13	333432.64	555351.08	731040.88	710413.9	206604.53	30564.78	174184.47	67505.41	86306.41
Snails	23795.37	23966.73	12922.55	28386.12	24383.93	9313.33	2694.03	11207.04	9697.99	13697.13
Sponge unidentified	198370.76	67555.06	69937.3	40984.67	19224.67	19270.16	64698.87	139966.11	115984.83	63068.37
Stichaeidae	41.87	1.28	2.86		0.41	3.56	0.67	3.32	6.1	
urchins dollars cucumbers	13420.33	8889.78	9279.99	3899.54	32164.61	6035	1104.59	4173.13	3449.36	1601.22

BSAI Yellowfin sole:

Table 25. The estimated non-target species catch (t) in the yellowfin sole fishery, 2003-2012 (PSC not included). BSAI yellowfin sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIyfin.pdf

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Benthic urochordata	1670846	1695563	674762	520091	114427	347756	205806	155571	132867	80023
Birds			0				0	0	0	
Bivalves	1543	1113	1327	343	448	1484	1300	1822	1671	321
Brittle star unidentified	34303	32271	28706	19961	7526	19048	5209	4082	14024	1476
Capelin	3	4519	45	108	321	161	251	718	3769	2275
Corals Bryozoans	240	46	1232	9378	162	8309	312	504	950	611
Eelpouts	19044	12256	7729	4514	2344	5598	5188	5144	29320	11444
Eulachon	12	278	33	115	5075	22	89	133	453	106
Giant Grenadier									236	
Greenlings	646	753	283	703	474	183	24	53	49	98
Grenadier					339		358			
Gunnels					1					
Hermit crab unidentified	87940	51999	82996	26898	35820	36606	15623	16760	15898	4407
Invertebrate unidentified	556495	625561	418512	177181	40009	70401	30665	25883	65462	55579
Misc crabs	14432	21524	11774	10571	27967	14095	11052	11681	20216	5504
Misc crustaceans	14	186	225	2325	1402	719	1335	935	539	458
Misc fish	95745	91469	66164	42470	70971	66422	48913	29256	40108	76536
Misc inverts (worms etc)	20	123	25	50	46	152	170	105	181	79
Other osmerids	4258	4292	497	634	35770	9833	849	2830	2053	4692
Pacific Sand lance	9	167	97	33	17	37	15	35	395	147
Pandalid shrimp	216	920	115	772	101	305	494	744	2273	554
Polychaete unidentified	16	68	42	360	69	175	75	102	212	39
Scypho jellies	111900	299034	115550	46785	42346	146153	222944	152367	309001	144892
Sea anemone unidentified	6087	6202	2581	4896	8791	24840	25572	20526	14668	5187
Sea pens whips	9	28	164	3	12	324	185	635	20	52
Sea star	1939624	1865768	1606948	1308482	1456620	1831017	684867	791632	1662779	816611
Snails	118257	191064	69769	141517	95876	139765	58354	57060	74718	15067
Sponge unidentified	11434	6807	12205	3118	405	6721	69506	16623	11312	10018
Stichaeidae	72	32		10	784	239	10	171	384	135
Surf smelt						1.02				
urchins dollars cucumbers	2253.73	314.93	2548.64	845.45	3477.35	4897.16	7548.42	1278.18	987.46	550.86

GOA Flathead sole:

Bycatch of non-target species in the flathead sole fishery tends to be highly variable between years, at least when expressed as a percentage of the total observed bycatch in the FMP by non-target species group. In 2011, the flathead sole fishery accounted for more than 5% of the bycatch of six species groups: benthic urochordata (tunicates; 8.5%), eelpouts (9.2%), grenadier (6.4%), unidentified polychaetes (39.2%), sea pens and whips (8.6%), and stichaeidae (pricklebacks; 12.0%).

In 2010, the fishery reportedly caught no unidentified polychaetes or grenadier, but again accounted for more than 5% of the bycatch of benthic urochordata (14.1%), eelpouts (11.3%), sea pens and whips (14.0%), and stichaeidae (13.5%), as well as unidentified brittle stars (9.7%), Giant grenadiers (5.1%), greenlings (5.5%), and pandalid shrimp (6.1%). The fishery has had no bycatch of birds and has accounted for less than 5% of bycatch in all shark, skate, and forage fish (capelin, eulachon, sandlance) species groups over the time frame analyzed (2003-2011).

Table 26. Catch of nontarget species in the GOA flathead sole target fishery, expressed as the fraction of species catch by all fisheries in the FMP. GOA flathead sole SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOAflathead.pdf

Nontarget Species Group	Year								
	2011	2010	2009	2008	2007	2006	2005	2004	2003
Benthic urochordata	8.5%	14.1%	0.0%	0.0%	0.0%	0.0%	0.0%	1.8%	0.0%
Birds	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bivalves	3.0%	4.2%	2.5%	2.0%	1.7%	2.8%	6.4%	5.6%	4.2%
Brittle star unidentified	2.4%	9.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%
Capelin	0.0%	0.0%	0.0%	0.0%	--	0.0%	0.0%	0.0%	0.0%
Corals Bryozoans	0.0%	6.9%	0.0%	1.3%	0.0%	0.0%	0.0%	0.0%	1.8%
Dark Rockfish	0.0%	0.0%	9.3%	0.0%	--	--	--	--	--
Eelpouts	9.2%	11.3%	0.0%	6.0%	7.1%	4.9%	6.9%	6.3%	9.3%
Eulachon	1.8%	3.9%	2.6%	2.1%	0.0%	1.2%	2.9%	0.4%	1.4%
Giant Grenadier	0.0%	5.1%	4.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Greenlings	2.4%	5.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%	0.3%
Grenadier	6.4%	0.0%	0.0%	0.0%	0.0%	1.3%	5.8%	3.3%	4.5%
Gunnels	--	--	--	2.8%	--	100.0%	--	--	0.0%
Hermit crab unidentified	2.7%	3.6%	0.0%	1.8%	0.0%	0.0%	0.1%	0.6%	4.4%
Invertebrate unidentified	2.6%	0.0%	4.8%	2.1%	0.0%	1.6%	0.0%	2.6%	2.4%
Lanternfishes (myctophidae)	--	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Large Sculpins	1.0%	2.0%	1.6%	0.6%	0.8%	1.0%	2.7%	3.0%	1.9%
Misc crabs	2.1%	4.2%	3.1%	0.0%	0.0%	0.0%	0.0%	3.6%	0.9%
Misc crustaceans	0.0%	0.0%	0.0%	--	--	--	0.0%	0.0%	0.0%
Misc deep fish	--	--	--	0.0%	--	--	--	--	--
Misc fish	1.1%	2.5%	1.5%	0.9%	0.7%	0.5%	2.0%	1.7%	2.3%
Misc inverts (worms etc)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	--	--
Octopus	0.0%	1.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.2%
Other osmerids	2.6%	0.0%	0.0%	0.6%	0.0%	2.7%	0.0%	0.0%	3.1%
Other Sculpins	2.1%	4.7%	2.3%	0.9%	0.9%	2.0%	4.2%	0.4%	3.3%
Pacific Sand lance	0.0%	--	0.0%	0.0%	--	0.0%	0.0%	0.0%	0.0%
Pandalid shrimp	2.1%	6.1%	2.9%	1.6%	0.9%	2.2%	3.7%	0.5%	4.8%
Polychaete unidentified	39.2%	0.0%	0.0%	0.0%	0.0%	--	51.1%	--	0.0%
Scypho jellies	0.0%	2.3%	3.1%	0.0%	0.0%	1.0%	0.0%	1.0%	0.8%
Sea anemone unidentified	2.2%	3.2%	2.2%	0.0%	0.0%	2.0%	0.0%	1.6%	3.8%
Sea pens whips	8.6%	14.0%	0.0%	0.0%	0.0%	0.0%	0.0%	7.2%	0.0%
Sea star	1.3%	3.1%	2.1%	1.0%	1.3%	0.8%	2.9%	2.5%	2.8%
Shark, Other	0.0%	0.0%	0.0%	0.0%	0.0%	1.3%	4.3%	3.9%	1.2%
Shark, Pacific sleeper	0.0%	1.6%	0.2%	0.0%	1.6%	1.0%	1.1%	0.8%	2.8%
Shark, salmon	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%	0.0%
Shark, spiny dogfish	0.1%	2.0%	0.1%	0.0%	0.0%	0.1%	0.7%	0.0%	4.1%
Skate, Alaska	0.7%	0.1%	--	--	--	--	--	--	--
Skate, Aleutian	0.2%	--	--	--	--	--	--	--	--
Skate, Big	1.8%	4.1%	2.6%	1.9%	0.7%	2.6%	2.5%	1.3%	--
Skate, Longnose	1.8%	4.0%	2.0%	1.4%	1.2%	1.3%	1.3%	1.8%	1.1%
Skate, Other	1.7%	4.2%	2.2%	1.5%	1.8%	1.9%	4.2%	2.9%	4.4%
Skate, Whiteblotched	0.0%	--	--	--	--	--	--	--	--
Snails	2.0%	4.0%	2.8%	1.4%	0.8%	1.4%	4.3%	0.9%	4.7%
Sponge unidentified	2.1%	3.8%	0.0%	0.0%	0.0%	0.0%	0.0%	3.1%	4.9%
Squid	0.1%	0.1%	0.2%	0.0%	0.0%	0.1%	0.0%	0.1%	2.7%
Stichaeidae	12.0%	13.5%	6.8%	0.6%	0.0%	8.3%	20.8%	7.5%	19.0%
Surf smelt	--	--	--	0.0%	--	--	0.0%	0.0%	--
urchins dollars cucumbers	2.0%	3.9%	0.0%	0.0%	0.0%	0.0%	4.0%	0.9%	2.9%

Table 27. Catch of non-prohibited species in the flathead sole target fishery. The species accounting for the two largest totals are highlighted. GOA flathead sole SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOAflathead.pdf

	2011		2010		2009		2008		2007	
Species	total (t)	% retained	total (t)	% retained	total (t)	% retained	total (t)	% retained	total (t)	% retained
all sculpins, sharks, squid, octopus	6	78%	22	20%	9	57%	14	74%	35	0%
arrowtooth flounder	779	7%	2650	6%	1337	10%	801	21%	723	10%
Atka mackerel	18	99%	10	98%	17	99%	3	98%	36	71%
big skate	39	94%	112	92%	53	96%	66	84%	23	99%
Dover sole and turbot	1	100%	45	48%	18	8%	4	98%	1	0%
flathead sole	367	97%	1242	96%	696	98%	572	92%	423	90%
longnose skate	12	95%	30	97%	24	66%	11	81%	13	19%
northern rockfish	1	89%	6	53%	1	89%	0	100%	2	0%
other rockfish complex	0	--	2	4%	0	--	2	53%	0	99%
pacific cod	108	94%	297	81%	279	97%	125	84%	131	90%
pelagic shelf rockfish	1	82%	9	72%	4	94%	2	100%	2	0%
pollock	57	94%	319	46%	135	81%	45	97%	27	99%
POP	2	6%	74	7%	2	5%	2	2%	11	13%
rex sole	77	86%	397	96%	184	94%	86	98%	110	98%
rougheye	2	16%	15	94%	3	44%	0	42%	0	100%
sablefish	8	98%	13	98%	19	77%	1	61%	4	100%
shallow water flatfish	56	97%	122	98%	95	98%	41	98%	26	95%
shortraker	2	97%	1	78%	3	98%	0	--	0	--
thornyhead	5	100%	13	76%	8	100%	0	100%	7	100%
unidentified skate	9	52%	19	13%	13	49%	5	28%	20	64%

Over the past five years, the flathead sole-directed fishery caught more arrowtooth flounder than any other non-prohibited FMP species, including flathead sole. Flathead sole was the second most-caught species in the directed fishery. Only small amounts of arrowtooth were retained (typically 10%), while generally more than 90% of flathead sole was retained. Pacific cod was the third most caught species, with retention rates typically greater than 90%.

GOA Rex sole:

Bycatch of non-target species in the rex sole fishery tends to be highly variable between years, at least when expressed as a percentage of the total observed bycatch in the FMP by non-target species group. In 2010, the rex sole fishery accounted for more than 10% of the bycatch of four species groups: corals and bryozoans (10.3%), unidentified invertebrates (14.3%), miscellaneous invertebrates (e.g., worms) (100%) and unidentified polychaetes (100%). In 2009, by contrast, the fishery reportedly accounted for over 10% of total bycatch in 19 species groups, including three of the four species groups caught in 2010 (miscellaneous worms were not caught in 2009). The fishery has had no bycatch of birds and has accounted for less than 10% of bycatch in all shark and skate species groups over the time frame analyzed (2003-2011), except for other skates (2003, 2006, 2009). The rex sole fishery has played a substantial role in bycatch of forage fish (capelin, eulachon, sandlance) in certain years, accounting for over 50% of capelin bycatch in 2008 and 2009 and almost 20% of eulachon bycatch in 2009.

Table 28. Catch of nontarget species in the rex sole target fishery, expressed as the fraction of species catch by all fisheries in the FMP. GOA rex sole SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOArex.pdf

Nontarget Species Group	Year 2011	2010	2009	2008	2007	2006	2005	2004	2003
Benthic urochordata	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	28.8%	0.3%	48.9%
Birds	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bivalves	0.5%	0.0%	9.6%	9.9%	0.0%	0.0%	5.4%	8.4%	8.6%
Brittle star unidentified	4.0%	0.1%	15.1%	3.8%	7.1%	0.0%	0.2%	0.0%	0.0%
Capelin	0.0%	0.0%	51.0%	95.5%	--	0.0%	0.0%	0.0%	17.3%
Corals Bryozoans	3.1%	10.3%	13.5%	0.0%	6.7%	0.0%	0.0%	0.0%	17.8%
Dark Rockfish	0.0%	0.0%	0.0%	0.0%	--	--	--	--	--
Eelpouts	2.6%	9.8%	19.3%	0.0%	0.0%	0.0%	0.3%	0.5%	11.0%
Eulachon	0.0%	5.5%	11.5%	2.9%	4.4%	0.0%	1.9%	0.0%	9.9%
Giant Grenadier	3.6%	8.9%	21.5%	3.2%	5.2%	8.6%	3.6%	0.0%	0.0%
Greenlings	0.0%	8.4%	10.5%	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%
Grenadier	11.2%	0.0%	0.0%	4.0%	0.0%	0.0%	0.0%	0.4%	7.8%
Gunnels	--	--	--	12.9%	--	0.0%	--	--	0.0%
Hermit crab unidentified	4.9%	4.3%	11.7%	4.6%	5.8%	15.6%	4.8%	0.0%	10.2%
Invertebrate unidentified	0.0%	14.3%	17.0%	5.9%	0.5%	0.0%	0.0%	0.3%	9.0%
Lanternfishes (myctophidae)	--	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Large Sculpins	1.8%	3.4%	7.9%	1.5%	3.2%	5.8%	3.1%	3.3%	7.8%
Misc crabs	0.2%	5.7%	14.2%	4.5%	5.6%	12.6%	3.9%	0.2%	8.3%
Misc crustaceans	10.0%	0.0%	0.0%	--	--	--	64.7%	0.0%	65.1%
Misc deep fish	--	--	--	0.0%	--	--	--	--	--
Misc fish	2.1%	3.5%	8.5%	2.5%	3.4%	4.1%	1.9%	2.5%	5.7%
Misc inverts (worms etc)	50.5%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	--	--
Octopus	0.2%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.2%
Other osmerids	4.4%	7.7%	16.1%	4.2%	6.5%	0.0%	0.0%	0.0%	5.2%
Other Sculpins	4.1%	6.3%	11.2%	3.4%	4.1%	8.8%	4.3%	0.3%	7.6%
Pacific Sand lance	0.0%	--	0.0%	0.0%	--	0.0%	0.0%	0.0%	0.0%
Pandalid shrimp	4.0%	6.4%	18.8%	4.3%	5.8%	8.7%	2.9%	0.0%	10.4%
Polychaete unidentified	0.0%	100.0%	100.0%	0.0%	0.0%	--	40.4%	--	0.0%
Scypho jellies	2.4%	3.6%	12.6%	0.0%	5.3%	0.0%	2.2%	0.0%	5.2%
Sea anemone unidentified	3.2%	3.7%	9.3%	0.5%	4.2%	0.0%	3.0%	4.5%	7.2%
Sea pens whips	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.3%	16.3%
Sea star	2.6%	4.8%	9.5%	3.3%	4.7%	4.9%	3.0%	3.4%	7.7%
Shark, Other	2.0%	0.0%	0.5%	0.0%	0.1%	0.9%	0.6%	8.8%	4.1%
Shark, Pacific sleeper	0.4%	0.5%	1.8%	0.1%	0.1%	2.6%	1.1%	1.4%	3.7%
Shark, salmon	0.0%	0.2%	0.0%	0.0%	0.7%	0.0%	0.0%	0.0%	0.7%
Shark, spiny dogfish	0.2%	2.0%	0.3%	0.0%	0.0%	0.6%	1.3%	0.8%	3.0%
Skate, Alaska	0.1%	0.1%	--	--	--	--	--	--	--
Skate, Aleutian	0.6%	--	--	--	--	--	--	--	--
Skate, Big	3.3%	4.3%	7.0%	2.2%	5.8%	8.9%	4.7%	2.9%	--
Skate, Longnose	4.0%	4.9%	7.4%	4.1%	6.1%	5.9%	2.2%	2.5%	0.0%
Skate, Other	3.2%	6.3%	11.4%	5.2%	8.9%	10.0%	6.4%	5.9%	10.0%
Skate, Whiteblotched	0.0%	--	--	--	--	--	--	--	--
Snails	3.2%	5.9%	9.5%	4.3%	4.6%	9.2%	3.8%	4.7%	8.0%
Sponge unidentified	3.0%	5.6%	12.4%	0.0%	10.0%	0.0%	6.1%	0.0%	9.7%
Squid	0.2%	0.6%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%
Stichaeidae	0.0%	14.1%	21.8%	22.8%	13.7%	0.0%	17.5%	0.0%	34.7%
Surf smelt	--	--	--	0.0%	--	--	0.0%	0.0%	--
urchins dollars cucumbers	4.0%	7.7%	15.1%	3.7%	4.8%	0.0%	4.8%	0.4%	7.7%

Over the past five years, the rex sole-directed fishery caught more arrowtooth flounder than any other non-prohibited FMP species, including rex sole. Rex sole was the second most-caught species in the directed fishery. Only small amounts of arrowtooth were retained (typically 10-20%), while generally more than 98% of rex sole was retained. Catches of other non-prohibited species in the rex sole fishery were typically less than 20% of the rex sole catch.

Table 29. Catch of non-prohibited species in the rex sole target fishery. The species accounting for the two largest totals are highlighted. GOA rex sole SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOArex.pdf

	2011		2010		2009		2008		2007	
Species	total (t)	% retained	total (t)	% retained	total (t)	% retained	total (t)	% retained	total (t)	% retained
Atka mackerel	4	99%	225	83%	225	83%	0	0%	1	89%
arrowtooth flounder	1,790	19%	5,628	10%	6,207	9%	2,501	12%	3,108	8%
big skate	106	84%	214	83%	264	85%	70	96%	74	99%
deep water flatfish	47	7%	269	7%	321	6%	227	3%	68	0%
flathead sole	178	94%	497	93%	629	94%	283	81%	264	92%
longnose skate	44	94%	76	93%	82	94%	36	97%	24	97%
northern rockfish	12	39%	37	38%	37	39%	12	0%	12	0%
all sharks, squid, sculpin, octopus	--	--	31	1%	36	2%	9	0%	15	0%
Pacific cod	155	87%	557	86%	592	85%	238	96%	409	88%
pelagic rockfish complex	11	78%	35	89%	42	91%	5	94%	31	94%
pollock	118	83%	550	70%	615	72%	70	95%	110	99%
POP	291	25%	399	34%	420	32%	76	2%	68	10%
rex sole	1,073	98%	3,142	99%	3,401	99%	1,091	98%	1,556	100%
rougheye	3	92%	10	27%	10	29%	14	41%	4	94%
other rockfish	1	37%	3	9%	3	9%	1	0%	0	0%
sablefish	29	91%	122	93%	125	93%	35	76%	42	83%
shallow water flatfish	11	93%	32	88%	46	92%	12	82%	10	100%
shortraker	9	78%	20	62%	21	62%	4	71%	4	92%
thornyheads	27	95%	52	99%	54	97%	29	100%	24	95%
unidentified skates	21	28%	50	66%	60	63%	22	56%	103	50%
octopus	0	8%	--	--	--	--	--	--	--	--
sculpin	3	6%	--	--	--	--	--	--	--	--
USRK (???)	6	0%	--	--	--	--	--	--	--	--

The remaining species in the flatfish complex are primarily bycatch species themselves in the directed fisheries shown above.

In addition, the GOA flatfish fisheries caught 19% of the total incidental catch of the spiny dogfish and 21% of the total incidental catch of the Pacific sleeper shark. Spiny dogfish (*Squalus suckleyi*) is listed under the IUCN Red list as "Vulnerable". Fisheries and population trend data indicate that the southern part of the Northeast Pacific stock has also declined through overfishing, but stocks appear stable off Alaska.

http://www.iucnredlist.org/apps/redlist/details/61413/0

Table 30. Estimated catch (tons) of spiny dogfish in the GOA by fishery, 1990-1996 catch estimated by pseudo-blend estimation procedure (Gaichas et al. 1999). 1997-2001 catch estimated with NMFS new pseudo blend estimation procedure (Gaichas 2002). Years 2003-2010 from NMFS AKRO using the improved pseudo blend estimation procedure. Catch by target fishery and species are not available for 2002. Spiny dogfish do not occur in the Atka mackerel fishery. Bycatch in the halibut fisheries has been estimated by NMFS AKRO since 2003, but is based only on landed sharks and does not include discarded catch. http://www.afsc.noaa.gov/REFM/docs/2012/GOAshark.pdf

Fishery	Pollock	Pacific Cod	Flatfish	Rockfish	Halibut	Sablefish	Grand Total	Year % of Total 97-11
1990	57.6	36.0	13.5	1.8		59.0	170.9	
1991	29.3	52.6	16.2	16.4		26.2	141.2	
1992	84.4	50.5	116.0	22.4		40.7	320.6	
1993	137	10.1	138.5	2.4		95.3	383.4	
1994	22	16.9	83.4	2.5		35.4	160.2	
1995	2.8	28.1	24.1	18.4		50.7	140.6	
1996	2.9	15.3	182.6	19.8		79.5	336.9	
1997	2.8	57.6	137.2	326.2		133.7	657.5	8%
1998	4.9	727.2	69.0	3.1		59.6	864.9	10%
1999	8.6	160.2	56.6	4.8		83.4	313.6	4%
2000	18.7	29.4	66.3	146.6		136.6	397.6	5%
2001	11.6	172.8	162.5	25.1		122.1	494.0	6%
2002	-	-	-	-	-	-	-	
2003	6.1	43.6	166.0	35.5	6.6	17.3	275.0	3%
2004	9.2	19.6	15.5	2.3	13.4	123.2	183.2	2%
2005	15.2	27.9	50.1	2.8	17.3	329.3	442.7	6%
2006	50.0	113.2	122.9	2.0	713.2	147.4	1,148.6	14%
2007	47.6	250.2	151.4	6.2	210.5	165.6	831.4	10%
2008	59.6	289.6	87.3	4.8	0.5	91.1	533.0	7%
2009	17.6	113.7	204.8	7.0	603.2	80.7	1,027.1	13%
2010	19.8	118.1	164.0	3.5	21.4	70.8	397.7	5%
2011	1.5	20.0	46.8	0.7	69.1	248.9	387.1	5%
Fishery % of Total	3%	27%	19%	7%	21%	23%		

Table 31. Estimated catch (tons) of Pacific sleeper shark in the GOA by fishery, 1990-1996 catch estimated by pseudo-blend estimation procedure (Gaichas et al. 1999). 1997-2001 catch estimated with NMFS new pseudo blend estimation procedure (Gaichas 2002). Years 2003-2010 from NMFS AKRO using the improved pseudo blend estimation procedure. Catch by target fishery and species are not available for 2002. Bycatch in the halibut fisheries has been estimated by NMFS AKRO since 2003, but is based only on landed sharks and does not include discarded catch. http://www.afsc.noaa.gov/REFM/docs/2012/GOAshark.pdf

Fishery	Pollock	Pacific Cod	Flatfish	Rockfish	Atka Mackerel	Halibut	Sablefish	Grand Total	Year % of Total 97-11
1990	2.9	9.9	0.4	4.3	0		2.2	19.7	
1991	27.2	2.8	3.1	0	0		16.2	49.4	
1992	1.1	27.4	2.7	0	0		6.4	37.6	
1993	156.5	21.8	1	0	0		35.5	214.8	
1994	79.6	16.6	0.8	1.3	0		21.2	119.5	
1995	16.9	13.7	20.7	0.1	0		11.6	63	
1996	14.5	11.9	12.1	0	0.2		26.4	65.9	
1997	22.3	59.3	46	0.9	0		7.5	135.9	4%
1998	32.4	19.6	10.1	0.2	0		11.3	74	2%
1999	34.1	505.8	6	3	0		8.7	557.7	17%
2000	178.4	376.8	35.9	0.3	0		16.7	608.2	18%
2001	145.9	65.8	6.3	0.7	0		30.3	249	7%
2002	-	-	-	-	-		-	-	
2003	50.3	56.3	93.0	0.3	0.0	59.1	9.2	268.1	8%
2004	168.9	25.5	73.7	0.8	0.0	8.4	4.2	281.3	8%
2005	196.0	133.8	129.6	0.2	0.0	2.2	18.9	480.7	14%
2006	153.5	13.5	60.4	0.4	0.0	0.8	23.1	251.7	7%
2007	58.9	9.1	222.7	0.0	0.0	3.7	0.7	295.1	8%
2008	47.5	13.2	2.0	1.1	0.0	0.0	0.7	64.6	2%
2009	30.2	4.3	14.5	0.3	0.0	0.0	0.2	49.5	1%
2010	149.6	2.0	7.9	0.0	0.0	0.0	0.4	159.8	5%
2011	2.7	3.9	9.9	2.1	0.0	0.0	4.3	22.9	1%
Fishery % of Total	36%	37%	21%	0%	0%	2%	4%		

There are currently no directed commercial fisheries for shark species in federally or state managed waters of the BSAI and the GOA, and most incidental catch is not retained. Spiny dogfish are allowed as retained incidental catch in some state managed fisheries, and salmon sharks are targeted by some sport fishermen in Alaska state waters. There is no evidence to suggest that overfishing is occurring for any shark species in the BSAI and the GOA because the OFL has not been exceeded.

Total shark catch in 2012 was 522 t in the GOA and 74 t in the BSAI as of October 1, 2012. Recommendations in the 2012 GOA sharks SAFE report recommend that the shark complex be managed with spiny dogfish as a Tier 5 species (OFL = F_{OFL} (0.097)*3 yr average biomass, ABC = 0.75*OFL) and the remaining sharks (Pacific sleeper shark, salmon shark and other sharks) as Tier 6 species (OFL = average catch 1997-2007, ABC = 0.75*OFL). The recommended ABC is 5,600 t and OFL is 7,467 t for the spiny dogfish.

The shark complex (Pacific sleeper shark, spiny dogfish, salmon shark and other/unidentified sharks) in the Bering Sea and Aleutian Island (BSAI) are a Tier 6 complex, with OFL based on maximum historical catch between the years 1997 – 2007 (ABC is 75% of OFL). Changes in the Catch Accounting System did not result in new estimates of maximum historical catch and thus did not change the proposed ABC/OFL. For 2012 the same ABC and OFL as in last year's assessment are recommended: ABC = 1,022 t and OFL = 1,363 t.

Evidence

http://www.afsc.noaa.gov/REFM/docs/2012/GOAshark.pdf

http://www.afsc.noaa.gov/REFM/docs/2012/BSAIshark.pdf

http://www.nmfs.noaa.gov/pr/pdfs/sars/ak2011.pdf

http://www.afsc.noaa.gov/REFM/docs/2012/ecosystem.pdf

BSAI flathead sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIflathead.pdf

BSAI yellowfin sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIyfin.pdf

BSAI northern rock sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIrocksole.pdf

GOA flathead sole SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOAflathead.pdf

GOA rex sole SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOArex.pdf

3.6. Economic Value of the Alaska Flatfish Fisheries

The flatfish fisheries are important to the economy of coastal Alaska communities. The CDQ program has been successfully contributing to fisheries infrastructure in western Alaska by funding docks, harbors, vessel acquisition and the construction of seafood processing facilities. The CDQ program has allowed CDQ groups to acquire equity ownership interests in the groundfish fishery that provide additional revenues to fund local in-region economic development projects, and education and training programs. The value of the 2011 groundfish catch after primary processing was $2,520 million. In 2009, production was 126,540 mt for all flatfish products for a total gross value of $157 million. Ex-vessel value of all flatfish caught in the BSAI in 2009 was $61.8 million. Products include whole round fish, headed and gutted (H&G) (with or without tail and/or roe), and kirimi (fish slices).

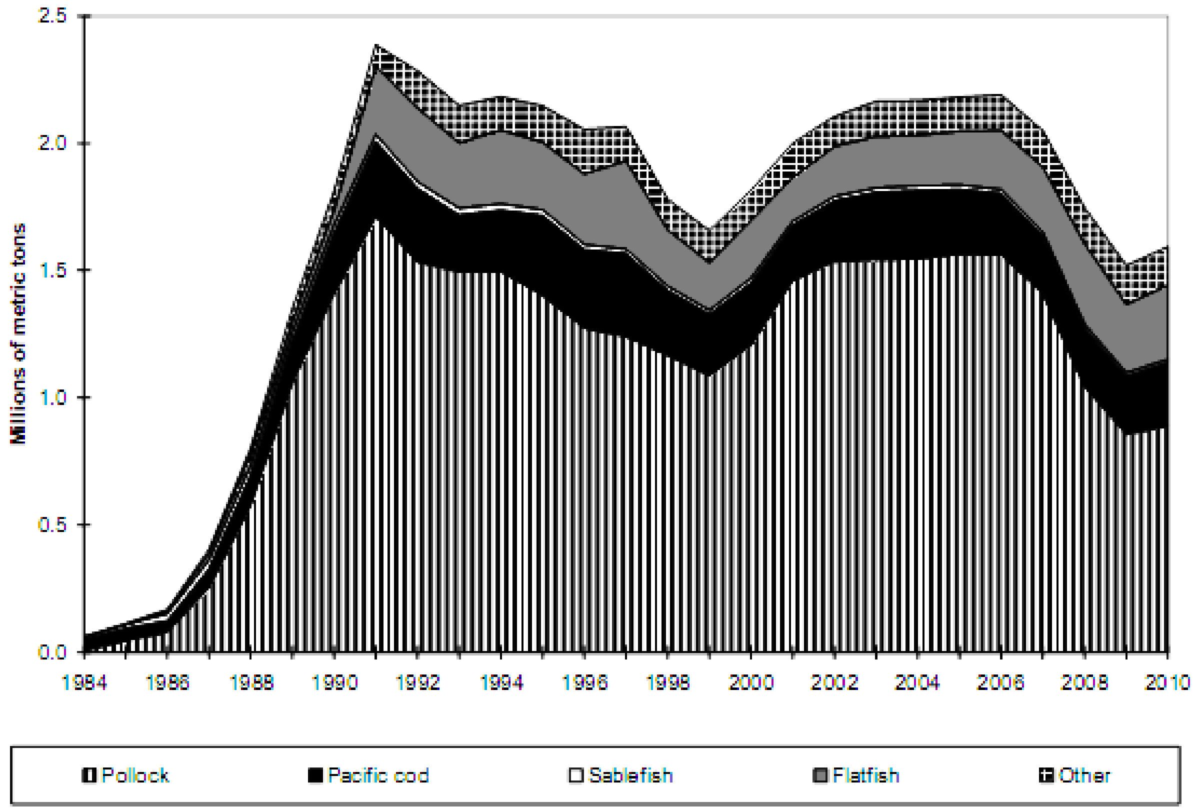


Figure 31. Groundfish catch in the domestic commercial fisheries off Alaska by species, 1984-2010.
http://www.afsc.noaa.gov/REFM/docs/2012/economic.pdf

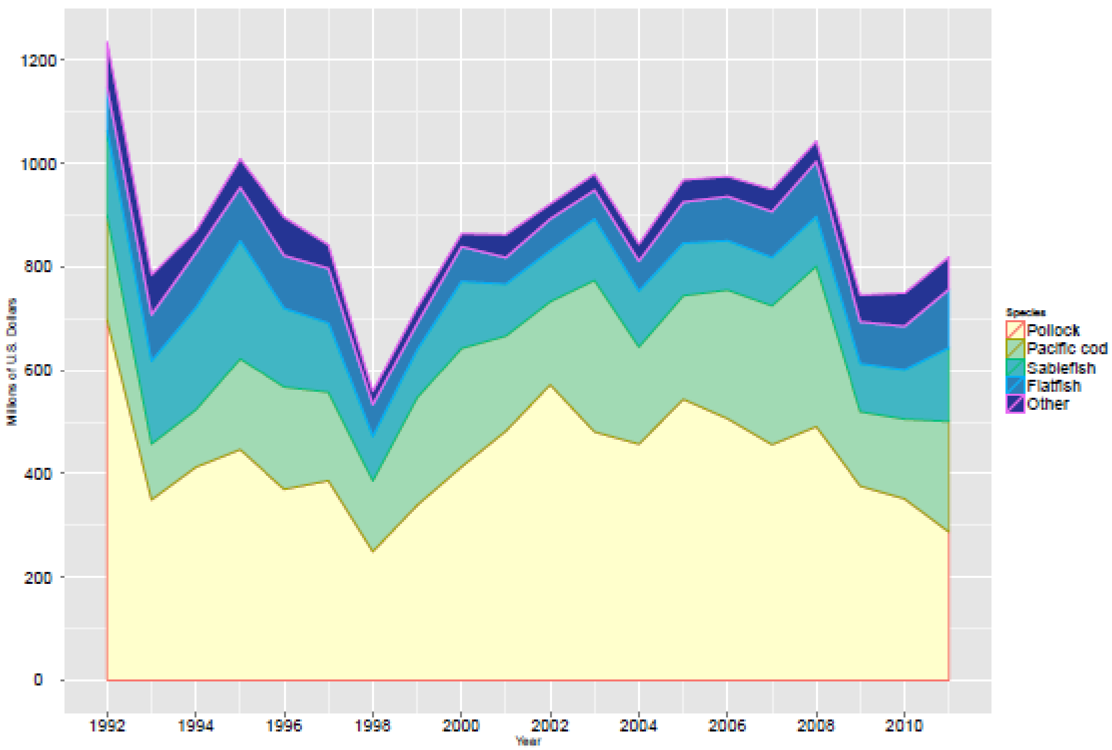


Figure 32. Real ex-vessel value of the groundfish catch in the domestic commercial fisheries off Alaska species, 1994-2011 (base year 2011). Estimates include federal and state fisheries of Alaska.
http://www.afsc.noaa.gov/REFM/docs/2012/economic.pdf

4. Proposed Units of Assessment

The proposed *Units of Assessment* submitted at the time of Application were reviewed with respect to their appropriateness for undertaking a full assessment. The assessors have reviewed the proposed units of assessment with respect to the application of management functions across all jurisdictions and an examination of the characteristics of each of the management regions to assess the similarities and potential differences during a full assessment of the Alaska Flatfish Complex Commercial Fisheries.

The proposed Units of Assessment within the Unit of Certification are listed below.

	Fish Species (Common & Scientific Name)	Geographical Location of Fishery	Gear Type	Principal Management Authority
1.	**Yellowfin sole, *Limanda aspera***	**Bering Sea and Aleutian Islands**	**Non-pelagic Trawl**	**NOAA NMFS Alaska, NPFMC**
2.	**Flathead sole, *Hippoglossoides elassodon***	**Gulf of Alaska, Bering Sea and Aleutian Islands**	**Non-pelagic Trawl**	**NOAA NMFS Alaska, NPFMC**
3.	**Northern rock sole, *Lepidopsetta polyxstra***	**Gulf of Alaska, Bering Sea and Aleutian Islands**	**Non-pelagic Trawl**	**NOAA NMFS Alaska, NPFMC**
4.	**Southern rock sole, *Lepidopsetta bilineatus***	**Gulf of Alaska**	**Non-pelagic Trawl**	**NOAA NMFS Alaska, NPFMC**
5.	**Arrowtooth flounder, *Atheresthes stomias***	**Gulf of Alaska, Bering Sea and Aleutian Islands**	**Non-pelagic Trawl**	**NOAA NMFS Alaska, NPFMC**
6.	**Kamchatka flounder, *Atheresthes evermanni***	**Bering Sea and Aleutian Islands**	**Non-pelagic Trawl**	**NOAA NMFS Alaska, NPFMC**
7.	**Alaska plaice, *Pleuronectes quadrituberculatus***	**Bering Sea and Aleutian Islands**	**Non-pelagic Trawl**	**NOAA NMFS Alaska, NPFMC**
8.	**Greenland turbot, *Reinhardtius hippoglossoides***	**Bering Sea and Aleutian Islands**	**Non-pelagic Trawl, Longline**	**NOAA NMFS Alaska, NPFMC**
9.	**Rex sole, *Glyptocephalus zachirus***	**Gulf of Alaska**	**Non-pelagic Trawl**	**NOAA NMFS Alaska, NPFMC**

5. Site Meetings

5. 1. Initial Consultation Meetings

The objectives of the initial consultation meetings were to support information gathering and understanding of the role, functions and activities of the fishery management organizations responsible for US Alaska Flatfish Complex resources and to further investigate the approach that a full assessment might undertake with respect to the Unit of Certification and the Assessment Units that are proposed.

Consultation meetings were planned based on an initial review identifying the key management organizations and participants. The initial consultation meetings were not designed to be inclusive of all organizations and representatives of the Alaska Flatfish Complex fisheries. However, the consultation plan was designed to strategically capture sufficient information to ensure understanding and confidence with respect to validation reporting.

There were other important functions that the on-site consultation also served. These included:

- The provision of an overview of the FAO-based assessment and certification process to management organizations and fishery representative organizations,
- Responding to any questions or comments raised at this initial stage in the assessment. An overview of the key criteria of the FAO Code of Conduct for Responsible Fisheries, and minimum substantive requirements for ecolabelling of fisheries (FAO Guidelines for the Ecolabelling of Fisheries and Fishery Products) was presented.

All consultation meetings were conducted by Vito Romito and Geraldine Criquet.

Overview of Meeting Plan:

The validation meetings were held between in March 2013, in Washington and Alaska State, USA.

Summary of Consultation Meetings:

Each meeting served as the primary purpose to introduce the Certification Body, SAI Global/Global Trust, and provide an overview of the FAO-Based RFM assessment approach and process. Key timelines for assessments and the specifics of the proposed assessment and certification units were presented. Immediate questions and concerns expressed by management and participatory organizations were addressed and some key areas which will form part of the full assessment were also addressed. Consultation meetings are intended to provide a briefing of the certification process and link to management organizations for the purposes of carrying out the fishery assessments and to support the next step in the assessment, the planning of full assessments for the fisheries in application.

The following summary Table 33 provides the background to each organization met, and a description of the specific key items discussed.

Table 33: Summary of Consultation Meetings

Date, time	Organization	Representatives	Item discussed
4th March 2013, 09.00-11.30	Groundfish Forum, Seattle,	Jason Anderson (Co-op Manager), John Gauvin (Resource Economist, Fishing Gear Scientist) Vito Romito (GTC), Geraldine Criquet (GTC)	• Changes in regulations, proposals: reduction of halibut PSC in GOA, Amendment 94 to BSAI FMP for any directed flatfish fishery, NPFMC action for nursery ground in Bristol Bay, BS TAC flexibility, discussion on GOA rationalization program. • Fleet structure: longliners in BS for turbot directed fishery with incidental catch of arrowtooth and Kamchatka flounders, Amendment 80 fleet in BSAI and GOA, most of catcher vessels are from Alaska. • Observer coverage: BSAI coverage close to 100%, coverage of AI longliner fleet is probably about 30%, coverage for Amendment 80 GOA CP vessels is 100%, provisional data from the restructured observer program will be available in June 2013. • Fishery dependent data collection: dockside inspections, plant observers in Kodiak, VMS mandatory in BSAI and GOA, logbook mandatory (catch characteristic, marine mammal and seabird interactions, logbooks verified by USCG during fishing vessel boardings. • Small-scale fishery in Russia. • Stock assessment and stock abundance trends: coding errors for last year turbot (Tier 5) assessment. • Bycatch avoidance mechanisms/improved selectivity: trawl sweep modifications in place in BSAI, but implementation is still in progress for GOA, no Chinook excluder device, trials in progress for a halibut excluder device (upper panel modification). • Measures in place for the protection of juveniles: no size limits but mesh size of the net to allow juveniles escapement. • Methods to reduce waste of target species: groundfish retention program requires retaining minimum 85% of groundfish, market development for smaller individuals, report of gear loss and lost nets are recovered. • Gear conflict with other users, overlapping fishing areas with other

			fisheries: trawlers indirectly catch turbot (would like a TAC split between longliners and trawlers), crabbers send information on their pots location to trawlers. • EFH: done separately by species. • Concerns relating to trawl gear interaction with Red King crab spawners in Bristol Bay • New research programs: turbot larval dispersion, reproductive potential under different temperature regimes. • Adequacy of consultation between management authorities and industry: adequate consultative process (for example, trawl sweep modifications).
5th March 2013, 16.00-17.00	Pacific Seafood Processors Assoc. (PSPA), Seattle	Glenn Reed, President Vito Romito (GTC), Geraldine Criquet (GTC)	• Changes in regulations, proposals: reduction of halibut PSC in GOA, regulatory changes in ABC and TAC, discussion on GOA rationalization program. • New observer program: reticence from smaller fishing vessels, industry would prefer EM • Potential adoption of trawl sweep modifications in the GOA flatfish fleet.
6th March 2013, 09.00-13.00	Alaska Fisheries Science Center, Seattle	Patricia Livingston, Daniel H. Ito, flatfish complex stock assessment scientists and Craig Rose Vito Romito (GTC), Geraldine Criquet (GTC)	• Survey activities: same period and station than the previous one, CIE review of the survey methodology in June 2012. • BSAI arrowtooth flounder: biomass increases, recruitment is high, biomass well above target reference point. • BSAI Greenland turbot: Tier 3a, stock across Russia but no data available from Russia, directed longline fishery and bycatch for directed arrowtooth flounder trawl fishery, large recruitment in 2008-2009 after several years of very low recruitment (1979-2007). • BSAI yellowfin sole/Northern rock sole: Tier 1, yellowfin fishery is the world largest flatfish fishery, TAC is never fully harvested, SBB is around $B_{40\%}$. Rock sole: TAC well below ABC, SBB is well above $B_{40\%}$, relation between spring winds and larval arrival. • BSAI AK plaice: Tier3, very lightly exploited, change in M in the 2010 assessment, biomass very stable, SBB is well above $B_{40\%}$, no

			temperature effects on recruitment. • BSAI Kamchatka flounder: Tier 5, was managed as a complex with arrowtooth flounder until 2010, 3 stock components (BS shelf, BS slope and AI. • BSAI flathead sole (Tier 3)/BS flounder (Tier 5): very lightly exploited, SBB is well below $B_{35\%}$, the 2010 survey was extended in the north, temperature has an important effect and is included in the BS flounder stock assessment model. • GOA flatfish are surveyed on a biennial basis, last survey was in 2011, ADFG uses different gear type then ADFG data are not included in models. • GOA flathead sole: Tier 3, very lightly exploited, mostly caught around Kodiak and the Southeast Peninsula, biomass is stable. • GOA Rex sole: Tier 5, very lightly exploited, spatial segregation between juveniles and adults, fishery catches only larger and older individuals, biomass is stable. • GOA Northern and Southern rock sole: Tier 4 to Tier 3 in 2012, most of the catch is coming from East Kodiak, assessment by species since 1997, survey biomass decrease for S. rock sole between 2009 and 2010, N. rock sole biomass is stable, S. rock sole biomass is flat since 2006, more S. rock sole than N. rock sole in the GOA, no available data on exchanges between the GOA and BSAI. • GOA arrowtooth flounder: biomass increases since the 70's, higher catch around Kodiak. • Bycatch avoidance mechanism/ improved selectivity: trawl sweep modifications in place in BSAI, but implementation is still in progress for GOA, halibut excluder device (upper panel modification), no fishing at night time, fishing at slow speed for avoiding halibut bycatch. • Measures in place for the protection of juveniles: no size limits but legal mesh size of 6 inch. • Observer coverage: trawl fishing vessel are probably above 60 ft

			and therefore have 30% of observer coverage. • EFH: evaluations for all flatfish species, evaluation of shipping activities impacts on EFH in AI. • Environmental effects: studies on correlation between larval settling/growth and water temperature and winds, climate forecast/scenario, NPRB projects, arrowtooth avoids cold waters in BS so good candidate to evaluate the climate change impacts. • Role of flatfish in the food web dynamic: arrowtooth flounder predation is high on pollock, competition with cod for pollock, flatfish complex is diverse, species with separated ecological niches. • BS and GOA IERP
7th March 2013, 14:30-16:00	U.S. Coast Guard (USCG), Juneau	Lt Tony Kenne Vito Romito (GTC), Geraldine Criquet (GTC)	• Flatfish complex fleet size: the active fleet size is approximately 87 vessels and 85 vessels in the BSAI and GOA, respectively, VMS requirements. • Enforcement activities: from fiscal year 2008 to the end of 2012, the USCG conducted 90 boardings on BSAI flatfish vessels, noting 7 violations on 7 vessels, and the USCG conducted 21 boardings on GOA flatfish vessels, noting 5 violations on 2 vessels. • New observer program: same number of observer days but differently distributed.
7th March 2013 16:30-17:30	United Fishermen of Alaska (UFA)	Julianne Curry (Executive Director) Vito Romito (GTC), Geraldine Criquet (GTC)	• Industry's concern: increase of arrowtooth flounder biomass in the GOA. • New observer program: problem relating to the cost of the program.
15th March 2013, 09:00-10:30	Groundfish Data Bank, Kodiak Islands	Katy McGauley Vito Romito (GTC), Geraldine Criquet (GTC)	• Changes in regulation/fisheries operations: trawl sweep modifications will be implemented in 2014, closure at Marmot Bay to protect Tanner crab, proposal for the implementation of a rationalization program in the GOA fleet. • Fleet structure: CVs only, mostly over 60 ft. Mostly local with some Oregon owned. • Observer coverage: good perception as long as it is a random

			process. • Fishery dependent data collection: dockside inspections but not for biological data collection, VMS mandatory in BSAI and GOA, logbook mandatory, e-landings. • Bycatch: halibut, Tanner crab, chinook; NPFMC final action is possible in June 2013 for a Chinook bycatch cap for non-pollock fisheries. • Bycatch avoidance mechanisms/improved selectivity: trawl sweep modifications in place in BSAI, but implementation in GOA scheduled for 2014, no Chinook excluder device, trials in progress for a halibut excluder device (upper panel modification). • Measures in place for the protection of juveniles: no size limits but mesh size of the net to allow juveniles escapement, there is a market for small individuals. • Methods to reduce waste of target species: groundfish retention program requires retaining minimum 85% of groundfish, market development for smaller individuals, report of gear loss and lost nets are recovered. • Discard: arrowtooth flounder is the biggest discard, legal as it is not an IR/IU species. • Gear conflict with other users: nothing significant. • Fishing season: approximately from May to November, once pollock and cod harvest is finished. • New research programs: a maturity study is scheduled. • Economic data collection: a motion passed in February 2013 for the implementation of economic data collection. • Adequacy of consultation between management authorities and industry: good relationships with management and enforcement staff.
19th March 2013, 14:30-16:30	North Pacific Fisheries Management Council, Anchorage	Chris Oliver, Dave Witherell, Diane Stram Vito Romito (GTC), Geraldine Criquet (GTC)	• Changes in regulations: reduction of halibut PSC in GOA next year, GOA trawl sweep modifications project is still in the NMFS process, proposal for a rationalization in GOA.

			• Economic data collection: approved by the NPFMC last fall and is now in the NMFS process. • New observer program: no robust collaboration between NMFS headquarters and regional offices. • Information exchange with Russia: very limited. • MSA: proposal for revisiting 2 years ago but nothing happened.

5.2. On-Site Witnessed Assessment and Consultation Meetings

On-site visits for full assessment purposes took place in September 2013. These were additional visits to the initial consultation meetings reported in the previous section. There are two types of on-site assessment activities; meetings with fishery management organizations to discuss various aspects of the assessment and witnessed assessment, which takes the form of witnessing specific management processes and functions, such as publically accessible NPFMC meetings where possible.

The schedule of on-site activities is provided in Table 34 below with a summary of the activity, meeting and discussion. Meetings were used to document information that either confirmed, clarified or substantiated aspects of the assessment and provided an opportunity for organizations to contribute and clarify information to support the assessment.

Table 34. Summary of full assessment site visits meetings, September 2013.

Date	Organization	Staff Represented	Overview/Key items discussed
09th September 2013, 09.00 am.	Alaska Seafood Marketing Institute, Seattle, USA.	Randy Rice, Seafood Technical Program Director Vito Romito (GTC), Erica Fruh (SAI Global); Assessors	The Alaska Seafood Marketing Institute is the client for the FAO RFM Alaska flatfish complex assessment. 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. Items Discussed: Flatfish assessment, technical aspects and timelines for assessment completion.
09th September 2013, 01.00 pm.	Alaska Seafood Cooperative/Groundfish Forum, 4241 21st Avenue W, Suite 302 Seattle, WA 98199	Jason Anderson, Co-op Manager and John Gauvin, Resource Economist Vito Romito (GTC), Erica Fruh (SAI Global); Assessors	Formed in 2008, the Alaska Seafood Cooperative (AKSC), formerly the Best Use Cooperative, is a group of "catcher processor" fishing companies interested in working to improve the management of Bering Sea flatfish and other non-pollock groundfish fisheries. Working with federal scientists, the AKSC has almost entirely eliminated its impact on the seafloor and bottom-dwelling marine species. The Alaska Seafood Cooperative fleet is leading the way under a new federal "catch share" program that allocates fixed amounts of Pacific cod, yellowfin sole, rock sole, Pacific ocean perch and Atka mackerel to the Cooperative. In return the fleet agreed to increase the amount of fish retained, to reduce bycatch and to promote sustainable fishing practices. The Groundfish Forum is a trade association that currently represents 5 trawl companies that fish for flatfish such as rock sole, yellowfin sole, flathead sole, as well as Atka mackerel and Pacific cod in the Bering Sea and Gulf of Alaska. These companies own the majority of the H&G ("Head & Gut") vessels in the North Pacific. The Groundfish Forum was formed in 1996 to craft meaningful solutions to

			problems such as discards, incidental catches, and impact on habitat. Groundfish Forum's mission is to inform state and local government officials of the contributions made by the H&G fleet to the economies of Alaska and the Pacific Northwest. Groundfish Forum has also recognized the importance of resource conservation and continues to keep an open approach to working with regulators, government officials, and the public in order to keep our industry economically viable in the years to come. Points discussed: Usage of the halibut excluder device in the BSAI/GOA flatfish fisheries; various gear modifications used. Greenland turbot history and current stock status. Conflict negotiations within the cooperatives. Greenland turbot tagging studies. Preliminary GOA trawl bycatch management proposals, Groundfish Forum. Amendment 80 fleet quota flexibility regulations, updates. Catches for the flatfish species under assessment during 2013, open and closed fisheries, bycatch and discards levels. Current stock levels for all species. Essential fish habitats for flatfish. EFH and HAPC area closures, other area closures throughout Alaska. Interaction with ETP species. Significant species bycatch. PSC in the flatfish fleets, limiting species and performance. Russian flatfish fisheries west of the federation line. Parallel fisheries for flatfish in the BSAI and GOA. Data to quantify the current utilization vs discarding levels of flatfish compared to the utilization requirements for the Amendment 80 fleet. Flatfish CDQ separate entities. Training courses for fishermen and skippers participating in the flatfish fisheries. MSC conditions, updates.
10th September 2013, all day.	Alaska Fisheries Science Center, Seattle, USA.	**Joint Groundfish Plan Teams for the BSAI and GOA.** **<u>GOA Plan Team</u>** Michael Dalton (AFSC) Obren Davis (NMFS) Craig Faunce (AFSC) Nancy Friday (AFSC) Kristen Green (ADFG) Jon Heifetz (AFSC/AB)	When reviewing potential rule changes, the Council draws upon the services of knowledgeable people from state and federal agencies, universities, and the public, who serve on panels and committees. Advisory bodies provide comments, both written and oral, on relevant issues being considered by the Council. Both the BSAI and the GOA have plan teams comprised of scientists and managers to give advice and recommendations to the NPFMC on stock assessments, surveys, observer program data collection and management decisions. Points discussed: Observer Deployment Plan; did 2013 work, and changes for 2014. Prohibited species closures for 2013. EFH

		Jim Ianelli, Co-Chair (AFSC) Sandra Lowe (AFSC) Chris Lunsford (AFSC Juneau) Janet Rumble (ADFG) Leslie Slater (USFW) Paul Spencer (AFSC) Ian Stewart (IPHC) Mark Stichert (ADFG) Diana Stram, Co-Chair (NPFMC) **<u>BSAI Plan Team</u>** Kerim Aydin (AFSC) David Barnard (ADFG) Elizabeth Chilton (AFSC) Bill Clark (IPHC) Jane DiCosimo (NPFMC) Lowell Fritz (AFSC) Mary Furuness (NMFS) Dana Hanselman (NMFS) Alan Haynie (AFSC) Brenda Norcross (UAF) Chris Siddon (ADFG) Mike Sigler, Co-Chair (AFSC B) Leslie Slater (USFW) Grant Thompson, Co-Chair (ODFW) Vito Romito (GTC), Erica Fruh (SAI Global); Assessors	description refinements and the Fishing Effects Model for 2015 EFH update.
11th September 2013, all	Alaska Fisheries Science	**Joint Groundfish Plan**	Points discussed: Retrospective analysis. Total current year removals.

day.	Center, Seattle, USA.	**Teams for the BSAI and GOA.** Vito Romito (GTC), Erica Fruh (SAI Global); Assessors	Value of surveys. Ecosystem chapter update for 2014. NMML report. Research priorities; including building integrated ecosystem management capabilities, facilitating Council efforts to reduce impacts on chinook salmon, increasing knowledge of SSL fishery interactions and population dynamics. Develop spatially explicit stock assessment models, refine methods to incorporate uncertainty into harvest strategies for groundfish, Conduct prospective and retrospective analyses of changes in the spatial and temporal distribution of fishing effort in response to management change and other research priorities for the 2013-2017 time period.
12th September 2013, all day.	Alaska Fisheries Science Center, Seattle, USA.	**Joint Groundfish Plan Teams for the BSAI and GOA.** Vito Romito (GTC), Erica Fruh (SAI Global); Assessors	Points discussed: EBS bottom trawl survey 2013. BSAI reallocations over the TAC. GOA bottom trawl survey 2013. GOA flatfish model discussion for flathead sole, Dover sole and northern and southern rock sole.
13th September 2013, all day.	Alaska Fisheries Science Center, Seattle, USA.	**Joint Groundfish Plan Teams for the BSAI and GOA.** Vito Romito (GTC), Erica Fruh (SAI Global); Assessors	Points discussed: BSAI arrowtooth flounder maturity discussion. BSAI northern rock sole assessment. Kamchatka flounder assessment moving to Tier 3. Adoption of proposed OFLs and ABCs for 2014/2015.
13th September 2013, 3.00 pm.	Pacific Seafood Processor Association, Seattle, USA.	Glenn Reed, President Vito Romito (GTC), Erica Fruh (SAI Global); Assessors	PSPA is a non-profit trade organization established in 1914 to address issues of concern to member seafood companies including both at sea processors and shore based processors. Current Corporate members include: Alaska General Seafoods, Alyeska Seafoods, Inc., Golden Alaska Seafoods, LLC, North Pacific Seafoods, Inc., Peter Pan Seafoods, Inc., Phoenix Processor Limited Partnership, Trident Seafoods, Inc. and UniSea Inc., Westward Seafoods, Inc. PSPA members produce and market products from salmon, crab, halibut, cod, pollock and a variety of other seafood species. These products are marketed domestically and around the globe. Points discussed: the assessment approach, the definition of non conformances and the merits of eco-labelling in the supply chain.

			Processing and handling of flatfish products. Trawl and longline fisheries for Greenland turbot. Environmental issues in Alaska, specifically mineral exploration updates.

6. Assessment Outcome Summary

This section provides a summary of the outcome of evidence that has been evaluated by the Assessment Team for the conformance of US Alaska Flatfish Complex Commercial fisheries to the FAO-Based RFM Conformance Criteria. The summary information is presented for each of the fundamental clauses (1 to 13) that form the FAO-Based RFM Conformance Criteria. These are divided into the 6 key components of responsible fisheries management (A-F).

- **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**

Section 7 documents the more detailed outcomes of the evidence that has been reviewed, evaluated and presented for each of the individual supporting clauses of the FAO-Based Conformance Criteria. Please note that the evidence provided for some clauses may be repetitious due to the overlapping nature of the FAO-Based Conformance Criteria clauses and relative requirements.

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.

The primary layer of governance for the Alaska Flatfish fisheries is dictated by the Magnuson Stevens Act (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 OFL/ABC/TAC/ACL.

The federal Fishery Management Plans (FMPs), more specifically, 1) the GOA Groundfish FMP, and 2) the BSAI Groundfish FMP govern the management of the Flatfish federal fisheries. In federal waters (3-200 nm), the Alaska Flatfish fisheries are managed by the NPFMC and the NMFS Alaska Region. The Council submits their recommendations/plans to the NMFS for review, approval, and implementation. The 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. The US Coast Guard (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. Current management measures consider the whole stocks biological units (i.e. structure and composition contributing to its resilience over their entire area of distribution, the area through which the species migrate during their life cycle and other biological characteristics of the stock).

All of the species within the Alaska flatfish complex are managed as separate stocks between the BSAI and the GOA, even if they occur in both areas. The Aleutian Island chain serves as a barrier between the two water bodies, and there is thought to be little mixing of flatfish stocks. None of the species considered here are known to complete large migrations, other than short range spawning or age related movements. These smaller migrations are thought not to be on a basin-wide scale.

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.**

The NMFS and the NPFMC 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 various proposed scenarios, before the path of action is decided. This occurs whenever resources under their management may be affected by other developments and each time they create, renew or amend regulations. The NEPA processes provide public information and opportunity for public involvement that are robust and inclusive at both the state and federal levels. Fisheries are relevant to the NEPA process in two ways. First, each significant NPFMC fisheries package must go through the NEPA review process. Second, any project that could impact fisheries (i.e., oil and gas, mining, coastal construction projects, etc.,) that is either on federal lands, in federal waters, receives federal funds or requires a federal permit, must go through the NEPA process. In this manner, both fisheries and non-fisheries projects that have a potential to impact fisheries have a built in process by which concerns of the NPFMC, NMFS, state agiencies, industry, other stakeholders or the public can be accounted for.

The NEPA process consists of an evaluation of the environmental effects of a federal undertaking including its alternatives. There are three levels of analysis: categorical exclusion determination; preparation of an environmental assessment/finding of no significant impact (EA/FONSI); and preparation of an environmental impact statement (EIS).

The state is a cooperating agency in the NEPA process for federal actions, giving the State of Alaska a 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.

Overall, the NEPA process, existing agencies and processes (e.g. ADFG, the Alaska Department of Environmental Conservation, the Department of Natural Resources (DNR), US Fish and Wildlife Service, the Alaska National Interest Lands Conservation Act, the DNR's Office of Project Management and Permitting and Bureau of Ocean Energy Management), 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.

The NPFMC system was designed so that fisheries management decisions were made at the regional level to allow input from affected stakeholders assuring that the rights of coastal communities and their historic access to the fishery is included in the decision process. Council meetings are open, and public testimony - both written and oral - is taken on each and every issue prior to deliberations and final decisions. Public comments are also taken at all Advisory Panel and Scientific and Statistical Committee meetings. Each Council decision is made by recorded vote in public forum after public comment. Final decisions then go to NMFS for a second review, public comment, and final approval. Decisions must conform to the MSA, the NEPA, Endangered Species Act, Marine Mammal Protection Act, and other applicable law including several executive orders. The Council meets five times each year, usually in February, April, June, October and December, with three of the meetings held in Anchorage, one in a fishing community in Alaska and one either in Portland or Seattle. Most Council meetings take seven days, with the AP and SSC usually following the same agenda and meeting two days earlier

The Alaska BOF and the NPFMC have signed a joint protocol agreement to help coordinate compatible and sustainable management of fisheries within each organization’s jurisdiction. A committee was formed, the Joint Protocol Committee, which includes three members from each group. The entire board and council meet jointly once a year to consider proposals, committee recommendations, the analyses, and other topics of mutual concern. The joint meeting is typically held in Anchorage in February, depending upon council and board meeting schedules.

The Community Development Quota (CDQ) Program began in December of 1992 with the goal of promoting fisheries related economic development in western Alaska. The CDQ Program allocates a percentage of all BSAI quotas for groundfish, prohibited species, halibut and crab to eligible communities. The Program allocates 10.7% of the flatfish complex (yellowfin sole, northern rock sole, arrowtooth flounder, Greenland turbot, and flathead sole) BSAI TAC to eligible communities. The purpose of the program is to (i) provide eligible western Alaska villages with the opportunity to participate and invest in fisheries in the BSAI Management Area; (ii) to support economic development in western Alaska; (iii) to alleviate poverty and provide economic and social benefits for residents of western Alaska; and (iv) to achieve sustainable and diversified local economies in western Alaska. There are 65 communities within a fifty-mile radius of the BS coastline who participate in the program. It was latest granted perpetuity status during the 1996 reauthorization of the MSA.

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

Under the MSA, the NPFMC is authorized to prepare and submit to the Secretary of Commerce for approval, disapproval or partial approval, a Fishery Management Plan (FMP) and any necessary amendments, for each fishery under its authority that requires conservation and management. The GOA and BSAI Groundfish FMPs, under which Flatfish in the federal waters of Alaska is managed, define nine management and policy objectives that are reviewed annually. These are 1) Prevent Overfishing, 2) Promote Sustainable Fisheries and Communities, 3) Preserve Food Webs, 4) Manage Incidental Catch and Reduce Bycatch and Waste, 5) Avoid Impacts to Seabirds and Marine Mammals, 6) Reduce and Avoid Impacts to Habitat, 7) Promote Equitable and Efficient Use of Fishery Resources, 8) Increase Alaska Native Consultation, 9) 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 Groundfish 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 requirements, retention and utilisation requirements, recordkeeping and reporting requirements, and observer requirements.

B. Science and Stock Assessment Activities

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

The annual age-based assessment used to determine stock status and harvest recommendations for BSAI and GOA Flatfish uses data collected from commercial landings and transhipment reports, port and at-sea observers; as well as sex, length and age data from fishery independent surveys in the EBS, the AI and the GOA. The Resource Assessment and Conservation Division (RACE) of the Alaskan Fisheries Science Center (AFSC) are 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, in many cases covering 100% of the fleet activity (e.g. in the EBS, but significantly less in the GOA) is also 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. For all operations under Federal jurisdiction, all US vessels catching Flatfish within the US EEZ, land based and stationary floating processor and factory (motherships) receiving catches of Flatfish are legally obliged to maintain accurate records of all transactions. Landing data are routinely cross checked for overall accuracy, and verified during US Coast Guard boardings.

The Fisheries Monitoring and Analysis Division (FMA) of the NMFS monitor 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.

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.

Data gathered under the auspices of the North Pacific Groundfish Observer Programme (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. As well as providing demographic data for scientific purposes, the observer programme is also used extensively in- 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 licence.

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 are required to carry observers, at their own expense, for at least a portion of their fishing time. These changes will increase the statistical reliability of data collected by the program, address cost inequality among fishery participants, and expand observer coverage to previously unobserved fisheries.

The NOAA biennial GOA groundfish survey data is used for the assessment for Flatfish 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 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 minutes 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 and the AI survey area. For each survey year, on average 825 stations are surveyed by three boats in the GOA, and 420 stations are surveyed by two boats in the AI.

In terms of socio-economic data collection, the Regulatory Flexibility Act (RFA) requires agencies (NPFMC) 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. Economic analyses are also required to varying degrees under the MSA, the NEPA, the Endangered Species Act, and other applicable laws.

NOAA's Resource Ecology and Fisheries Management (REFM) Division produces an annual Economic Status Report of the Groundfish fisheries in Alaska. The figures and tables in the report provide estimates of total groundfish catch, groundfish discards and discard rates, prohibited species catch (PSC) and PSC rates, the ex-vessel value of the groundfish catch, the ex-vessel value of the catch in other Alaska fisheries, the gross product value of the resulting groundfish seafood products, the number and sizes of vessels that participated in the groundfish fisheries off Alaska, vessel activity, and employment on at-sea processors. The report contains analysis and comment of the performance of a range of indices for different sectors of the North Pacific fisheries relate changes in value, price, and quantity, across species, product and gear types, to aggregate changes in the market.

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

The Resource Assessment and Conservation Engineering (RACE) Division comprises scientists from a wide range of disciplines whose function is to conduct quantitative fishery surveys and related ecological and oceanographic research to describe the distribution and abundance of commercially important fish and crab stocks in the region, and to investigate ways to reduce bycatch, bycatch mortality and the effects of fishing on habitat. Information derived from both regular surveys and associated research are analyzed by AFSC stock assessment scientists and supplied to fishery management agencies and to the commercial fishing industry. The Resource Ecology and Fisheries Management (REFM) Division conducts research and data collection to support an ecosystem approach to management of fish and crab resources. More than twenty-five groundfish and crab stock assessments are developed annually and used to set catch quotas. In addition, economic and ecosystem assessments are provided to the Council on an annual basis. The Fisheries Monitoring and Analysis Division (FMA) monitors groundfish fishing activities and conducts research associated with sampling commercial fishery catches and estimation of catch and bycatch mortality, and analysis of fishery-dependent data.

The 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 EBS survey is conducted annually, while the GOA and the AI surveys are conducted biannually, alternating with each other.
Stock Assessment and Fishery Evaluation (SAFE) Reports are produced annually for flatfish in the BSAI and GOA Regions. These reports contain all the details of the assessments including data collected and used, and stock assessment models trialed.

The adequacy and appropriateness of the stock assessments are ensured by extensive peer review. For BSAI and GOA groundfish assessments, the review process begins with an internal review of assessments by the AFSC. Following that review, assessments are reviewed annually by the groundfish plan teams who provide comments to the assessment authors on revisions to the assessment as well as to make recommendations to the SSC regarding OFL and ABC levels for each stock. The majority of the plan team members have expertise in stock assessment and fisheries biology with some additional members bringing in expertise in fishery management, in-season catch accounting, seabirds, marine mammals, and economics. The assessments as well as the plan team recommendations are then subsequently reviewed by the SSC who make the final OFL and ABC recommendations to the Council. The SSC may modify the recommendations from the Plan Team based upon additional considerations. The Council sets TAC at or below the ABC recommendations of the SSC.

The AFSC periodically requests a more comprehensive review of groundfish stock assessments by the Center of Independent Experts (CIE). These reviews are intended to lay a broader groundwork for improving the stock assessments outside the annual assessment cycle. The most recent CIE reviews of flatfish species SAFEs have been those for BSAI yellowfin sole- 2012; GOA southern rock sole – 2012; GOA northern rock sole – 2012; and GOA rex sole- 2012.

C. The Precautionary Approach

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

The BSAI and GOA groundfish fishery management plans management plans define a series of target and limit reference points for Flatfish and other groundfish covered by these plans. 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, Acceptable Biological Catch (ABC) and the fishing mortality rate (F_{ABC}) used to set ABC, the determination of each being dependent on the knowledge base for each stock. The overall objectives of the management plans are to prevent overfishing and to optimize the yield form the fishery through the promotion of conservative harvest levels while considering differing levels of uncertainty. 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.

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 Bmsy or the biomass $B_{X\%}$ corresponding to the percentage of the equilibrium spawning biomass that would be obtained in the absence of fishing.

BSAI Alaska plaice spawning stock biomass in 2013 was considered stable and well above target reference points. BSAI arrowtooth flounder spawning stock biomass in 2013 was considered stable and well above target reference points. In 2013, BSAI flathead sole B40% was estimated at 128,286 t. The year 2013 spawning stock biomass was estimated at 243,334 t; thus the stock appeared stable and well above its biomass target reference point. BSAI Northern Rock sole spawning stock biomass in 2013 was considered on the rise and well above target reference points. In 2013 the BSAI Alaska plaice spawning stock biomass was considered to be at about target reference point level. Projected

2014 Kamchatka flounder female spawning biomass is estimated at 50,400 t, above the B40% level of 46,100 t, and is projected to remain above B40% if fishing continues at that level.

The 2012 status of the Greenland Turbot stock is B21%, much lower than last year's projected status for 2012 of B89% and the 2008 estimate of B52%. The change in status was mostly due to fixing the input error and improvements in the shapes of the selectivity curves chosen in 2012. The 2013 recommended ABC is only 26% of the projected 2013 ABC from last year's model. However, the projected 2013 estimated total biomass in this year's model is higher than projected from the 2011 Reference model. This is due to strong 2008 and an especially large 2009 year classes observed in both the survey and fisheries size composition data. These two year classes are expected to be larger than any other recruitment event since the 1970's and will begin to have an increasing influence on spawning stock biomass starting in 2014.

BSAI Units	Tier	Year	B_{MSY} (t)	$B_{35\%}$ (t)	$B_{40\%}$ (t)	$B_{100\%}$ (t)	F_{OFL}	F_{ABC}	OFL (t)
Alaska plaice	3	2013		133,000	152,000	380,000	0.19	0.158	55,800
arrowtooth flounder	3	2013		215,667	246,476	616,191	0.21	0.17	131,985
flathead sole	3	2013		112,250	128,286	320,714	0.348	0.285	81,535
Greenland turbot	3b	2013		41,726	47,686	119,217	0.14	0.12	2,539
Kamchatka flounder	5	2013					0.13	0.098	16,300
northern rock sole	1	2013	260,000			694,500	0.164	0.146	241,000
yellowfin sole	1	2013	353, 000			966,900	0.112	0.105	220,000

Spawning biomass for arrowtooth flounder in the Gulf of Alaska is estimated for 2013 as 1,274,290 tonnes. This is much higher than the B40% reference point calculated at 482,231 t and B35% calculated at 421,953 t. The 2012 B40 spawning biomass for flathead sole in the GOA is estimated at 41,547 t while the projected spawning biomass is at 106,377 t, therefore stable and well above target reference point. The spawning biomass of both Northern and Southern rock sole in the Gulf of Alaska is considered to be above their target reference points of B40. SB_{40} for Northern rock sole in 2013 is estimated at 20,100 t while the spawning biomass is estimated at 42,700 t. SB_{40} for Southern rock sole in 2013 is estimated at 45,100 t while the spawning biomass is estimated at 82,800 t. GOA Rex sole estimated spawning stock biomass for 2013 (52,807 t) is greater than B35% (19,434 t). For this reason the stock is not considered overfished. Because the 2012 catch was less than the 2012 ABC (i.e. 2,425 t < 9,612 t), overfishing is not occurring.

GOA Units	Tier	Year	B_{MSY} (t)	$B_{35\%}$ (t)	$B_{40\%}$ (t)	$B_{100\%}$ (t)	F_{OFL}	F_{ABC}	OFL (t)
arrowtooth flounder	3	2013		421,953	482,231	1,205,580	0.207	0.174	247,196
flathead	3	2013		36,354	41,547	103,868	0.593	0.45	61,036

sole									
northern rock sole	3a	2013		16,600	19,000	47,500	0.180	0.152	11,400
rex sole	5	2013					0.17	0.128	12,492
southern rock sole	3a	2013		43,000	49,200	123,000	0.230	0.193	21,900

Limit reference points ($B_{17.5\%}$) are established. The management approach also stipulates that if the stock shows a decline in biomass beyond limit reference point e.g. $B_{17.5\%}$ then the fishery maybe subjected to closure and formal rebuilding. None of the flatfish complex stocks are close to, at or below the limit reference point.

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.

The precautionary approach is applied widely to conservation, management and exploitation of living aquatic resources in order to protect them and preserve the aquatic environment. The MSA, as amended, sets out ten national standards for fishery conservation and management. The BSAI and GOA Groundfish FMPs are consistent with MSA requirements in applying the Precautionary Approach to fisheries. The FAO Guidelines for the Precautionary Approach (PA) (FAO 1995) advocate a comprehensive management process that includes data collection, monitoring, research, enforcement, and review, prior identification of desirable (target) and undesirable (limit) outcomes, and measures in place to avoid and correct undesirable outcomes, the action to be taken when specified deviations from operational targets are observed and an effective management plan. Lastly, the FAO guidelines advocate that the absence of adequate scientific information should not be used as a reason for postponing or failing to take measures to conserve target species, associated or dependent species as well as non-target species and their environment. The overall management for the Flatfish in Alaska comprises all the elements as specified above in the FAO guidelines for the PA.

Absence of adequate scientific information is not used as a reason for postponing or failing to take conservation and management measures. The BSAI and GOA Flatfish stocks are managed under a tier system rule based on stock knowledge. Status determination criteria for groundfish stocks are annually calculated using a six-tier system that accommodates varying levels of uncertainty of information. The six-tier system incorporates new scientific information and provides a mechanism to continually improve the status determination criteria as new information becomes available. The higher the tier (i.e. 4, 5 or 6), the more conservative the determination of OFL/ABC and ACL are. This is because more conservative determinations are at the higher tier levels where less stock information is available. This system is intrinsically precautionary in nature and the results involve catches always lower than the overfishing level (equivalent to MSY). Stock assessment results indicate that the BSAI and GOA Flatfish stocks biomasses are generally well above B40 and that the stocks are neither overfished nor undergoing overfishing. Greenland Turbot in the BSAI is the exception, currently being between target and limit reference point, but projected to increase in the upcoming years, starting in 2014.

Another limit reference point used in managing groundfish in the BSAI and GOA is the optimum yield (OY). The sum of the TACs of all groundfish species (except Pacific halibut) is required to fall within a given range. The upper range for BSAI is 2.0 million Mt while for the GOA is 800 thousand Mt, acting as an ecosystem cap. In practice, only the upper OY limit in the BSAI has been a factor in altering and limiting harvests.

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.

The Alaska Flatfish commercial fishery is managed according to a modern management plan that attempts to balance long-term sustainability of the resources with optimum utilization. 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 ability and precision in catch control. Part of the assessment procedure is an extensive ecosystem assessment that shows development towards ecosystem-based management.

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 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.

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

The NMFS Alaska Region RAM division requires that all vessels fishing or processing groundfish possess a federal fishing permit, a federal vessel license or/and a federal processing permit. The

permit describes all pertinent information about the vessel and its' vessel fishing category, gear type and target fisheries. As a condition of these permits vessels must also comply with all regulations described in the GOA and BSAI FMPs. This includes reporting and landings requirements (*e*landings and logbooks), carrying onboard observers or having shoreside observers at shore plants.
The BSAI and GOA FMPs authorize only non-pelagic trawls and longlines (for Greenland Turbot) for flatfish fishing, hence no dynamiting, poisoning and other comparable destructive fishing practices are allowed. Trawl sweeps modifications that 1) decrease significantly habitat interaction of trawl gear and 2) reduce the bycatch of crabs, and mortality rates of crabs that slip under the gear without being caught, have been implemented in the BSAI in 2011 and the Council has allowed in December 2012 for trials to be conducted in the GOA Region during 2013 and 2014. Longline gear is regulated as for seabird avoidance measures (e.g. use of streamer lines, sink baited hooks, circle hooks, line shooters, lining tubes, night settings etc.). No fish size limits are implemented for flatfish. Market forces assure that fishermen target adult fish as it fetches a higher price per pound.

The flatfish complex fisheries in Alaska are not overharvesting the resource and fleet capacity is carefully measured. Mechanisms are in place via the permitting process, observer program and catch reporting programs to quantify fishing capacity and ensure that excess capacity is avoided. Accordingly, the resources in the GOA and BSAI are generally above their target reference points, except for Greenland turbot. Overall, the flatfish complex in Alaska appears to be lightly exploited. Various management measures to decrease discards and increase retention have been implemented. These are considered efficient measures in that retention in the flatfish fleet of Alaska has increased significantly in recent years. The fleets are measured and controlled in terms of permitting and quota share limitations by federal agencies. Estimated discards are accounted for by observers and accrued towards the TACs for each species.

Regulations implementing the FMP include conservation measures that temporally and spatially limit fishing in certain geographical areas as well as effort around areas important to marine mammals. NMFS uses Stellar sea lion protection measures (SSLPM) to ensure the groundfish fisheries off Alaska are not likely to jeopardize the continued existence of the western population of Steller sea lions or adversely modify their critical habitat. The management measures disperse fishing over time and area to protect against potential competition for important Steller sea lion prey species near rookeries and important haulouts.

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

The flatfish stocks in Alaska part of this unit of certification are not depleted or threatened with depletion. Presently, the resources in the GOA and BSAI are considered to be generally above their target reference points, except for Greenland turbot. Overall, the flatfish complex in Alaska appears to be lightly exploited.

Council guidelines, federal FMP regulations and the MSA with its National Standards all define to management agencies what must be done if a stock becomes depressed. The US Congress established new statutory requirements under the MSA in 2006 to end and prevent overfishing by the use of annual catch limits (ACLs) and accountability measures. These new requirements were implemented in 2010 for all stocks subject to overfishing and in 2011 for all stocks not subject to overfishing. A new provision of the MSA requires that the respective scientific and statistical committees (SSC) of the eight fishery management councils determine scientific benchmarks, while the councils continue to recommend quotas subject to these scientific benchmarks. This separation of authorities represents a major step forward in trying to eliminate overfishing and to enhance recovery of overfished stocks nation-wide.

Assuming that catch is measured accurately, ACLs provide a transparent measure of the effectiveness of management practices to prevent overfishing. They cannot exceed the fishing level determined by the SSC, but catch thresholds can also be established that trigger accountability measures to prevent overfishing. Accountability measures might include: (1) seasonal, area, and gear allocations; (2) bycatch limits; (3) closed areas; (4) gear restrictions; (5) limited entry; (6) catch shares; (7) in-season fishery closures; and (8) observer and vessel monitoring requirements. Accountability measures allow close monitoring of overall catch levels, as well as seasonal and area apportionments. They might close designated areas, or fisheries, if bycatch limits for prohibited species are attained. They also allow monitoring of any endangered or threatened mammals or seabirds and provide a database for evaluating likely consequences of future management actions.

The Council has consistently adopted the annual OFL and acceptable biological catch (ABC) recommendations from its SSC and set the total allowable catch (TAC) for each of its commercial groundfish stocks at or below the respective ABC. The NPFMC first defined OFL in 1991 as a catch limit that never should be exceeded. The NPFMC adopted more conservative definitions of OFL in 1996 and again in 1999, to comply with revised national guidelines. In 1999, the NPFMC prescribed that OFL should never exceed the amount that would be taken if the stock were fished at FMSY (or a proxy for FMSY), after Congress redefined the terms “overfishing” and “overfished” to mean a rate or level of fishing mortality that jeopardizes the capacity of a fishery to produce MSY on a continuing basis. The OFL could be set lower than catch at FMSY at the discretion of the SSC. OFL can be then virtually defined as an upper limit reference point.

In 1996, the NPFMC capped the rate of fishing mortality used to calculate ABC by the rate used to calculate OFL. These rates were prescribed through a set of six tiers defining more and more conservative catch levels as the tiers increased. Harvest rates used to establish ABCs were reduced at low stock size levels, thereby allowing rebuilding of depleted stocks. If the biomass of any stock falls below BMSY, or a proxy for BMSY, the fishing mortality is reduced relative to the stock status.

Both target and non-target species are regularly assessed and bycatch limits and PSC caps are in place to control impacts. Also, Essential Fish Habitat (EFH), as defined in the MSA, are described and evaluated to assure that fishing impacts are not more than minimal or more than temporary. Some areas have been closed to protect dependent species - this includes SSL protection areas around rookeries and haulouts (10 & 20 nm closures).

During the last EFH review in 2010 it has been shown that fishing effects on the habitat of flatfish in the BSAI and GOA do not appear to have impaired either stocks’ ability to sustain themselves at or near the MSY level.

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

The North Pacific Fishing Vessel Owners association (NPFVO) provides a large and diverse training program that many of the professional 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. 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. Also, the University of Alaska Sea Grant Marine Advisory Program (MAP) provides education and training in several sectors, including fisheries management, in the forms of seminars and workshops. MAP also conducts sessions of their Alaska Young Fishermen's Summit. Each Summit is an intense course in all aspects of Alaska fisheries, from fisheries management & regulation (e.g. MSA), to seafood marketing. The 2013 summit was hosted in Anchorage, Alaska, from December 10th to the 12th. The conference aimed at providing crucial training and networking opportunities for fishermen entering the business or wishing to take a leadership role in their industry.

In addition to this, MAP provides training and technical assistance to fishermen and seafood processors in Western Alaska. 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.

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.

Effective mechanisms are established for fisheries monitoring, surveillance, control and enforcement measures including, an observer program (although it is designed for biological data collection rather than enforcement), inspection schemes such as US Coast Guard (USCG) boardings, dockside landing inspections and vessel monitoring systems, to ensure compliance with the conservation and management measures for the Alaska flatfish fisheries.

The U.S. Coast Guard (USCG) and NMFS Office of Law Enforcement (OLE) enforce federal fisheries laws and regulations, especially 50 CFR679. OLE Special Agents and Enforcement Officers conduct complex criminal and civil investigations, board vessels fishing at sea, inspect fish processing plants, review sales of wildlife products on the internet and conduct patrols on land, in the air and at sea. NOAA Agents and Officers can assess civil penalties directly to the violator in the form of Summary Settlements (SS) or can refer the case to NOAA's Office of General Counsel for Enforcement and Litigation (GCEL). GCEL can then assess a civil penalty in the form of a Notice of Permit Sanctions (NOPs) or Notice of Violation and Assessment (NOVAs), or they can refer the case to the U.S. Attorney's Office for criminal proceedings.

On January 8, 2002, an emergency interim rule (67 FR 956) was issued by NMFS to implement Steller sea lion protection measures. Vessels that catch flatfish also catch Pacific cod since it found in similar fishing grounds and they have quota for it. 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.

Boardings and Violations

Flatfish fisheries in the Bering Sea are primarily targeted by trawl vessels, although there are some longliners that also target various flatfish species. The active fleet size of vessels targeting these species is approximately 87 vessels each year, and the Coast Guard attempts to board 18 of these vessels annually. This fleet has a VMS requirement, which makes them relatively easy to track.

With regards to the question of checking gear, vessels using bottom contact trawl gear in the Bering Sea are required to have elevating devices installed on their trawl sweeps to raise them off the sea floor to reduce interactions with other species. To date, since the implementation of this requirement, there have been no violations detected by at-sea boardings of this requirement. This is the only gear measurement requirement that is in place.

From fiscal year 2008 through the end of fiscal year 2012, the Coast Guard boarded 90 vessels targeting flatfish in the Bering Sea with 7 violations detected on 7 vessels, providing a detected violation rate of 7.77%.

Flatfish fisheries in the Gulf of Alaska are targeted primarily by trawl vessels. The active fleet size of vessels targeting these species is approximately 85 vessels each year, and the Coast Guard attempts to board 17 of these vessels annually. This fleet has a VMS requirement, which makes them relatively easy to track.

Currently, there are no gear modification requirements for this fishery, although there are provisions being put in place to mimic the Bering Sea trawl sweep elevating devices. Given the success of that problem and some of the gains realized by the fishermen for using these devices, there are not expected significant violations associated with implementation of these regulations.

From fiscal year 2008 through the end of fiscal year 2012, the Coast Guard boarded 21 vessels targeting flatfish in the Gulf of Alaska with 5 violations noted on two vessels, providing a detected violation rate of 9.52%.

Fishing permits requirements. No foreign fleet is allowed to fish in the Alaska's EEZ. Every fishing vessel targeting flatfish in Alaska is required to have a federal permit. The permit programs are managed by the Restricted Access Management (RAM) federal division.

The flatfish fisheries of Alaska under assessment here are harvested exclusively within the Alaska EEZ only. Those fisheries are not part of any international agreement or part of a framework of sub-regional or regional fisheries management organizations or arrangements. Flatfish fisheries in international waters abutting the GOA or BSAI EEZ occur in north-western British Columbia and in Russian waters across the Bering Sea Convention Line. Those fisheries are regulated by their own Governments.

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

In Alaska waters, 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 "Policy for the Assessment of Civil Administrative Penalties and Permit Sanctions" issued by NOAA Office of the General Counsel – Enforcement and Litigation on March 16, 2011, provides guidance for the assessment of civil administrative penalties and permit sanctions under the statutes and regulations enforced by NOAA. The purpose of this Policy is to ensure that: (1) civil administrative penalties and permit sanctions are assessed in accordance with the laws that NOAA enforces in a fair and consistent manner; (2) penalties and permit sanctions are appropriate for the gravity of the violation; (3) penalties and permit sanctions are sufficient to deter both individual violators and the regulated community as a whole from committing violations; (4) economic incentives for noncompliance are eliminated; and (5) compliance is expeditiously achieved and maintained to protect natural resources. Under this Policy, NOAA expects to improve consistency at a national level, provide greater predictability for the regulated community and the public, improve transparency in enforcement, and more effectively protect natural resources. For significant violations, the NOAA attorney may recommend charges under NOAA's civil administrative process (*see* 15 C.F.R. Part 904), through issuance of a Notice of Violation and Assessment of a penalty (NOVA), Notice of Permit Sanction (NOPS), Notice of Intent to Deny Permit (NIDP), or some combination thereof. Alternatively, the NOAA attorney may recommend that there is a violation of a criminal provision that is sufficiently significant to warrant referral to a U.S. Attorney's office for criminal prosecution.

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.

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 Alaska's groundfish fisheries on the ecosystem and effects of the ecosystem on the groundfish fisheries.

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. 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 Gulf of Alaska 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 Gulf of Alaska. The study includes two field years (2011 and 2013) followed by one synthesis year.

For the Bering Sea, a large multiyear ecosystem project is moving 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 are combining 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.

The NMFS and the NPFMC, and other institutions interested in the North Pacific conduct assessments and research on environmental factors on flatfish and associated species and their habitats. Findings and conclusions are published in SAFE document, annual Ecosystem SAFE documents and other reports. SAFE documents for BSAI and GOA Flatfish summarize ecosystem considerations for the stocks.

Ecosystem Effects on Alaskan flatfish stocks

The prey and predators of BSAI and GOA flatfish are well understood. The composition of most flatfish prey varies by species, time and area. NOAA's AFSC REFM division has done extensive diet studies on multiple species occurring in Alaska's commercial fisheries.

Bycatch and ETP species

Gear modifications have been implemented in the BSAI and are being tested in the GOA to lift the sweep off the seafloor and hence limit detrimental effects on the seafloor. Trials in the BSAI have found a 90% decrease in bottom habitat interaction and reduction in unobserved mortality of crab from interacting with the trawl sweeps. Additionally there are several regulations in place towards seabird avoidance for vessels fishing with hook-and-line gear.

Pacific halibut, Pacific herring, Pacific salmon and steelhead, king crab, and Tanner crab are prohibited species and must be avoided while fishing for groundfish and must be returned to the sea with a minimum of injury, except when their retention is required or authorized by other applicable law. Groundfish species and species under this FMP for which TAC has been achieved shall be treated in the same manner as prohibited species. When a target fishery attains a PSC limit apportionment or seasonal allocation, the bycatch zone or management area to which the PSC limit applies will be closed to that target fishery for the remainder of the year or season.

Bycatch is managed operationally by assessing bycatch species (see SAFE-reports), having bycatch caps (PSC and MRA), using data collected and validated by the observer program to account for total catches. Measures applied to minimize catch, waste and discards of non-target species are described in the Management Measures for the BSAI and GOA Groundfish Fisheries given in the FMPs. Of notice in 2013, the BSAI Alaskan plaice fishery, which had significant discards, was closed in May of 2013 due to the initial TAC having been reached. Vessels fishing flatfish in the BSAI were prohibited from retaining Alaska plaice and forced to move their operations away from areas with high Alaska plaice catches. All retained and discarded catch of the managed (target) species count toward their TAC.

The AFSC also monitors the catch of non-target species in groundfish fisheries in the EBS, GOA and AI ecosystems. There are three categories of non-target species: 1) forage species (gunnels, stichaeids, sandfish, smelts, lanternfish, sand lance), 2) species associated with Habitat Areas of Particular Concern-HAPC species (seapens/whips, sponges, anemones, corals, tunicates), and 3) non-specified species (grenadiers, crabs, starfish, jellyfish, unidentified invertebrates, benthic invertebrates, echinoderms, other fish, birds, shrimp). Stock assessments have been developed for all groups in the other species (sculpins, unidentified sharks, salmon sharks, dog fish, sleeper sharks, skates, octopus, squid) category, so AFSC does not include trends for \other species" in the Ecosystem SAFE.

Total catch of non target species is estimated from observer species composition samples taken at sea during fishing operations, scaled up to reflect the total catch by both observed and unobserved hauls and vessels operating in all FMP areas. From 1997-2002, these estimates were made at the AFSC using data from the observer program and the NMFS Alaska Regional Office. Catch since 2003 has been estimated using the Alaska Region's new Catch Accounting system. These methods should be comparable. This sampling and estimation process does result in uncertainty in catches, which is greater when observer coverage is lower and for species encountered rarely in the catch. Until 2008, observer sample recording protocols prevented estimation of variance in catch; however, the AFSC is developing methods to estimate variance for 2008 on which are planned to be presented in future SAFE reports.

Status and trends: In all three ecosystems, non-specified catch comprised the majority of non target catch during 1997-2011. Non-specified catches are similar in the EBS and GOA, but are an order of magnitude lower in the AI. Catches of HAPC biota are highest in the EBS, intermediate in the AI and lowest in the GOA. The catch of forage fish is highest in the GOA, low in the EBS and very low in the AI.

In the EBS, the catch of non-specified species appears to have decreased overall since the late 1990s. Scyphozoan jellyfish, grenadiers and sea stars comprise the majority of the non-specified catches in the EBS. The 2008-2009 and 2010-2011 increase in non-specified catch was driven by jellyfish. Grenadiers (including the Giant grenadier) are caught in the flatfish, sablefish, and cod fisheries. Jellyfish are caught in the pollock fishery and sea stars are caught primarily in flatfish fisheries. HAPC biota catch has generally decreased since 2004. Benthic urochordata, caught mainly by the flatfish fishery, comprised the majority of HAPC biota catches in the EBS in all years except 2009-2011, when sponges and sea anemones increased in importance. The catch of forage species in the EBS increased in 2006 and 2007 and was comprised mainly of eulachon that was caught primarily in the pollock fishery; however, forage catch decreased in 2008-2010. The forage catch increased again in 2011, primarily due to capelin and eulachon.

In the AI, the catch of non-specified species shows little trend over time, although the highest catches were recorded in 2009-2010. The non-specified catch dropped in 2010-2011, primarily due to a reduction in the catch of giant grenadiers. Grenadiers comprise the majority of AI non specified species catch and are taken in flatfish and sablefish fisheries. HAPC catch has been similarly variable over time in the AI, and is driven primarily by sponges caught in the trawl fisheries for Atka mackerel, rockfish and cod. Forage fish catches in the AI are minimal, amounting to less than 1 ton per year, with the exception of 2000 when the catch estimate was 4 tons, driven by (perhaps anomalous) sandfish catch in the Atka mackerel fishery.

The catch of non-specified species in the GOA has been generally consistent aside from a peak in 1998 and lows in 2009 and 2010. Grenadiers comprise the majority of non-specified catch and they are caught primarily in the sablefish fishery. Sea anemones comprise the majority of the variable but generally low HAPC biota catch in the GOA and they are caught primarily in the flatfish fishery. The catch of forage species has undergone large variations, peaking in 2005 and 2008 and decreasing in 2006-2007 and 2009-2010. The catch of forage species increased in 2010-2011, primarily due to eulachon and other osmerids. The main species of forage fish caught are eulachon and they are primarily caught in the pollock fishery.

The state of the prohibited and forage species is considered in the setting MSY- and OY-levels. A programmatic supplemental environmental impact statement (PSEIS) was completed in June, 2004. The preferred alternative identified in the PSEIS retained the existing OY range. In addition to impacts on the stocks and stock complexes in the "target species" category the PSEIS analyzed impacts on prohibited species, forage fish, non-specified species, habitat, seabirds, and marine mammals. Ecosystem-level variables analyzed were pelagic forage availability, removal of top predators, introduction of non-native species, energy removal, energy redirection, species diversity, functional diversity (in terms of both trophic relationships and structural habitat), and genetic diversity. Effects were partitioned into direct and indirect effects, persistent past effects, reasonably foreseeable future external effects, and cumulative effects. For the preferred alternative, approximately half of the ecosystem-level effects were determined to be insignificant, conditionally significant/positive, or significant/positive; none were determined to be significant or negative.

Habitat interaction are not considered significant in the flatfish fisheries partly because of the development of trawl sweep modification, already implemented in the BSAI Region and to be implemented in the GOA in 2014. Bycatch is recorded in detail and endangered species interactions with Steller sea lions and short-tailed albatross are tightly monitored and regulated. The current ESA biological opinion specifies that the expected take of Short tailed albatross (bycatch) in the longline fishery is four in any 2-year period. In the event that a fifth bird is bycaught, an ESA Section 7 consultation involving the U.S. Fish and Wildlife Service and the National Marine Fisheries Service must be initiated. This process can lead to additional regulatory action on the fishery. Reports for 2012 show that the bycatch rate for seabirds in fisheries is 40% below the 5-year average, with no short-tailed albatross catches. Also, NMFS uses Stellar sea lion protection measures (SSLPM) to ensure the groundfish fisheries off Alaska are not likely to jeopardize the continued existence of the western population of Steller sea lions or adversely modify their critical habitat. The management measures disperse fishing over time and area to protect against potential competition for important Steller sea lion prey species near rookeries and important haulouts.

The BSAI and GOA flatfish stocks are not considered overfished. Furthermore serious impacts are regulated in the FMPs by identifying ecosystem components and non-target stocks that are vulnerable or important for food web functioning (prohibited and forage species).

7. FAO-Based RFM Conformance Criteria Assessment Outcome

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

Confidence Ratings	Low	0 out of 17	Medium	1 out of 17	High	8 out of 17

Clause:

1.1 There shall be an effective legal and administrative framework established at the local and national level appropriate, for fishery resource conservation and management.

FAO CCRF 7.7.1

FAO Eco 28

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause	Evidence
1.1	**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 flatfish complex fisheries is dictated by the MSA. The main agencies involved in flatfish complex species 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. The State of Alaska allows parallel fisheries in State waters. Parallel fisheries are essentially federal fisheries, with federal regulations, prosecuted in state waters. In the case of flatfish, parallel fisheries are sometimes allowed in the Gulf of Alaska. The federal FMPs, more specifically, 1) the GOA Groundfish FMP, and 2) the BSAI Groundfish FMP govern the management of Alaskan flatfish complex federal fisheries. In federal waters (3-200 nm), flatfish complex 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 one million square mile EEZ off Alaska, the NPFMC has primary responsibility for groundfish management in the GOA and BSAI, including flatfish, pollock, Pacific cod, Atka mackerel, sablefish, and (offshore) rockfish. The flatfish species are harvested mainly by trawlers and hook and line longliners. 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, the NMFS Alaska Regional Office and Alaska Fisheries Science Center conduct 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. Most flatfish fisheries in state waters are managed concurrent to the federal BSAI or GOA fishery, and are referred to as parallel fisheries. ADFG issues emergency orders for state waters that duplicate NMFS management actions, except that gear or other restrictions may vary. These emergency orders establish parallel fishing seasons (termed “parallel fisheries”) allowing vessels to fish for groundfish in state waters within the same seasons as the federal fisheries. The parallel fishery is managed by adopting most NMFS rules and management actions, including seasons, and catch in this fishery is counted towards federal quotas. Groundfish fisheries that are not actively managed by the State of Alaska will open utilizing fishing seasons, bycatch limits, area closures, and allowable gear types from federal fishery management measures in adjacent waters of the Exclusive Economic Zone (EEZ). The state of Alaska manages minimal flatfish fisheries in state waters (in the Eastern Gulf of Alaska, Prince William Sound and Cook Inlet), either as bycatch in other fisheries or by special permit. (personal communications with ADFG managers) http://www.adfg.alaska.gov/static/home/news/pdfs/newsreleases/cf/241416353.pdf In the BSAI, parallel fisheries occur for Greenland turbot, arrowtooth flounder, rock	

sole, yellowfin sole, flathead sole and an aggregated flatfish species complex. http://www.adfg.alaska.gov/FedAidPDFs/FMR11-28.pdf

There is a history of non-pelagic trawl closures around Kodiak Island and along the Alaska Peninsula. Generally, bays have been closed year-round since 1986. In 1999, seasonal openings along the west side of Kodiak Island were designed to allow non-pelagic trawl vessels access to flatfish resources during parallel fisheries.

The majority of the Alaska flatfish complex is harvested in the federal BSAI and GOA fisheries, and is therefore studied, managed, and enforced under the federal GFMPs. In 2013 federal fisheries quotas were as follows:

- **GOA Flathead sole TAC**: 30,396 mt
- **GOA Rex sole TAC:** 9,560 mt
- **GOA Arrowtooth flounder TAC**: 103,300 mt
- **GOA Northern rock sole**: 37,077 mt*
- **GOA Southern rock sole TAC**: 37,077 mt*
- **BSAI Yellowfin sole TAC**: 198,000 mt
- **BSAI Flathead sole TAC**: 22,699 mt
- **BSAI Alaska plaice TAC:** 20,000 mt
- **BSAI Northern rock sole TAC**: 92,380 mt
- **BSAI Kamchatka flounder**: 10,000 mt
- **BSAI Arrowtooth flounder**: 25,000 mt
- **BSAI Greenland turbot TAC**: 2,060 mt

*managed under the shallow-water flatfish TAC

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.adfg.alaska.gov/static/home/news/pdfs/newsreleases/cf/241416353.pdf
http://www.adfg.alaska.gov/FedAidPDFs/FMR11-28.pdf
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/lglcntr/akstats/aac/title05/chapter028.htm

Clause:

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

1.2.1 The area through which the species migrates during its life cycle shall be considered by the management system.

1.2.2	**The biological unity and other biological characteristics of the stock shall be considered within the management system.** ***FAO ECO 30.3***
1.2.3	**All fishery removals and mortality of the target stock(s) shall be considered by management.**
1.2.4	**Previously-agreed management measures established and applied in the same region shall be taken into account by management.** ***FAO CCRF 7.3.1***

Evidence adequacy rating:	
☑**High** ☐ **Medium** ☐ **Low**	
☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**	
Clause:	**Evidence:**
1.2	**Rating determination** *Management measures take into account the whole stock units over its entire area of stock distribution (but see Greenland Turbot issues).* **GOA and BSAI flatfish complex management** NMFS conducts stock assessment and biological studies in the EEZ off Alaska on FMP species. The AFSC in Seattle and the Kodiak Fisheries Research Center (KFRC) generate the scientific information and analysis necessary for the conservation, management, and utilization of the region's groundfish resources. With this information, the NPFMC and NMFS produce annual Stock Assessment & Fishery Evaluation (SAFE) reports for each fishery under federal jurisdiction, including the twelve units (9 species) being assessed. Both state and federal biologists meet at the NPFMC Plan Team meetings and share research information and harvest strategies to assure conservation management over the entire stock distribution. There are 11 SAFE reports for the Alaskan flatfish considered here (BSAI Alaska plaice, BSAI arrowtooth flounder, BSAI flathead sole, BSAI Greenland turbot, BSAI Kamchatka flounder, BSAI northern rock sole, BSAI yellowfin sole, GOA arrowtooth flounder, GOA flathead sole, GOA northern and southern rock sole and GOA rex sole). The GOA and BSAI flatfish stocks are both considered and managed as different stocks and separate from other Pacific stocks further south along the west coast of North America and West across Russia and Asia. In terms of both the fisheries and the groundfish resources, the BSAI and the GOA form distinct management areas. The history of fishery development, target species and species composition of the commercial catch, bathymetry, and oceanography are all much different in the GOA than in the adjacent BSAI management area or British Columbia to California regions. Although

many species occur over a broader range than the GOA management area, with only a few exceptions (e.g., sablefish), stocks of common species in this region are believed to be different from those in the adjacent BSAI.

Russian Fisheries and potential interaction with EBS flatfish stocks

Flatfish species can be found on both sides of the U.S.-Russia Federation line. Russian flatfish fisheries are managed by the setting of TACs. Catch totals from Russia waters, including the western Bering Sea, are well below the TAC limits. The flatfish fisheries on the Russian side of the Federation Line appear to be managed.

Alaskan species found in Russian management categories include:

Black Halibut-

американский стрелозубый палтус. Arrowtooth flounder (*Atheresthes stomias*)

азиатский стрелозубый палтус, Kamchatka flounder, (*Atheresthes evermanni*)

синекорый палтус; тихоокеанский белокорый палтус. чёрные палтусы

Greenland turbot, (*Reinhardtius hippoglossoides*)

Far Eastern Flounder-

желтопёрая камбала. Yellowfin sole (*Limanda aspera*)

желтобрюхая камбала, Alaska plaice or yellow-bellied flounder (*Pleuronectes quadrituberculatus*)

северная палтусовидная камбала. Flathead sole (*Hippoglossoides elassodon*)

Catches of these species and others not found in Alaskan waters make up the Flatfish, general category. Table 1.1 shows Russian flatfish catches for 2011 and 2012 for multiple areas. Note the catches from the western Bering Sea totaling only 7653 metric tons for the entire general flatfish category. The species included in the Far Eastern Flounder category are very abundant and currently underfished in the EBS, so no threat to these species is apparent. In the Halibut category we have catch data of 2460 tonnes in the WBS in 2012.

Table 1.1. Russian flatfish catch in 2012 and 2011

		Flatfish, general Камбалообразные в т.ч		**Halibut** палтусы		**Flounder** камбала		**Flounder, Far Eastern** камбалы дальневосточные	
Region	**Code**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**
N.W Pacific Ocean (Russian EEZ)	**057**	**86587**	**82707**	**13435**	**14831**	**309**	**24345**	**72844**	**43531**
East Kamchatka	**059**	**10321**	**10501**	**773**	**627**	**215**	**2607**	**9332**	**7267**
Karaginskaya	*060*	*3875*	*3872*	*638*	*443*	*68*	*1134*	*3169*	*2295*
Petropavletsk - Komandorskaya	*061*	*6445*	*6629*	*135*	*184*	*147*	*1473*	*6163*	*4972*
Western Bering Sea	**062**	**7653**	**10041**	**2460**	**3416**	**34**	**113**	**5159**	**6512**
Sea of Okhotsk	**063**							**47112**	**25015**
Northern Kurils	**068**							**4576**	**189**
Southern Kurils	**071**							**1238**	
Sea of Japan	**074**							**5428**	**4549**

Russian Federal Fisheries Agency; prepared 27 March 2013.

http://www.fishcom.ru/activities/Documents/f407-0%20январь-декабрь%202012.pdf

The Russian government sets the total allowable catch (TAC) levels for fish and seafood annually. The Ministry of Agriculture of the Russian Federation approved TAC levels for 2013 by Order #571 issued on October 31, 2012. In general, the TAC for most species has been relatively stable from year to year, although some species have seen significant fluctuations.

Table 1.2. TACs approved by the Russian Federation Ministry of Agriculture for 2013.

TAC Levels for Bering Sea (in Thousand MT)

	2011	2012	2013
Pollock	652	765	740
Pacific Herring	18	23	133
Cod	72	74	81
Far Eastern Flounder	20	21	20
Black Halibut	2	2	2
Pacific Halibut	4	3	4
Greenling	88	89	73
Rockfish	3	5	5
Far Eastern Cod	17	16	15
King Crab	<1	<1	<1
Blue Crab	1	1	1
Golden King Crab	1	1	1
Snow Crab Opilio	3	3	2
Tanner Crab	1	1	1
Squid	85	85	95

http://www.thefarmsite.com/reports/contents/russiajune13.pdf

Stocks that may straddle to some degree the U.S./ Russia Federation line are managed conservatively by Alaska's management agencies and appear to be under very light pressure in the Western Bering Sea. In fact all of the BSAI stocks part of this assessment are considered to be in good shape, with stock status generally above target reference points and increasing, although Greenland Turbot is an exception (biomass below target reference point but projected to increase to target within 4 years). Greenland turbot is exploited in the Western Bering Sea, with a TAC amount for 2013, 2012, 2011 of 1500 t each year (personal communication, Sergey Korostelev, Russian fishery scientist). To account for this, the AFSC Greenland turbot assessment model fits survey catchability (q) for the BSAI slope and shelf surveys. The result is a value lower than 1.0, accounting for biomass that extends into Russian waters. If q is fixed at the value obtained in the current reference model and the catch is added to the model then R0 increases. The reference points increase, a higher Fs is reached, and a lower estimate of current stock status.

Russian scientists contacted for the SAFE report claim a rather large historic fishery, but very little fishing in their zone on turbot in recent years. If historic catches are increased in the model and allow qs to be fit with the reference model priors, besides selecting a higher R0, these model runs also select a fit with lower qs than the current estimates (a balancing act between increasing R0 and reducing q to find the best fit for the increased historic catch). The preliminary runs completed with the higher historic catch, result in a higher abundance and stock productivity than currently estimated. These model runs result in both higher reference points and a higher estimate of current stock biomass than estimated in the reference model. In the end, models fit with increased historic catch and estimated qs resulted in turbot being at a higher status than the reference model (anywhere from B_{20} to B_{50} depending on historic catch levels). These model runs would suggest that higher catch could be allowed than what the current reference model allows.

It is the opinion of the SAFE author that the current reference model is the best available and is somewhat conservative given the constrained priors on q. In addition, the conservative control rule greatly reduces allowable F when the stock descends below B_{35} providing an additional safeguard for the stock. This is not an ideal way to manage the stock, but is the best option without having the historic Russian catch records. The saving grace for this stock is the very large 2008 and 2009 year classes observed in all of the recent survey and fishery size and age composition data. Under current reference model projections and recommended fishing levels this new recruitment is projected to rise above B_{35} by 2016 and above B_{40} by 2017. (Pers. Communication with Steve Barbeaux, AFSC)

In support of the other BSAI flatfish species under assessment, all the Alaskan stocks harvested in the Eastern Bering Sea are virtually always well below their TAC allowances, and the TAC to ABC to OFL limit margin offers a further degree of precautionary harvest for flatfish in this area. All in all, catches of flatfish in the Western Bering Sea are not deemed significant in impacting the overall health of these stocks throughout the Bering Sea shelf.

Gulf of Alaska flatfish fisheries and potential overlap with British Columbia stocks

In the Gulf of Alaska, the flatfish species here under assessment are caught in the Central and Western GOA. The Eastern Gulf of Alaska, bordering British Columbia (BC) at its southern tip, is completely closed to bottom trawling. Flatfish is therefore not caught in this area and potential issues of stock overlap and harvest between Southeastern Alaska and BC is likely not significant and buffered by this large, year round, area closure.

Evidence
www.adfg.alaska.gov/FedAidPDFs/FMR12-20.pdf
www.afsc.noaa.gov/refm/stocks/assessments.htm
Fishery Management Plan for the Groundfish of the BSAI 2013:
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf
Fishery Management Plan for the Groundfish of the GOA 2013:
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf

Evidence adequacy rating:

☑High **☐ Medium** **☐ Low**

<table>
<tr><td colspan="2">☑ Full Conformity ☐ Minor Non-conformity ☐ Major Non-conformity

☐ Critical Non-conformity</td></tr>
<tr><td>Clause:</td><td>Evidence:</td></tr>
<tr><td>1.2.1</td><td>Rating determination
The area through which the species migrates during its life cycle is considered by the management system.

All of the species within the Alaska flatfish complex are managed as separate stocks between the BSAI and the GOA, even if they occur in both areas. The Aleutian Island chain serves as a barrier between the two water bodies, and there is thought to be little mixing of flatfish stocks. None of the species considered here are known to complete large migrations, other than short range spawning or age related movements. These smaller migrations are thought not to be on a basin-wide scale. Few tagging studies have been done in Alaska on flatfish to determine the extent or patterns of possible inter-basin migrations.

BSAI Alaska Plaice

Alaska plaice are not considered to be a migratory species, but they tend to move into deeper waters with age after settling 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 softer substrates consisting of sand and mud. The distribution of Alaska plaice is mainly on the Eastern Bering Sea continental shelf, with only small amounts found in the Aleutian Islands region. In particular, the summer distribution of Alaska plaice is generally confined to depths < 110 m, with larger fish predominately in deep waters and smaller juveniles (<20 cm) in shallow coastal waters (Zhang et al., 1998).

Alaska plaice in the GOA are managed as a component of the shallow water flatfish grouping and make up a very small percentage (0.002% of total shallow water flatfish catch in 2010) of the overall flatfish catch in the GOA. The GOA and BSAI Alaska plaice stocks are considered to be different stocks and are managed as two different units. In the Russian western Bering Sea, Alaska plaice is managed as a portion of the “far east flounder” grouping. This group is managed with a TAC set at 20,000 t, and harvested at a rate of 5,159 t in 2012. Catches are low in the western Bering Sea and the stock there is managed separately and under exploited (see clause 1.2).</td></tr>
</table>

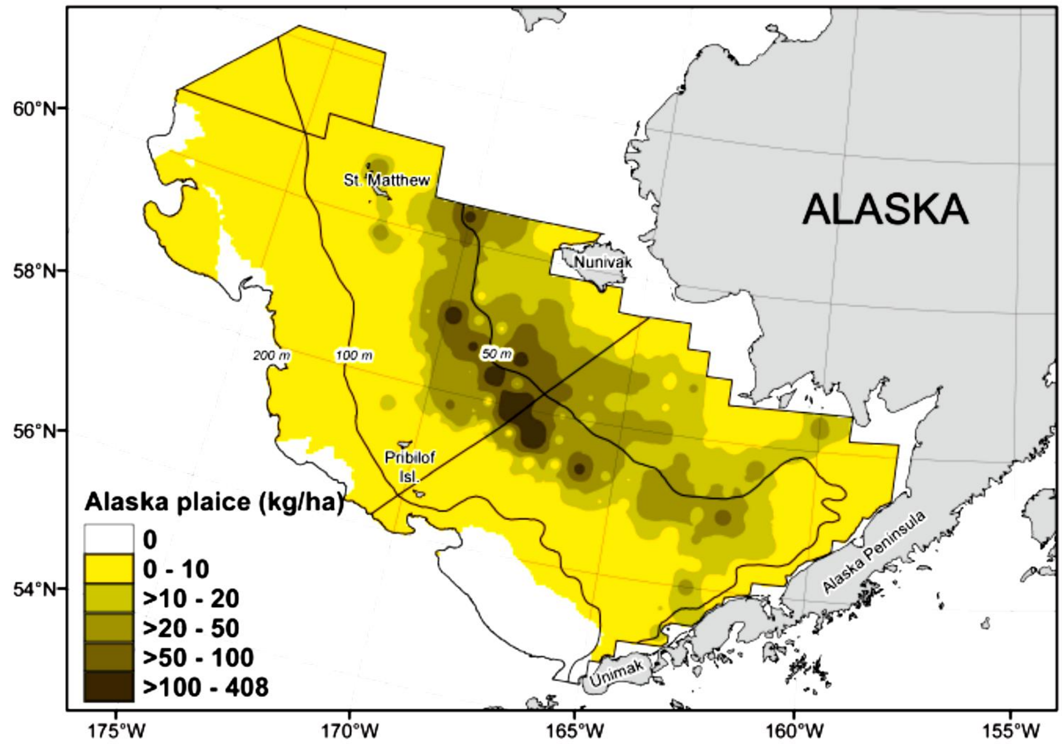


Figure 1.1. Distribution and relative abundance (kg/ha) of Alaska plaice for the 2012 eastern Bering Sea shelf bottom trawl survey.

Substantial amounts of Alaska plaice were encountered in the northern Bering Sea past St. Lawrence Island when the 2010 survey extension was conducted. An estimated 38% of the overall BSAI Alaska plaice biomass was found to occur in this northern area. The northern Bering Sea area is closed to fishing, so this biomass remains unfished and can contribute to the fished populations in more southerly areas.

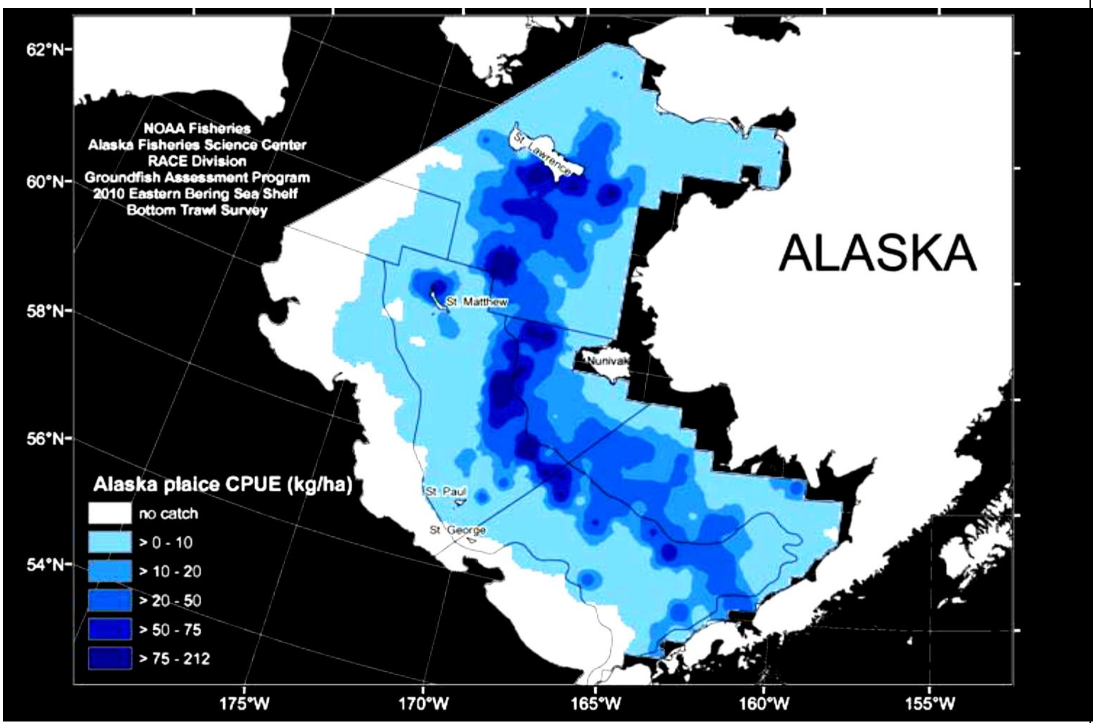


Figure 1.2. Eastern and northern Bering Sea survey CPUE (kg/ha) of Alaska plaice from

	2010 BSAI Alaska plaice SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIplaice.pdf GOA shallow water flatfish SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOAshallowflat.pdf Zhang, C. I., T.K. Wilderbuer, and G.E. Walters. 1998. Biological characteristics and fishery assessment of Alaska plaice, *Pleuronectes quadrituberculatus*, in the Eastern Bering Sea. Marine Fisheries Review 60(4), 16-27. http://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-256.pdf **BSAI arrowtooth Flounder** Arrowtooth flounder are found throughout the BSAI management area; however, their abundance in the Aleutian Islands region is lower than in the eastern Bering Sea. The arrowtooth flounder population of the GOA is treated as a separate stock and managed independently. The resource in the EBS and the Aleutians are managed as a single stock although the stock structure has not been studied. The absence of arrowtooth flounder from the northwest tip of the eastern Bering Sea shelf perhaps also indicates the decreasing abundance of arrowtooth flounder from east to west in the eastern Bering Sea. Arrowtooth flounder occur from central California to the Bering Sea, in waters from about 20 m to 800 m.  **Figure 1.3**. U.S. EEZ distribution of arrowtooth flounder. http://www.fishwatch.gov/seafood_profiles/species/flounder/species_pages/arrowtooth_flounder.htm CPUE from the EBS shelf trawl survey data is highest in the 100 m to 300 m depth range.

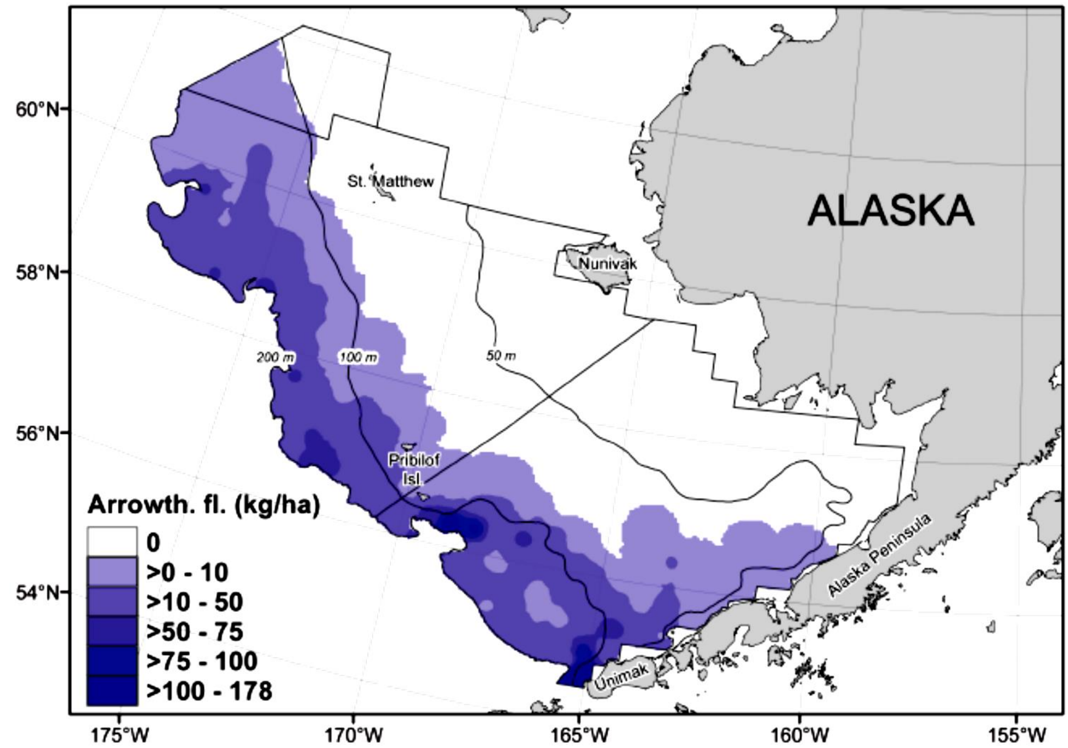


Figure 1.4. Distribution and relative abundance (kg/ha) of arrowtooth flounder for the 2012 eastern Bering Sea shelf bottom trawl survey.

Migration patterns are not well known for arrowtooth flounder, however, there is some indication that arrowtooth flounder move into deeper water as they grow. Adults migrate seasonally from shelf margins in the winter to the outer shelf in April/May with the onset of warmer waters temperatures.
http://fishbull.noaa.gov/942/zimmermann.pdf
BSAI arrowtooth flounder SAFE 2012:
http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIatf.pdf

http://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-256.pdf

BSAI flathead sole

Flathead sole are managed in the EBS and the Aleutians as a species group with Bering sole (*Hippoglossoides robustus*) and separate from the GOA flathead sole stock. Bering sole however, constitute a very small percentage of the overall catch (~3%, less than 300 t annually). Flathead sole occur primarily on mixed mud and sand bottoms in depths < 300 m. Adults exhibit a benthic lifestyle and occupy separate winter spawning and summertime feeding distributions on the EBS shelf and in the GOA. Adult flathead sole overwinter near the shelf margins before migrating to the mid and outer continental shelf in April or May each year for feeding. The spawning period may range from as early as January but is known to occur in March and April, primarily in deeper waters near the margins of the continental shelf. Juveniles less than age 2 have not been found with the adult population and probably remain in shallow nearshore nursery areas. The population appears to occur well within Alaska's jurisdiction, specifically on the Bering sea shelf close to the slope. This appears to justify the BSAI management region.

Bering flounder generally represents less than 3% of the estimated survey biomass of the two species. In 2010, RACE extended the groundfish survey into the northern Bering Sea and conducted standardized bottom trawls at 142 new stations. The data generated by this survey extension may have important implications for the future management of Bering flounder, in particular. Larger catches of Bering flounder in the northern extension show that a significant portion of the population is currently not under fishing pressure.

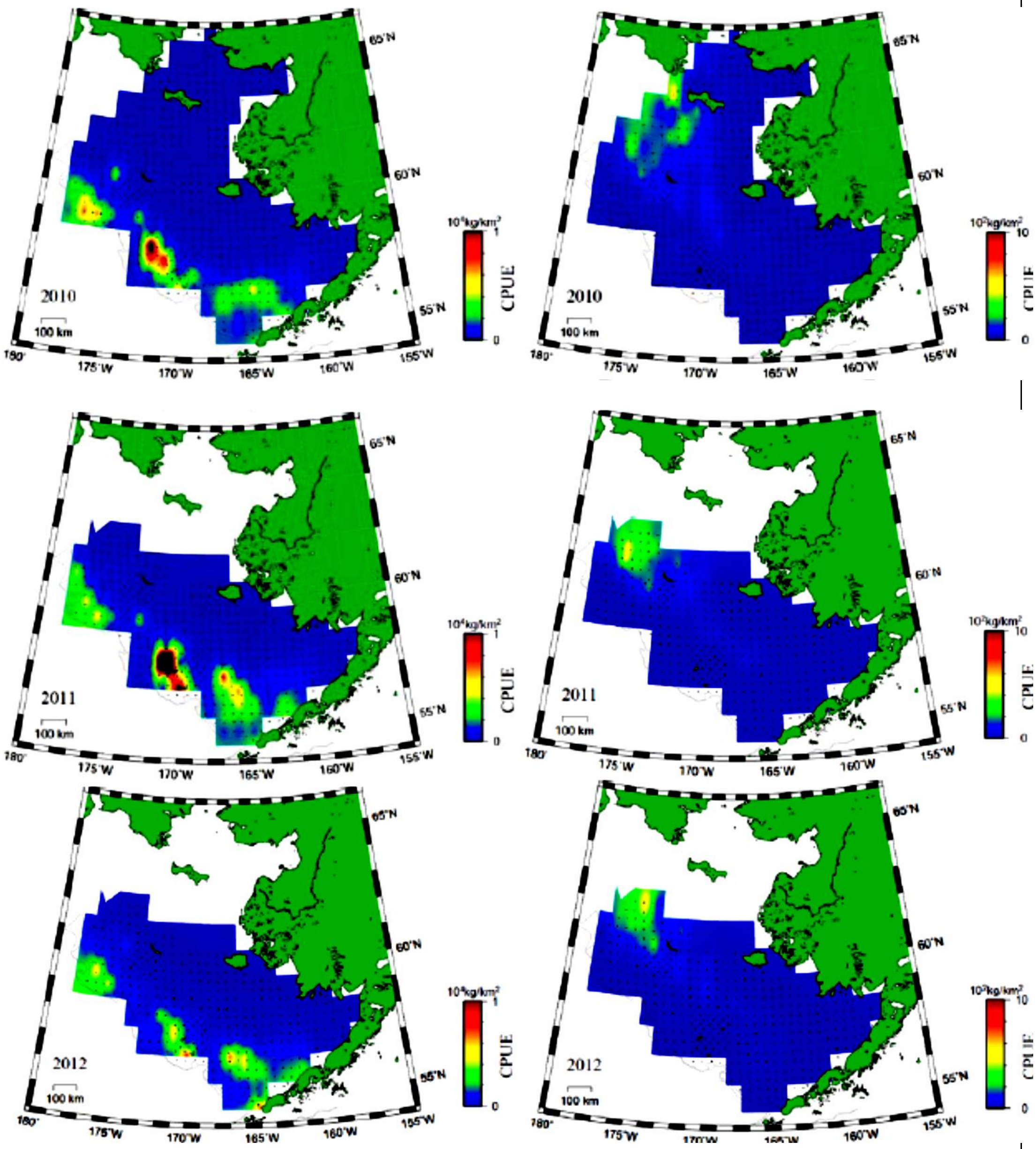


Figure 1.5. Spatial distributions of flathead sole (left column) and Bering flounder (right column) from the 2010-2012 EBS Groundfish Surveys. In 2010, the northern Bering Sea (which is closed to fishing) was surveyed in addition to the standard area.

In the Russian western Bering Sea, flathead sole is managed as a portion of the "far east flounder" grouping. This group is managed with a TAC set at 20,000 t, and harvested at a rate of 5,159 t in 2012. Catches are low in the western Bering Sea and the stock there is managed separately and under exploited (see clause 1.2).

BSAI flathead sole SAFE 2012:
http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIflathead.pdf

BSAI Greenland turbot

The Greenland turbot exhibits complex population dynamics due to its unique life history and distribution across two geopolitical boundaries (the US-Russian EEZ and the Northern extent of the AFSC surveys). Greenland turbot has a circumpolar distribution inhabiting the North Atlantic, Arctic and North Pacific Oceans.

This species primarily inhabits the deeper slope and shelf waters (between 100 m to 2000 m) in bottom temperatures ranging from -2°C to 5°C. The area of highest density of Greenland turbot in the Pacific Ocean is in the northern Bering Sea, straddling the border between US and Russian exclusive economic zones. Juveniles are believed to spend the first 3 or 4 years of their lives on the continental shelf and then move to the continental slope. Adult Greenland turbot distribution in the Bering Sea appears to be dependent on size and maturity as larger more mature fish migrate to deeper warmer waters. In the annual summer shelf trawl surveys conducted by the Alaska Fisheries Science Center (AFSC) the distribution by size shows a clear preference by the smaller fish for shallower (< 100m) and colder shelf waters (< 0°C). The larger specimens were in higher concentrations in deeper (> 100 m), warmer waters (> 0°C). Fairbairn (1981), using biochemical genetic techniques on muscle, heart, and liver tissues, found genetic divergence approaching the subspecies level between samples from the northwest Atlantic Ocean and the Bering Sea.

In the North Pacific, species abundance is centered in the eastern Bering Sea and, secondly, in the Aleutians. Isolated occurrences have also been recorded along the North American continent outside the distribution described above. In the far north, Greenland turbot has been taken irregularly in Norton Sound of the Bering Sea and in the southwest Chukchi Sea (about lat. 66°N). Species distribution is light and intermittent in the Gulf of Alaska and southward to about lat. 45°N. Alton et al (1988) was not able to discern any long-distance migrations related to spawning and feeding as reported for the northwestern Atlantic stock and the Icelandic stock. However, findings (Alton et al (1988)) for the eastern Bering Sea do suggest a long term movement of maturing fish from the northwest slope towards the predominantly mature population in the central and southern slope regions, where the majority of spawning is believed to take place. If this is occurring, that would move the stock further into Alaskan waters, increasing the separation from any stocks in Russian waters.

http://spo.nwr.noaa.gov/tr71.pdf

Fairbairn, D.J. 1981. Biochemical genetic analysis of population differentiation in Greenland halibut, *Reinhardtius hippoglossoides,* from the Northwest Atlantic, Gulf of St. Lawrence, and Bering Sea. Can. J. Fish. Aquat. Sci. 38:669-677.

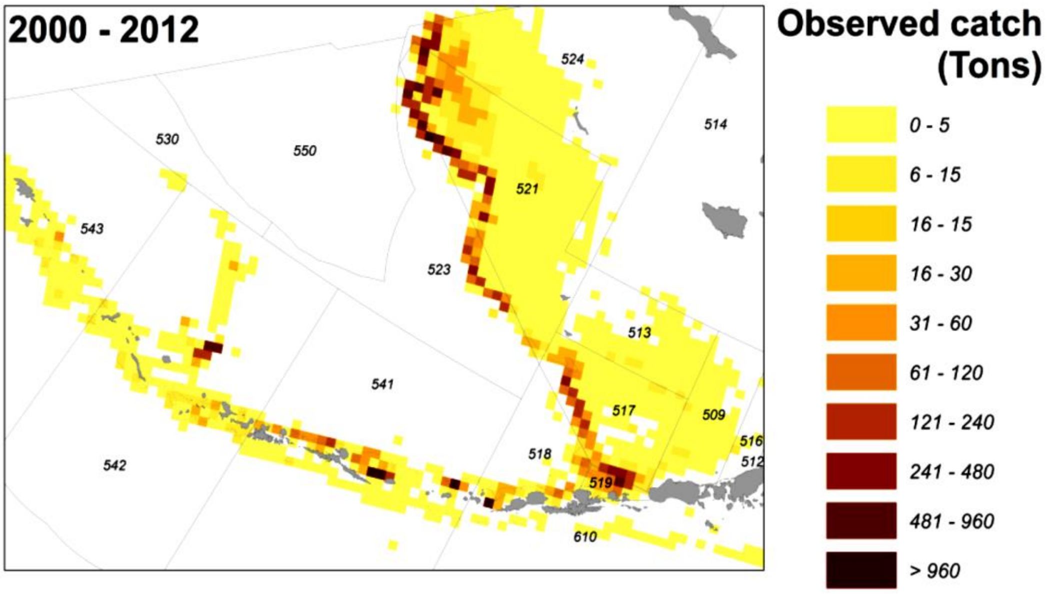


Figure 1.6. All observed catch for 2000 through 2012, data are aggregated spatially at a 400 km^2 grid.

The figure above clearly shows that a portion of Greenland turbot is caught in proximity of the federation line and that the stock likely extends into Russian waters. This stock is very likely a straddling stock but overall harvest appear conservative and there are projected stock increases (see **clause 1.2 for more detailed evidence**). The Russian 2013 TAC for the western Bering Sea "Black Halibut" (Greenland turbot, Kamchatka flounder and arrowtooth flounder) fishery is set at 2000 mt, which is a fairly low exploitation rate. http://www.thefarmsite.com/reports/contents/russiajune13.pdf

Table 1.3. Biomass estimates (t) for GOA deepwater flatfish by NPFMC regulatory area from the NMFS groundfish trawl surveys. Note that the Eastern Gulf (West Yakutat + Southeast) was not surveyed in 2001.

2) Greenland turbot

Year	Western Gulf	Central Gulf	West Yakutat	Southeast	Total	Std. Dev
1984	108	184	0	0	292	87
1987	76	67	0	0	143	61
1990	0	0	0	0	0	0
1993	0	0	0	0	0	0
1996	0	0	0	0	0	0
1999	0	0	--	--	0	0
2001	0	0	0	0	0	0
2003	109	0	0	0	109	108
2005	0	0	0	0	0	0
2007	122	0	0	0	122	122
2009	0	0	0	0	0	0
2011	0	0	0	0	0	0

Catches of Greenland turbot in the GOA are very small. They are limited to the western and central GOA management areas. The Greenland turbot stock in the GOA is assessed

	biennially as a part of the GOA Deepwater Flatfish Complex. GOA shallow water flatfish SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOAdeepflat.pdf Recent research results (Cianelli et al. 2010) indicate that Greenland turbot (Reinhardtius hippoglossoides) early life stages have a long pelagic duration and are subject to extended drift pathways before settlement. Hatching may occur in deep water, below 530 m, and larvae then rise in the water column with development. Some larvae cross to the continental shelf from March to May through the Bering Canyon, while others are likely transported through the Pribilof Canyon. During summer, flexion/postflexion larvae are mostly found around the Pribilof Islands over the middle shelf (50 - 100 m depths) and settlement occurs on the middle shelf near St. Matthew Island. Given that age-1 individuals were primarily found on the outer shelf (100 - 200 m depths), it appears that Greenland turbot actively move to deeper water with age (or size). Preflexion and flexion/postflexion larvae are vigorous carnivores and their feeding habits change as they grow. This study shows that Greenland turbot undergo extensive horizontal and vertical ontogenetic migrations in the Bering Sea, and utilize a range of geographic areas over the Bering slope and shelf at different life history stages. Results indicate that Greenland turbot larvae have a long pelagic duration and are subject to extended drift pathways before settlement. The distance of probable drift to settlement location (near St. Matthew Island) in the Bering Sea is approximately 1,000 km over a six-month period with vertical excursion of over 500 m. Greenland halibut occupy a variety of habitats for spawning, nursery, and settlement over this six-month period, and appear to utilize large swaths of the EBS shelf as nursery areas for immature stages. Ciannelli, L., Duffy-Anderson, J.T., Bailey, K., and A. Matarese. 2010. Connectivity between Greenland halibut (Reinhardtius hippoglossoides) spawning and nursery areas in the eastern Bering Sea: a paradigm for offshore spawning flatfish species. North Pacific Research Board Final Report 619, 62 p. BSAI Greenland turbot SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIturbot.pdf http://www.thefarmsite.com/reports/contents/russiajune13.pdf **BSAI Kamchatka flounder** The Kamchatka flounder is distributed from Northern Japan through the Sea of Okhotsk to the Western Bering Sea north to Anadyr Gulf and east to the eastern Bering Sea shelf and south of the Alaska Peninsula. In U.S. waters they are found in commercial concentrations in the Aleutian Islands where they generally decrease in abundance from west to east. The waters around the easternmost Aleutian Islands marked the general

southeastern border of the Kamchatka flounder population. They are also present in Bering Sea slope waters but are absent in survey catches east of Chirikof Island.

Data collected by the Fishery Observer Program of the AFSC supported the findings of Shuntov (1965), indicating that the Kamchatka flounder distribution also extends into the Gulf of Alaska, but only in limited numbers and in deep water. Kamchatka flounder are not targeted or assessed for the GOA area. Although large-size Kamchatka flounder were reported from deep waters in the Gulf of Alaska, the lack of any Kamchatka flounder in the Gulf of Alaska survey may indicate that this is not a self-sustaining population. These large-size Kamchatka flounder may have ventured into the Gulf of Alaska from the Aleutian Islands or eastern Bering Sea areas. The westerly flowing currents in the Gulf of Alaska do not foster retention of larvae in this area), which might make it more difficult for larval Kamchatka flounder spawned in the Gulf to remain there.

Commercial fisheries are only pursued for Kamchatka flounder in the BSAI. There is no commercial catch in the GOA. Kamchatka flounder is considered to be a part of the "halibut" grouping in Russian fisheries management, but the TAC and catches are set very conservatively and the stock is believed to be under exploited (see clause 1.2).

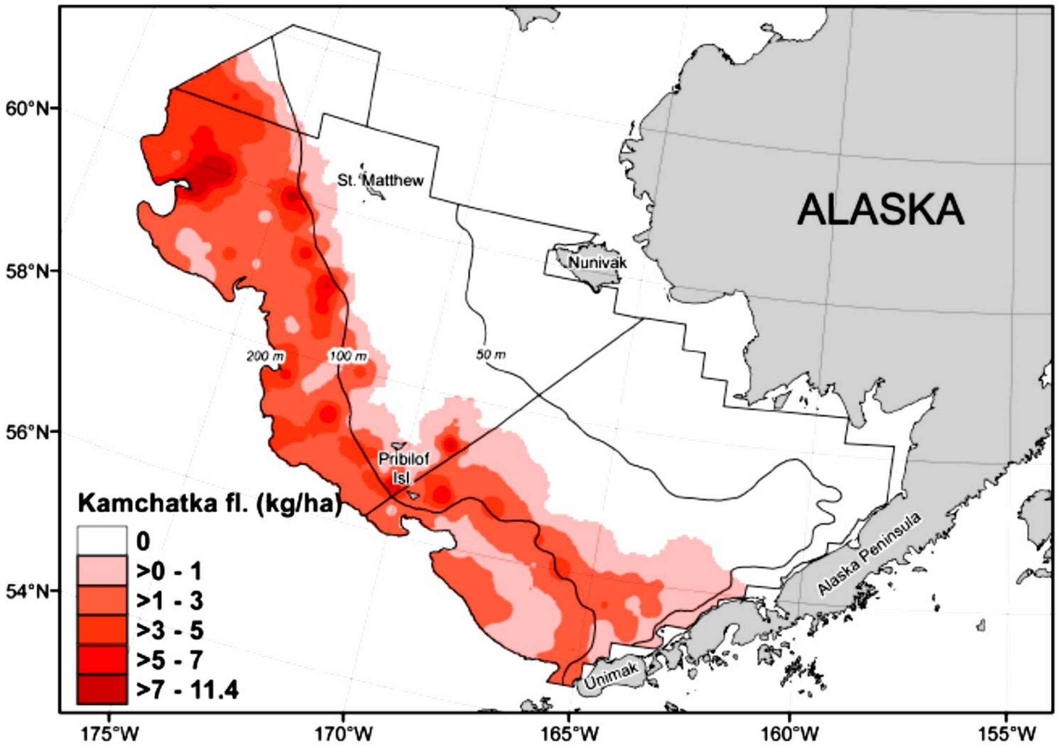
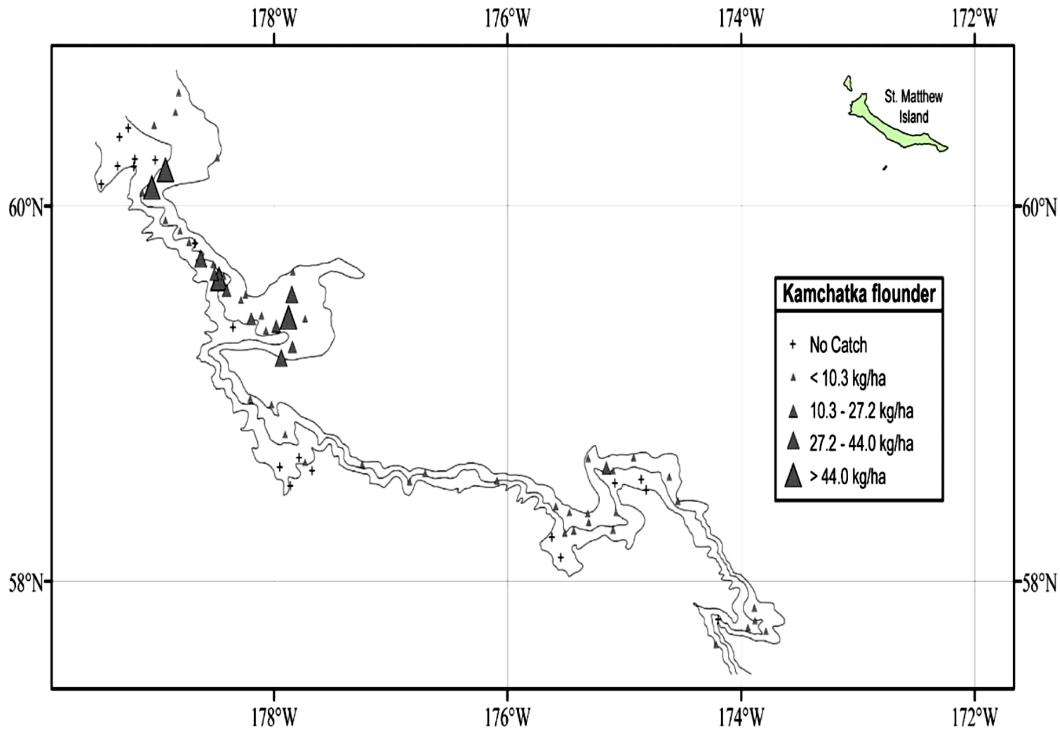
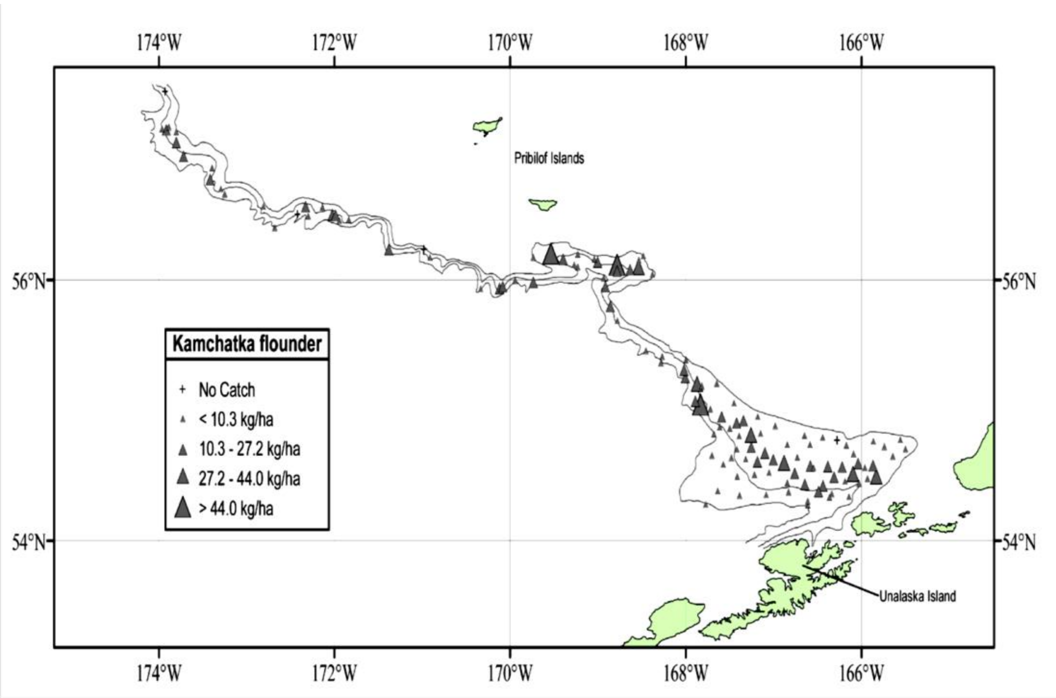


Figure 1.7. Distribution and relative abundance (kg/ha) of Kamchatka flounder for the 2012 eastern Bering Sea shelf bottom trawl survey.





Figures 1.8 and 1.9. Distribution and relative abundance of Kamchatka flounder from the 2010 EBSS survey. Relative abundance is categorized by no catch, sample CPUE less than the mean CPUE, between the mean CPUE and one standard deviation above the mean, between one and two standard deviations above the mean CPUE, and greater than two standard deviations above the mean CPUE.

BSAI Kamchatka flounder SAFE 2012:
http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIkamchatka.pdf

BSAI northern rock sole

Northern rock sole are distributed primarily on the eastern Bering Sea continental shelf and in much lesser amounts in the Aleutian Islands region. Two species of rock sole are known to occur in the North Pacific Ocean, a northern rock sole and a southern rock sole. These species have an overlapping distribution in the Gulf of Alaska, but the northern species comprise the majority of the Bering Sea and Aleutian Islands populations where they are managed as a single stock. Centers of abundance for rock soles occur off the Kamchatka Peninsula, British Columbia, the central Gulf of Alaska, and in the southeastern Bering Sea. Adults exhibit a benthic lifestyle and seem to occupy separate winter (spawning) and summertime feeding distributions on the southeastern Bering Sea continental shelf.

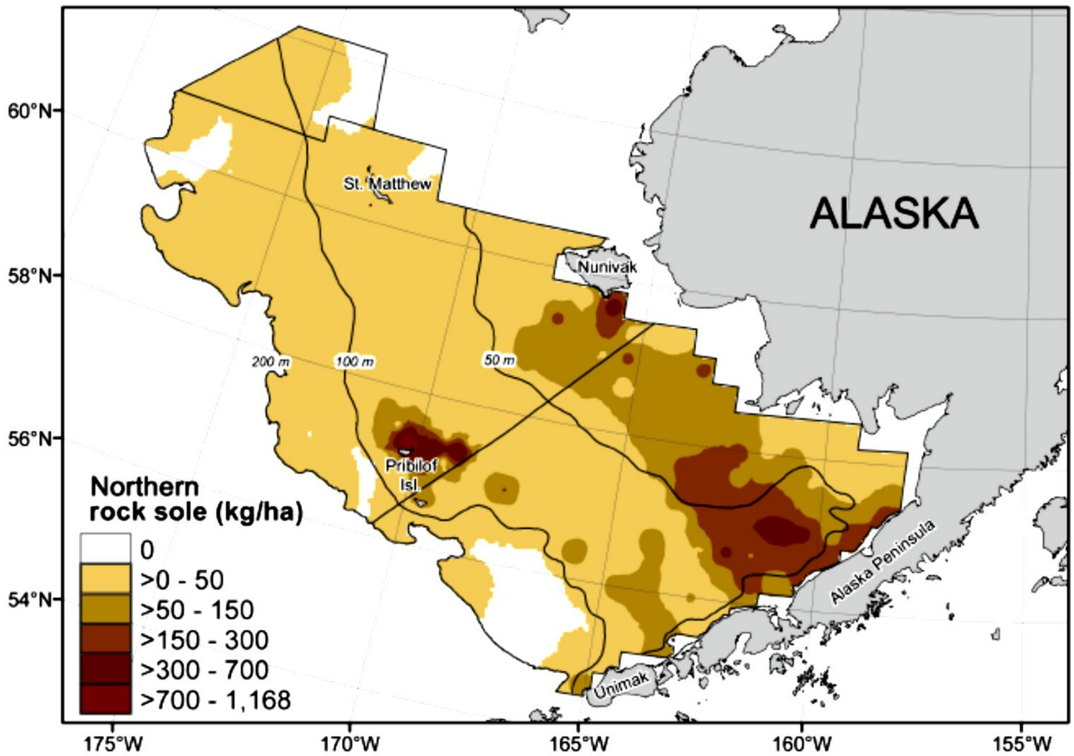


Figure 1.10. Distribution and relative abundance (kg/ha) of northern rock sole for the 2012 eastern Bering Sea shelf bottom trawl survey.

BSAI northern rock sole SAFE 2012:
http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIrocksole.pdf

BSAI yellowfin sole

The yellowfin sole is one of the most abundant flatfish species in the eastern Bering Sea. They inhabit the EBS shelf and are considered one stock. Abundance in the Aleutian Islands region is negligible. Yellowfin sole are distributed in North American waters from off British Columbia, Canada, (approx. lat.49° N) to the Chukchi Sea (about lat. 70° N) and south along the Asian coast to about lat. 35° N off the South Korean coast in the Sea of Japan. Adults exhibit a benthic lifestyle and occupy separate winter, spawning and summertime feeding distributions on the eastern Bering Sea shelf. From over-winter grounds near the shelf margins, adults begin a migration onto the inner shelf in April or early May each year for spawning and feeding.

Figure 1.11. Range of yellowfin sole in the BSAI and GOA.
http://www.fishwatch.gov/seafood_profiles/species/sole/species_pages/yellowfin_sole.htm

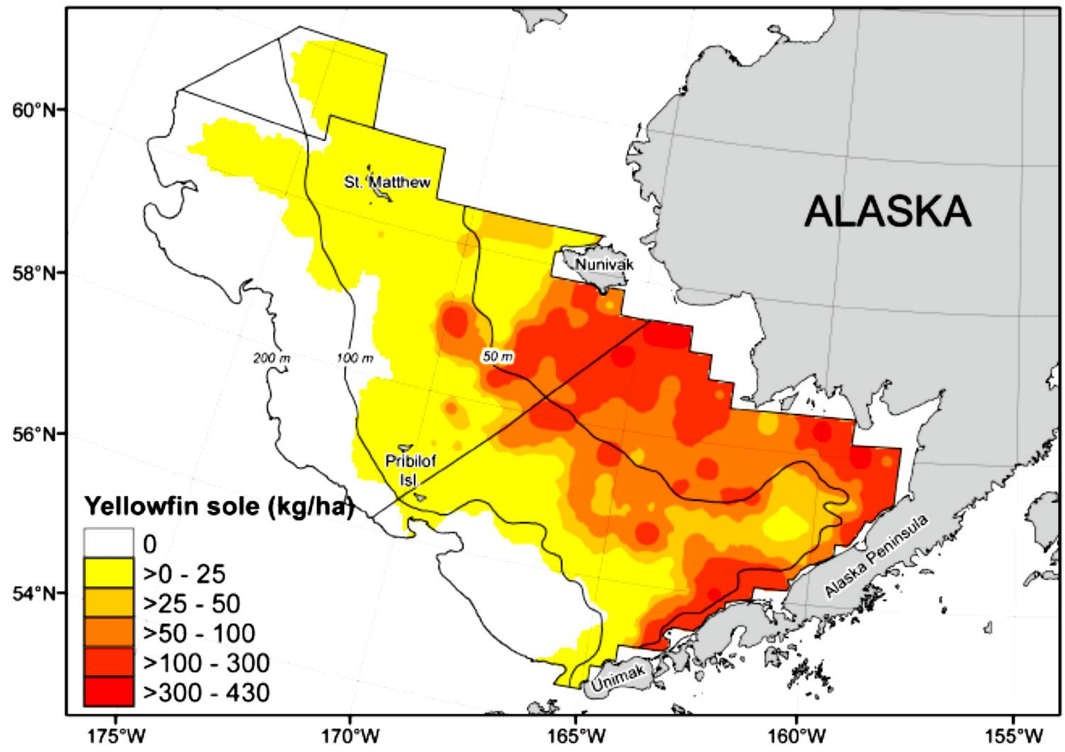


Figure 1.12. Distribution and relative abundance (kg/ha) of yellowfin sole for the 2012 eastern Bering Sea shelf bottom trawl survey.

Japanese tagging studies (Wakabayashi, 1989) (Figure 1.13.) have shown that each group moves into a specific location. The Unimak Island group moves into Bristol Bay, the easternmost portion of the Bering Sea. The two Pribilof Islands groups move farther north to the vicinity of Nunivak Island. Since these areas are for feeding and spawning, it was originally thought that at least two stocks existed. However, further examination of the tagging results and genetic studies using electrophoretic techniques (Grant et al., 1983) now leads to a consensus that there is only one stock.

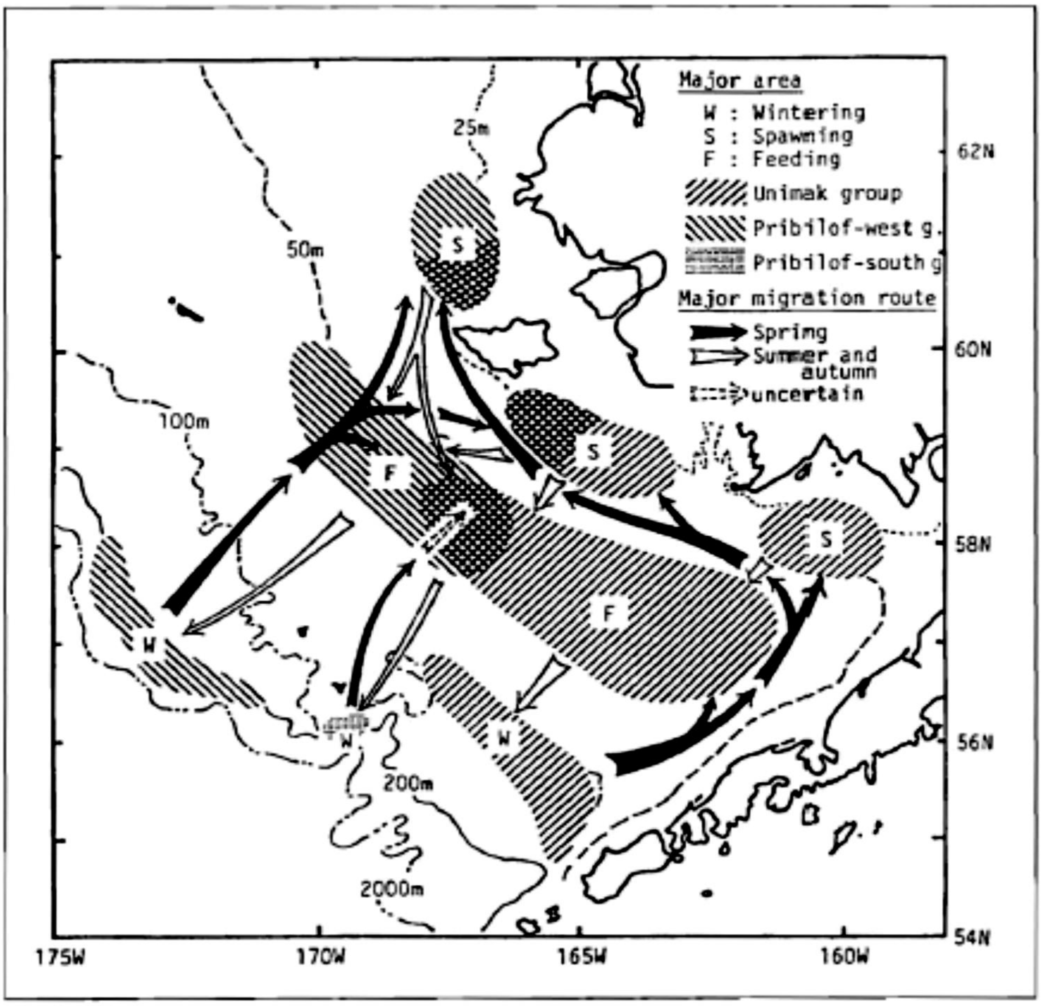


Figure 1.13. Schematic diagram showing seasonal migration and distribution of yellowfin sole by wintering group in the eastern Bering Sea (from Wakabayashi, 1989).

The yellowfin sole population in the GOA is managed as a separate stock under the GOA Shallow Water Flatfish Complex. Catches of yellowfin sole in the GOA are approximately 1 t annually. In the Russian western Bering Sea, yellowfin sole is managed as a portion of the "far east flounder" grouping. This group is managed with a TAC set at 20,000 t, and harvested at a rate of 5,159 t in 2012. Catches are low in the western Bering Sea and the stock there is managed separately and under exploited (see clause 1.2).

BSAI yellowfin sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIyfin.pdf

GOA shallow water flatfish SAFE 2011:
http://www.afsc.noaa.gov/REFM/Docs/2011/GOAshallowflat.pdf

GOA arrowtooth flounder

While arrowtooth flounder are present in the Aleutian Islands and Eastern Bering Sea, the density of arrowtooth flounder as measured in survey-estimated tons per square kilometer is by far the greatest in the GOA. Migration patterns are not well known for arrowtooth flounder, however, there is some indication that arrowtooth flounder move into deeper water as they grow. Adults migrate seasonally from shelf margins in the winter to the outer shelf in April/May with the onset of warmer waters temperatures. The Eastern Gulf of Alaska is closed to bottom trawling and catches for this species are virtually zero in this area. If any stock connection is present between Southeast Alaska and the same species in British Columbia, Canada; the pressure on the latter is deemed very small to non-existent. In 2013, the quota for arrowtooth flounder on Canada's west coast is 19,257 t, as of October 29, 2013 only 4, 196 t had been harvested. http://www-ops2.pac.dfo-mpo.gc.ca/contractordata/sector_catch_summary_GFT.pdf

In this respect, the GOA management unit appears to be in line with the biological distribution and catches distribution of the species in question.

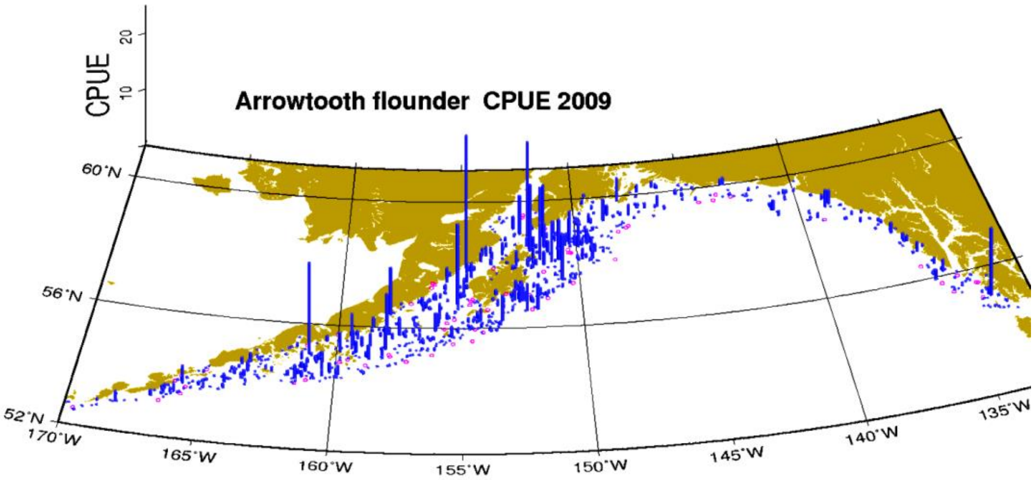


Figure 1.14. Arrowtooth flounder 2009 survey CPUE by tow.

The CPUE generated by the trawl survey shows larger catches firmly into the GOA with smaller catches in areas of potential overlap with BSAI stocks.

GOA arrowtooth flounder SAFE 2011:
http://www.afsc.noaa.gov/REFM/Docs/2011/GOAatf.pdf

GOA flathead sole

In the GOA, flathead sole are managed as a single stock, separate from the BSAI stock. Flathead sole occur primarily on mixed mud and sand bottoms in depths < 300 m. Adults exhibit a benthic lifestyle and occupy separate winter spawning and summertime feeding distributions on the EBS shelf and in the GOA. Adult flathead sole overwinter near the shelf margins before migrating to the mid and outer continental shelf in April or May each year for feeding. The spawning period may range from as early as January but is known to occur in March and April, primarily in deeper waters near the margins of the continental shelf. Juveniles less than age 2 have not been found with the adult population and probably remain in shallow nearshore nursery areas.

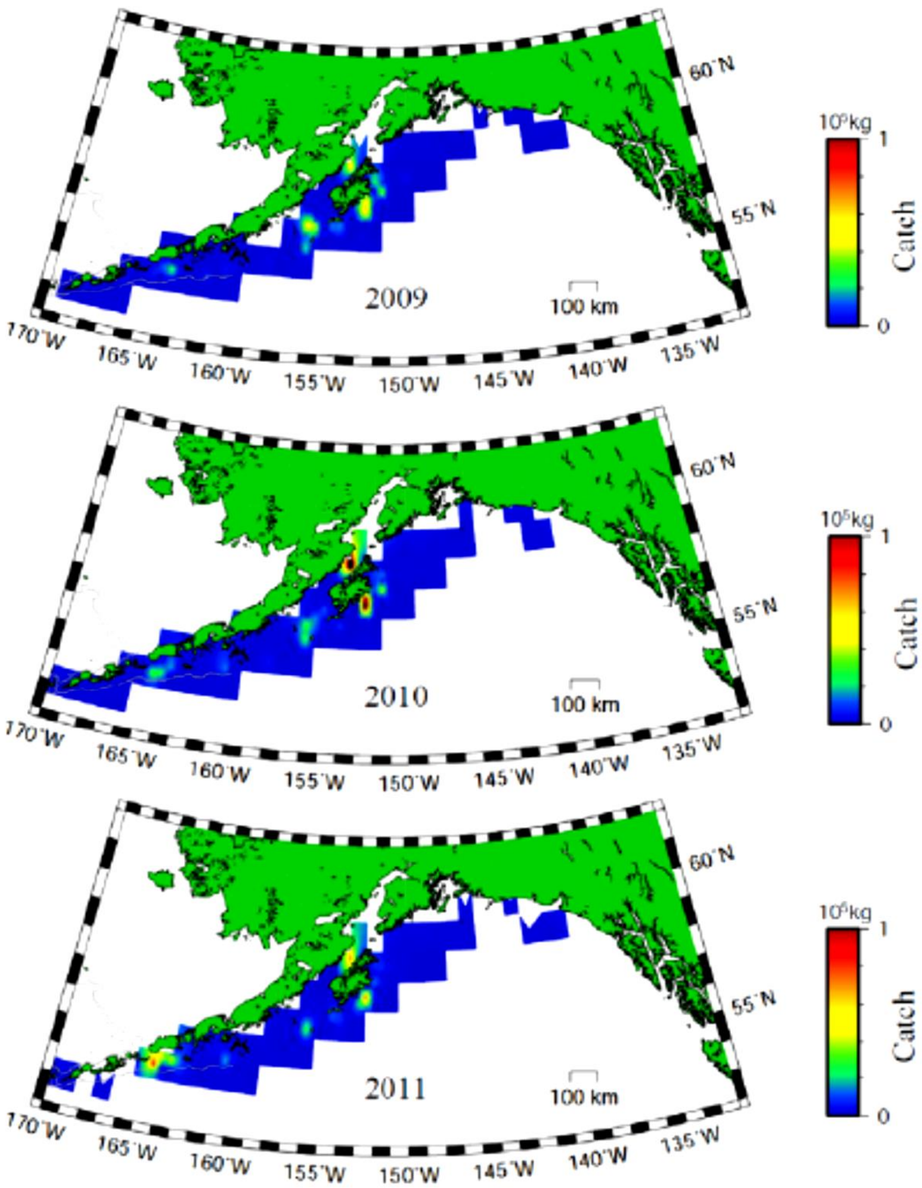


Figure 1.15. Spatial patterns of fishery catches for GOA flathead sole, 2009-2011.

The flathead sole fishery in the GOA is focused on high catch areas well into the GOA and not along margins with the BSAI or Canada (Figure 1.15). The Eastern Gulf of Alaska is closed to bottom trawling and catches for this species are virtually zero in this area. If any stock connection is present between southeast Alaska and the same species in British Columbia, Canada; the pressure on the latter is deemed very small to non-existent. Flathead sole is not a directed fishery in Canada and has no quota set. http://www-ops2.pac.dfo-mpo.gc.ca/contractordata/sector_catch_summary_GFT.pdf

In this respect, the GOA management unit appears to be in line with the biological distribution and catches distribution of the species in question.

GOA flathead sole SAFE 2011:
http://www.afsc.noaa.gov/REFM/Docs/2011/GOAflathead.pdf

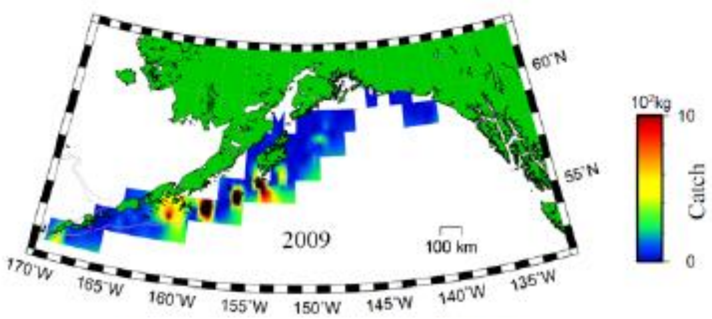
GOA northern rock sole & GOA southern rock sole

Adults of the northern rock sole are found from Puget Sound through the Bering Sea and Aleutian Islands to the Kuril Islands, while the southern rock sole is known from the southeast Bering Sea to Baja California. Rock sole are demersal fish and can be found in shelf waters to 600 m. These species have an overlapping distribution in the Gulf of Alaska and are most abundant in the Kodiak and Shumagin areas. The eastern Gulf of Alaska is closed to bottom trawling and catches for these species are virtually zero in this area. If any stock connection is present between southeast Alaska and the same species in British Columbia, Canada; the pressure on the latter is deemed very small to non-existent. In 2013, the quota for rock sole on Canada's west coast is 1,830 t, as of October 29, 2013 only 773 t had been harvested. http://www-ops2.pac.dfo-mpo.gc.ca/contractordata/sector_catch_summary_GFT.pdf
In this respect, the GOA management unit appears to be in line with the biological distribution and catches distribution of the species in question. They are managed as separate species and separately from the BSAI northern rock sole stock. GOA northern and southern rock sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/GOAnsrocksole.pdf

GOA shallow water flatfish SAFE 2011:
http://www.afsc.noaa.gov/REFM/Docs/2011/GOAshallowflat.pdf

GOA rex sole

Rex sole (*Glyptocephalus zachirus*) are distributed from Baja California, through the Bering Sea/Aleutian Islands and widely throughout the Gulf of Alaska. They range from shallow water (<100m) to about 800 meters depth, but are most abundant at depths between 100 and 200m. The stock within the GOA is managed as a unit stock but with area-specific ABC and TAC apportionments to avoid the potential for localized depletion. Little is known on the stock structure of this species.



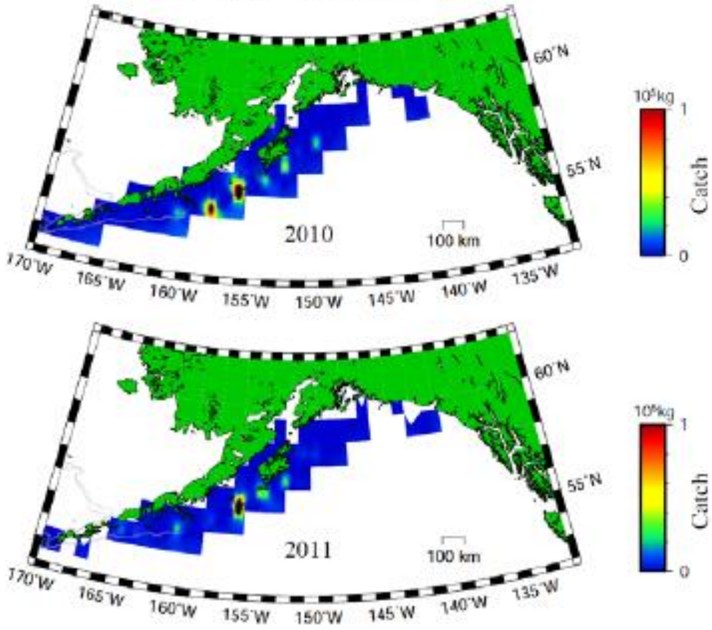


Figure 1.16. Spatial patterns of fishery catches for GOA rex sole, 2009-2011.

Directed catches of rex sole in the GOA are taken almost exclusively in the western and central management areas (Figure 1.16). The eastern Gulf of Alaska is closed to bottom trawling and catches for this species are virtually zero in this area. If any stock connection is present between southeast Alaska and the same species in British Columbia, Canada; the pressure on the latter is deemed very small to non-existent. Rex sole is not a directed fishery in Canada and has no quota set. http://www-ops2.pac.dfo-mpo.gc.ca/contractordata/sector_catch_summary_GFT.pdf

In this respect, the GOA management unit appears to be in line with the biological distribution and catches distribution of the species in question.

GOA rex sole SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOArex.pdf

http://www.afsc.noaa.gov/REFM/Stocks/assessments.htm

Evidence adequacy rating:

☑High **☐ Medium** **☐ Low**

☑ Full Conformity **☐ Minor Non-conformity** **☐ Major Non-conformity**

☐ Critical Non-conformity

Clause:	**Evidence:**
1.2.2	**Rating determination** *The biological unity and other biological characteristics of the flatfish stocks are considered within the management system.*

	The biological unity of all the species in the flatfish complex in the waters off Alaska is taken into account and well utilized in the management framework (see also clause 1.2). Stock divisions are based on areas where the species is encountered, physical barriers to movement, prevailing current patterns and catch rates. Current research has expanded the stock division knowledge base, including surveys into the northern Bering Sea, which provides a de facto reserve for portions of some stocks (Alaska plaice and Bering flounder) as it is closed to fishing. Please see the discussion in **clauses 1.2 and 1.2.1** above for details on the biological unity/distribution of the stocks in relation to harvest pressure. In terms of accounting for biological characteristics, the annual or biennial stock assessment (GOA and BSAI SAFEs) reports are based on stock assessment models that use both length-structured and age-structured data including estimates of natural mortality, catchability, variability in estimated age, variability in estimated in length at age, season specific parameters governing the weight at length schedule, recruitment, maturity etc... In addition the SAFE reports estimate and evaluate stock status and structure. Furthermore, the flatfish species in Alaska are assessed in terms of trophic relationships (prey and predator species of flatfish and abundance, composition of flatfish prey variance by time and area), fishery effects on the ecosystem (predation pressure on shared prey species) and essential fish habitats. **Evidence** http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf http://www.afsc.noaa.gov/REFM/Stocks/assessments.htm
Evidence adequacy rating: ☑**High** ☐ **Medium** ☐ **Low**	
☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**	
Clause:	**Evidence:**
1.2.3	**Rating determination** *All fishery removals and mortality of the target stocks are considered (BSAI and GOA SAFEs) by management.* All fishery removals and mortality of the target stock(s) are considered by management. For both the BSAI and the GOA flatfish complex stocks (see BSAI and GOA individual flatfish species SAFEs), the management organizations collect the necessary information on removals and mortality (including natural mortality) of the target stock, as well as data on bycatch and discards. Strictly enforced daily landing reports, at sea and shore-based fishery enforcement, fishery observers and an extensive mandatory and voluntary logbook program verify and ground-truth total mortality estimates. Detailed tables and

	other descriptions of a given stock removals are generally provided within the various SAFE reports as well as throughout other documents (e.g. Economic SAFE). **For further information, refer to chapter 3.5 of the Background section.** **Evidence** http://www.afsc.noaa.gov/REFM/Stocks/assessments.htm
Evidence adequacy rating: ☑**High** ☐ **Medium** ☐ **Low**	
☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**	
Clause:	**Evidence:**
1.2.4	**Rating determination** *The Alaska flatfish complex fisheries management system (NPFMC/NMFS) routinely takes into account all previously-agreed management measures.* Many examples exist showing the continued implementation of previously agreed regulations for Alaskan flatfish management within the Alaska EEZ (this is well illustrated by the NPFMC process). One example is the continuous use the 2 million mt optimum yield cap for the BSAI groundfish fisheries and the 800,000 mt OY cap of for groundfish in the GOA management area. On a more general perspective, the NPFMC and BOF public meetings (the NPFMC meets five times each year, usually in February, April, June, October and December; the BOF meetings generally occur from October through March, four to six times per year) allow for continuous review and improvement (where needed) of fishery management measures where all fishery stakeholders routinely participate, interact and input within the management process of the Alaskan flatfish complex fisheries. **Evidence** http://www.fakr.noaa.gov/npfmc/PDFdocuments/meetings/Management_FMP.pdf http://www.fakr.noaa.gov/npfmc/public-meetings/meeting-calendar.html http://www.adfg.alaska.gov/index.cfm?adfg=fisheriesboard.main

Clause:

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

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

FAO CCRF 7.1.3/7.1.4/7.3.2

Evidence adequacy rating:

☐**High** ☐ **Medium** ☐ **Low**

☐ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause	Evidence	
1.3	**Not applicable.** The stocks here in question are not considered trans-boundary, straddling, highly migratory fish stocks or high seas fish stocks exploited by two or more States. **Please see the evidence provided in clause 1.2.** The U.S. and Russia have signed an Agreement on Mutual Fisheries Relations (first signed in 1988) for conservation, management and optimal utilization of shared fisheries resources between both nations. The agreement is not specific to flatfish alone, but does call for cooperation, shared science, conservation and management of fisheries resources. http://www.nmfs.noaa.gov/ia/slider_stories/2013/04/us_russia.html http://www.nmfs.noaa.gov/ia/slider_stories/2013/04/agreement.pdf	

Evidence adequacy rating:

☐**High** ☐ **Medium** ☐ **Low**

☐ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause	Evidence	
1.3.1	**Not applicable.** The stocks here in question are not considered trans-boundary, straddling, highly migratory fish stocks or high seas fish stocks exploited by two or more States and therefore requiring common/integrated management measures. **Please see the evidence provided in clause 1.2.** http://www.thefarmsite.com/reports/contents/russiajune13.pdf http://www.fishcom.ru/activities/Documents/f407-0%20январь-декабрь%202012.pdf	

Clause:
1.4 Organizations within the Management System shall cooperate with neighbouring coastal states with respect to common and shared fishery resources for their conservation and for the conservation of the environment. ***FAO CCRF 10.3,* 7.1.4 and 7.1.5** **1.4.1 A State not member/participant of a sub-regional or regional fisheries management organization shall cooperate, in accordance with relevant international agreements and law, in the conservation and management of the relevant fisheries resources by giving effect to any relevant measures adopted by such organization/arrangement.** ***FAO CCRF 7.1.5*** **1.4.2 States seeking to take any action through a non-fishery organization which may affect the conservation and management measures taken by a competent sub-regional or regional fisheries management organization or arrangement shall consult with the latter, in advance to the extent practicable, and take its views into account .** ***FAO CCRF 7.3.5***
Evidence adequacy rating: **☐High ☐ Medium ☐ Low**
☐ Full Conformity ☐ Minor Non-conformity ☐ Major Non-conformity **☐ Critical Non-conformity**

Clause	Evidence	
1.4	**Not applicable.** The stocks here in question are not considered shared resources exploited by two or more States. Please refer to **clauses 1.2 and 1.3**.	
Evidence adequacy rating: ☐**High** ☐ **Medium** ☐ **Low**		
☐ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**		
Clause	**Evidence**	
1.4.1	**Not applicable.** The stocks here in question are not considered shared resources exploited by two or more States. Please refer to **clauses 1.2 and 1.3**.	
Evidence adequacy rating: ☐**High** ☐ **Medium** ☐ **Low**		
☐ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**		
Clause	**Evidence**	
1.4.2	**Not applicable.** The stocks here in question are not considered shared resources exploited by two or more States. Please refer to **clauses 1.2 and 1.3**.	

Clause:

1.5 The Applicant fishery's management system shall actively foster cooperation between States with regard to:

- **Information gathering and exchange**
- **Fisheries research**
- **Fisheries management**
- **Fisheries development**

		FAO CCRF 7.3.4
Evidence adequacy rating: ☐**High** ☐ **Medium** ☐ **Low**		
☐ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**		
Clause	**Evidence**	
1.5	**Not applicable.** The stocks here in question are not considered shared resources exploited by two or more States. Please refer to clauses **1.2 and 1.3**. The U.S. and Russia both consistently publish management data (TACs, catch data) and are both signatories of the Agreement on Mutual Fisheries Relations (first signed in 1988) for conservation, management and optimal utilization of shared fisheries resources between both nations. The agreement is not specific to flatfish alone, but does call for cooperation, shared science, conservation and management of fisheries resources. http://www.nmfs.noaa.gov/ia/slider_stories/2013/04/us_russia.html http://www.nmfs.noaa.gov/ia/slider_stories/2013/04/agreement.pdf	

Clause:

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

FAO CCRF 7.7.4

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

FAO CCRF 7.8.1

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause	Evidence
1.6	**Rating determination** *The U.S. federal government conducts conservation and management activities for flatfish species (Pacific halibut is managed independently) off Alaska. The federal management of the flatfish complex displays a clear means for financing the activities of fishery management organizations and arrangements (detailed in GOA and BSAI Groundfish FMPs). Where appropriate, the costs for fisheries conservation, management and research are recovered.* Specific costs incurred during the management, research and enforcement of the groundfish stocks in the BSAI and GOA are reported in the BSAI and GOA Groundfish Fishery Management Plans. Please refer to these management plans for precise detailed description of expenditure figures. Estimates of the costs of BSAI and GOA groundfish management are summarized in the Table 1.4 below. It was not possible to make accurate estimates of exact expenditures on groundfish management, nor, in some cases, to distinguish between the BSAI and GOA groundfish fisheries expenditures. The GOA and BSAI groundfish fisheries appear to cost the U.S. in excess of $60 million, annually, in management and related research efforts. A larger share of this appears to be spent in the BSAI than the GOA. A comparison of the costs reported in this section with estimates of revenues generated by the groundfish fisheries does not constitute a cost-benefit analysis of this management effort. There are a number of reasons for this: • The gross revenues from fishing are not a measure of the value of the commercial groundfish fisheries. On one hand, they ignore the private costs (the opportunity costs of labor and capital) used to catch and process the fish resources. On the other hand, they ignore the appropriate measure of benefits to consumers - the “consumers’ surplus” or the value that consumers would be willing to pay for consuming the fish, over and above what they actually have to pay.

• Management costs are only imperfectly identified. Many costs are incurred for multiple purposes, and it is difficult to determine what costs were incurred for which function. Research into ecosystem dynamics may support groundfish management, as well as many other goals. Agency staff often had difficulty determining what portion of an agency budget was spent on groundfish management; staff were often unable to make the even more detailed cost assignment to GOA or BSAI management. This is a problem inherent in the nature of the joint or fixed costs that are often involved. There often simply is no logical way to make these allocations. Even when cost estimates are provided, they are generally very rough approximations.

• The BSAI and GOA groundfish fisheries produce a range of social and ecological services beyond the commercial production and consumption of groundfish products. Groundfish support sport and subsistence fisheries and are an integral part of the North Pacific ecosystem. For example, groundfish provide forage for other fish species, seabirds, and marine mammals. The commercial values presented only represent one "use" of the groundfish resources.

Table 1.4 below presents the estimated cost of groundfish fishery management in a "typical" year in the period 2002-2006. Often the cost estimates are based on operations in the 2003 Federal year, the most recently completed fiscal year at the time the estimates were completed (May 2004). Almost all of the agencies listed here have multiple functions. Often an activity - such as a USCG patrol - will carry out a wide range of tasks in addition to supporting groundfish management. It is therefore often impossible for agency staff to separate groundfish management costs from overall expenditures, or to separate out GOA and BSAI groundfish management expenditures from groundfish expenditures. In general, these estimates are very rough.

Many activities produce multiple outcomes and it is difficult or impossible to assign their costs to one of those outcomes. Often there is no clear bright line between fishery management activities and other activities. In many cases, the appropriate criteria for allocating costs to one activity or another were not well defined. Much of this analysis depends on the judgment of agency analysts, and the use of different analysts for each agency means that differing judgments might have been used by different agencies. For all of these reasons, the reader should be aware that these estimates can only be treated as rough approximations.

Table 1.4. Estimated cost of fishery management by government agencies.

Agency Division	**$ Millions**			
	Overall Alaska Region expenditures	**Groundfish Fisheries**	**GOA**	**BSAI**

North Pacific Fisheries Management Council (NPFMC)	$ 3.0	$ 2.4	$0.8	$1.6
National Marine Fisheries Service (Alaska Region)				
Sustainable Fisheries Division (SFD)	$ 3.6	$ 2.9	$ 0.9	$ 2.0
Protected Resources Division (PRD)	$ 2.2	$ 0.8	No Estimate Provided	
Habitat Conservation division (HCD)	$ 1.6	$ 0.4	$ 0.2	$ 0.2
Restricted Access Management (RAM)	$ 1.9	$ 0.4	$ 0.3	$ 0.1
Other NMFS Alaska Region organizational units: Regional Directorate, Operations, Management and Information	$ 6.2	$ 3.5	$ 1.0	$ 2.5
Grants administered by the Alaska Region	Usually marine mammal related (i.e. Steller sea lion). Grants vary. In 2003 grants where of $13 million of which $ 11 million were for Steller sea lion to the State of Alaska. No additional significant grants specifically for groundfish.			
Alaska Fisheries Science Center (AFSC)				
Resource Assessment and Conservation Engineering Division (RACE)	$ 17.7	$ 13.6	$ 5.8	$ 7.8
Resource Ecology and Fisheries Management (REFM)	$ 11.2	$ 10.7	$ 3.2	$ 7.5
Auke Bay Lab (ABL)	$ 12.0	$ 3.9	$ 2.9	$ 1.0
NOAA Office of General Counsel - Alaska Region	$ 2.0	No Estimates Provided		
NOAA Office of Law Enforcement - Alaska Region	$ 5.0	$ 2.4	$ 1.8	$ 0.6
United States Coast Guard - 17th District		< $ 40.2	<$ 13.9	< $ 26.3
Alaska Department of Fish and Game		> $ 2.5	No Estimates Provided	

Other Agencies of the State of Alaska	No Estimates Provided			
Fish and Wildlife Service (USFWS)	No Estimates Provided			
Alaska Fisheries Information Network (AKFIN)	$ 0.8	$ 0.7	$ 0.4	$ 0.3
North Pacific Research Board (NPRB)		$ 5.5	Not Estimated	
Costs incurred by private sector	For Paperwork	$ 3.7		
	For Observers	>10.8		

Note: These estimates are rough approximations and refer to the year 2003.

Data taken from the June 2013 update version of the Gulf of Alaska Groundfish FMP: http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf

Congressional Appropriations

Generally speaking, the costs of fisheries management and conservation in the U.S. derive from the following services and are funded through Congressional appropriations.

1) Research; data collection, surveys, data analysis, and stock assessment services are mainly financed through Congressional appropriations, other public sector funding, and industry funding.

2) Management; conservation and management of the fishery and services for fishery participants, state and industry assistance programs, including marine fisheries commissions, disaster assistance are mainly financed through Congressional appropriations and industry.

3) Enforcement; vessel boarding, dockside monitoring, vessel monitoring system (VMS) implementation, auction inspection, aerial surveillance, criminal investigations are funded through Congressional appropriations and industry (for some VMS).

Wherever possible, in addition to appropriations, fishery management organizations will seek to balance the costs of management by organizing self-funding programs. An example is the newly restructured groundfish observer program. In January 2013, the new observer program replaced the existing observer service delivery model, in which industry contracts directly with observer providers to meet observer coverage requirements in Federal regulations. The new system involves NMFS contracting directly with observer providers and determining when and where observers are deployed. Vessels and processors under the restructured observer program pay either a fee based on a percentage of ex-vessel revenue (not to exceed 2%), or a daily observer fee, to fund the program.

Other relevant NOAA Accounts

NOAA uses the Fishermen's Contingency Fund to compensate domestic fishermen for the damage or loss of fishing gear and resulting economic loss due to obstructions related to oil and gas exploration, development or production in the Outer Continental Shelf. The funds come from fees collected annually by the Secretary of the Interior from the holders of leases, explorations, permits, easements, and rights of way. FY 2013 President's Request includes $0.4 million for the Fisherman's Contingency Fund. The Promote and Develop American Fishery Products & Research Pertaining to American Fisheries Fund receives 30 percent of the import duties the Department of Agriculture collects on fishery-related products. The S-K grants program has provided substantial assistance to address impediments to the management, development, and utilization of US' marine resources. Each year a Federal Register notice is published announcing the program. The annual notice outlines priority areas, such as research on reduction/elimination of bycatch and aquaculture. The remainder of the S-K funds, which are transferred as discretionary funds, are used to offset the appropriation requirements of the Operations, Research, and Facilities account.

The Damage Assessment and Restoration Revolving Fund (DARRF) receives proceeds from claims against responsible parties, as determined through court settlements or agreements, for damages to natural resources for which NOAA serves as trustee. NOAA utilizes funds transferred to this account to respond to hazardous materials spills in the coastal and marine environments, by conducting damage assessments, providing scientific support during litigation, and using recovered damages to restore injured resources.

The Federal Ship Financing Fund manages the loan guarantee portfolio that existed prior to the enactment of the Federal Credit Reform Act of 1990.

The Limited Access System Administration Fund was established by Title III of Public Law 104-297. Fee collections equaling no more than three percent of the proceeds from the sale or transfer of limited access system permits are deposited into the Fund. These deposits to the Fund are used to administer an exclusive central registry system for the limited access system permits.

The Environmental Improvement and Restoration Fund was created by the Department of the Interior and Related Agencies Act, 1998, for the purpose of carrying out marine research activities in the North Pacific. These funds will provide grants to Federal, State, private or foreign organizations or individuals to conduct research activities on or relating to the fisheries or marine ecosystems in the North Pacific Ocean, Bering Sea, and Arctic Ocean.

Marine Mammal Unusual Mortality Event Fund provides funds to support investigations and responses to unusual marine mammal mortality events.

	State of Alaska The groundfish fisheries in the EEZ are a source of jobs and income for many residents of Alaska; groundfish stocks and fishing operations move across the line dividing state from federal jurisdiction; a large proportion of groundfish harvests from the EEZ are delivered to state ports and are recorded on state fish landings records. For all these reasons, the State of Alaska has a role in the management of groundfish stocks and fisheries in the EEZ. The state spends money to support the Council process. The state spends money on port sampling of groundfish landings, collecting landings records, and data processing and analysis of landings records. The Alaska Board of Fisheries interacts with the Council and considers management proposals to better coordinate federal and state regulations. State ADF&G offices provide local sources of information on EEZ management rules for the public. A significant part of the state's contribution is supported with federal funding. The figure for groundfish ($2.5 million, Table 1.4) represents the value of federal grants awarded to the state. **Evidence** http://www.osec.doc.gov/bmi/budget/FY13BIB/fy2013bib_noaa.pdf http://www.corporateservices.noaa.gov/nbo/fy12_bluebook/chapter5_2012_MandatoryDiscretionaryFunds.pdf http://alaskafisheries.noaa.gov/npfmc/pdfdocuments/fmp/goa/goa.pdf	

Evidence adequacy rating:

☐High ☐ Medium ☐ Low

☐ Full Conformity ☐ Minor Non-conformity ☐ Major Non-conformity

☐ Critical Non-conformity

Clause :	Evidence	
1.6.1	**Not applicable.** The stocks here in question are not considered common, shared, trans-boundary, straddling, highly migratory fish stocks or high seas fish stocks exploited by two or more States and bound by international agreements. All vessels fishing in the US must be at least 75 percent US ownership (see the Jones Act) and must possess appropriate federal groundfish BSAI and GOA permits to participate. http://alaskafisheries.noaa.gov/regs/680/680a4.pdf 50CFR679: www.fakr.noaa.gov/regs/default.htm	

Clause:

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

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

FAO CCRF 7.6.8

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	**Evidence**
1.7	**Rating determination** *Procedures (through NPFMC public meetings) are in place to keep the efficacy of current conservation and management measures and their possible interactions under continuous review to revise or abolish them in the light of new information.* The Alaskan flatfish complex fisheries are managed under the NPFMC's Groundfish FMPs. The NPFMC amends its FMPs as often as necessary; the most recent update is of June 2013. The NPFMC, for federal waters, allow for the continuous review of conservation and management measures. The MSA is periodically revised and reauthorized (i.e. the Sustainable Fisheries Act added 3 standards to MSA). **Evidence** GOA Groundfish Fishery Management Plan (updated 06/13) http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf BSAI Groundfish Fishery Management Plan (updated 06/13) http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf http://www.fakr.noaa.gov/npfmc/public-meetings/meeting-calendar.html

Clause:

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

- **Management arrangements**
- **Decision-making**

FAO CCRF 7.1.9

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	Evidence	
1.8	**Rating determination** *The NPFMC's management arrangements and decision making processes for the flatfish fisheries are organized in a very transparent manner.* The NPFMC's management arrangements and decision making processes for the flatfish fisheries are organized in a very transparent manner. The NPFMC (and NMFS) provide a great deal of information on their websites, including agenda of meetings, discussion papers, and records of decisions. The NPFMC actively encourage stakeholder participation, and all NPFMC deliberations are conducted in open, public sessions. Anyone may submit regulatory proposals, and all such proposals are given due consideration by the NPFMC. Rules impose transparency so that all NPFMC members' discussions are open to the public. No more than a predetermined number of NPFMC members can meet together unless the meeting is an open public meeting. **Evidence** http://alaskafisheries.noaa.gov/ http://alaskafisheries.noaa.gov/npfmc/	

Clause:

1.9 Management organizations not party to the Agreement to Promote Compliance with International Conservation and Management Measures by Vessels Fishing in the High Seas shall be encouraged to accept the Agreement and to adopt laws and regulations consistent with the provisions of the Agreement.

FAO CCRF 8.2.6

Evidence adequacy rating:		
☐**High**	☐ **Medium**	☐ **Low**
☐ **Full Conformity**	☐ **Minor Non-conformity**	☐ **Major Non-conformity**
☐ **Critical Non-conformity**		

Clause:	**Evidence**	
1.9	***Not relevant****. The Alaska flatfish complex fisheries under assessment occur exclusively within the EEZ of the U.S.* The United States ratified The Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas on the 19 December 1995. While the Alaskan flatfish complex fisheries under assessment occur exclusively within the EEZ of the U.S., the Compliance Agreement is important if climate change ever alters stock distributions such that high seas harvests become a concern. **Evidence** http://www.fao.org/fishery/topic/14766/en http://www.fao.org/docrep/meeting/003/x3130m/X3130E00.htm	

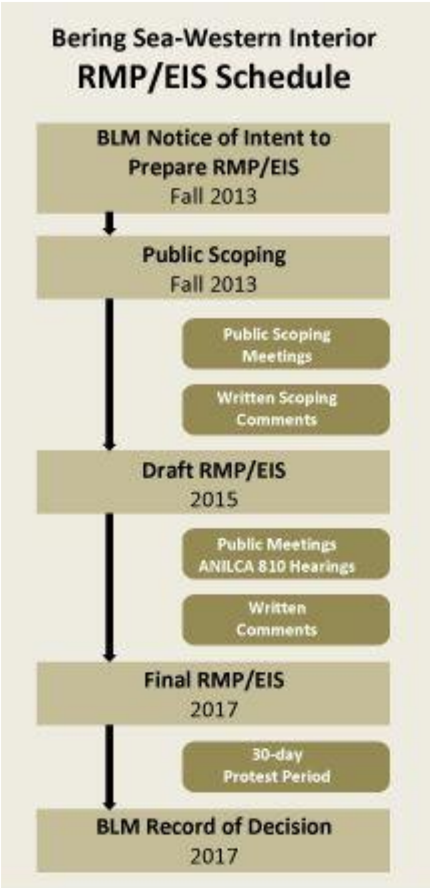
2. **Management organizations shall participate in coastal area management institutional frameworks, decision-making processes and activities related to the fishery and its users, in support of sustainable and integrated resource use, and conflict avoidance.** *FAO CCRF 10.1.1/10.1.2/10.1.4/10.2.1/10.2.2/10.2.4*						
Confidence Ratings	**Low**	**0 out of 16**	**Medium**	**0 out of 16**	**High**	**15 out of 16**

Clause: **2.1 An appropriate policy, legal and institutional framework shall be adopted in order to achieve sustainable and integrated use of living marine resources, taking into account the fragility of coastal ecosystems, the finite nature of their natural resources and the needs of coastal communities.** ***FAO CCRF 10.1.1*** **2.1.1 States shall develop, as appropriate, institutional and legal frameworks in order to determine the possible uses of coastal resources and to govern access to them taking into account the rights of coastal fishing communities and their customary practices to the extent compatible with sustainable development.** ***FAO CCRF 10.1.3*** **2.1.2 In setting policies for the management of coastal areas, States shall take due account of the risks and uncertainties involved.** ***FAO CCRF 10.2.3***		
Evidence adequacy rating: ☑**High** ☐ **Medium** ☐ **Low**		
☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**		
Clause:	**Evidence**	
2.1	**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 is required to manage the Alaskan flatfish complex 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 was implemented starting January 1st 2013. http://alaskafisheries.noaa.gov/analyses/observer/amd86_amd76_earirirfa0311.pdf http://alaskafisheries.noaa.gov/frules/77fr70062.pdf Therefore, all of the NPFMC proposed regulations include NEPA considerations. NEPA 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. The NEPA process consists of an evaluation of the environmental effects of a federal undertaking including its alternatives. There are three levels of analysis: categorical exclusion determination; preparation of an environmental assessment/finding of no significant impact (EA/FONSI); and preparation of an environmental impact statement (EIS). • **Categorical Exclusion**: At the first level, an undertaking may be categorically excluded from a detailed environmental analysis if it meets certain criteria which a federal agency has previously determined as having no significant environmental impact. A number of agencies have developed lists of actions which are normally categorically excluded from environmental evaluation under their NEPA regulations. • **EA/FONSI:** At the second level of analysis, a federal agency prepares a written environmental assessment (EA) to determine whether or not a federal undertaking would significantly affect the environment. If the answer is no, the agency issues a finding of no significant impact (FONSI). The FONSI may address measures which an agency will take to mitigate potentially significant impacts. • **EIS**: If the EA determines that the environmental consequences of a proposed federal undertaking may be significant, an EIS is prepared. An EIS is a more detailed evaluation of the proposed action and alternatives. The public, other federal agencies and outside parties may provide input into the preparation of an EIS and then comment on the draft EIS when it is completed. If a federal agency anticipates that an undertaking may significantly impact the	

environment, or if a project is environmentally controversial, a federal agency may choose to prepare an EIS without having to first prepare an EA. After a final EIS is prepared and at the time of its decision, a federal agency will prepare a public record of its decision addressing how the findings of the EIS, including consideration of alternatives, were incorporated into the agency's decision-making process.

http://www.epa.gov/compliance/basics/nepa.html



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. For example, the BLM is currently in the process of developing a Bering Sea Western Interior Resource Management Plan/ Environmental Impact Statement. http://www.blm.gov/ak/st/en/prog/planning/bering_sea_western.html

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 has 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://energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/G-CEQ-CitizensGuide.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 to participate 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.

DEC, ADFG, DNR and the USFWS

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

ADFG, on the hand, 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 federal 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).

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 NPFMC public meeting processes

The NPFMC has openly public processes. Any individual or group can submit proposals for discussion of management and research for the flatfish complex fisheries in Alaska. 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/

	Federal and State agencies cooperation The assessment team is confident that the NEPA process, existing agencies and processes (e.g. ADFG, DEC, DNM, 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.	
Evidence adequacy rating: ☑**High** ☐ **Medium** ☐ **Low**		
☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**		
Clause:	**Evidence**	
2.1.1	**Rating determination** *The routine collaboration and processes within and between federal and state agencies allows determining the possible uses of coastal resources and to govern access to them taking into account the rights of coastal fishing communities and their customary practices to the extent compatible with sustainable development.* In addition to the information provided in clause 2.1, the management organizations within Alaska and their processes take into account the rights of coastal fishing communities and their customary practices to the extent compatible with sustainable development. The beginning of such processes is clearly demonstrated by the NPFMC public decision-making processes. **The Council process** The NPFMC system was designed so that fisheries management decisions were made at the regional level to allow input from affected stakeholders which assures that the rights of coastal communities and their historic access to the fisheries are included in the decision process. NPFMC meetings are open, and public testimony - both written and oral - is taken on each and every issue prior to deliberations and final decisions. Public comments are also taken at all Advisory Panel and Scientific and Statistical Committee meetings. While there is not a formal "call for proposals," interested stakeholders are welcome to draft letters to the NPFMC. Each NPFMC decision is made by recorded vote in public forum after public comment. Final decisions then go to NMFS for a second review, public comment, and final approval. Decisions must conform to the MSA, the NEPA, Endangered Species Act, Marine Mammal Protection Act, and other applicable law including	

several executive orders. Regulatory changes may take up to a year or longer to implement, particularly if complex or contentious, but the NPFMC makes every attempt in being open and transparent throughout the process. The NPFMC meets five times each year, usually in February, April, June, October and December, with three of the meetings held in Anchorage, one in a fishing community in Alaska and one either in Portland or Seattle. Most NPFMC meetings take seven days, with the Advisory Panel (AP) and Scientific and Statistical Committee (SSC) usually following the same agenda and meeting two days earlier (http://www.fakr.noaa.gov/npfmc/index.html).

CDQ

The Community Development Quota (CDQ) Program began in December of 1992 with the goal of promoting fisheries related economic development in western Alaska. The CDQ Program allocates a percentage of all BSAI quotas for groundfish, prohibited species, halibut and crab to eligible communities. The Program allocates 10.7% of the flatfish complex (yellowfin sole, northern rock sole, arrowtooth flounder, Greenland turbot, and flathead sole) BSAI TAC to eligible communities. The purpose of the program is to (i) provide eligible western Alaska villages with the opportunity to participate and invest in fisheries in the BSAI Management Area; (ii) to support economic development in western Alaska; (iii) to alleviate poverty and provide economic and social benefits for residents of western Alaska; and (iv) to achieve sustainable and diversified local economies in western Alaska.

There are 65 communities within a fifty-mile radius of the BS coastline who participate in the program. The CDQ program allocated a portion of the BSAI harvest amounts to CDQ groups, including halibut, groundfish (pollock, Pacific cod, flatfish and rockfish), crab and bycatch species. The CDQ program was granted perpetuity status during the 1996 reauthorization of the MSA.

The six CDQ groups are located throughout the western Alaska coastline and South towards the AI, these are:

- Aleutian Pribilof Island Community Development Association (6 communities)
- Bristol Bay Economic Development Corporation (17 communities)
- Central Bering Sea Fishermen's Association (1 community)
- Coastal Villages Region Fund (20 communities)
- Norton Sound Economic Development Corporation (15 communities)
- Yukon Delta Fisheries Development Association (6 communities).

A map of these communities is available at:
http://www.wacda.org/pages/cdq-entities.php
http://alaskafisheries.noaa.gov/sustainablefisheries/specs13_14/bsaitable1.pdf
http://alaskafisheries.noaa.gov/cdq/groups.pdf

The CDQ program has been successfully contributing to fisheries infrastructure in western Alaska by funding docks, harbors, vessel acquisition and the construction of

	seafood processing facilities. The CDQ program has allowed CDQ groups to acquire equity ownership interests in the halibut, groundfish, and crab sectors that provide additional revenues to fund local in-region economic development projects, and education and training programs. Community Development Quota Program 2012 Decennial Review Section 305(i)(1)(H) of the Magnuson-Stevens Fishery Conservation and Management Act requires that during calendar year 2012 and every 10 years thereafter, the State of Alaska shall evaluate the performance of each entity participating in the CDQ Program. The decennial review included an evaluation of performance relative to four criteria which generally relate to socioeconomic characteristics, financial performance, workforce employment and scholarships opportunities, and implementation of community development plans. According to the State of Alaska, the Community Development Quota entities operating in federal waters on behalf of coastal communities have maintained or improved their performance from 2006 to 2010. Each of the six groups maintained or improved performance in all four categories — socioeconomic conditions, financial performance, workforce development and community development plan. The Aleutian Pribilof Island Community Development Association was not evaluated for the socioeconomic conditions category. http://alaskafisheries.noaa.gov/cdq/dreview.htm **State waters flatfish complex fisheries** Flatfish fisheries in state waters are managed through parallel seasons with the federal fisheries. The state of Alaska has instituted area closures to trawling in some state waters, manages the small southeastern beam trawl flatfish fishery, and shares data with federal managers. **Evidence** http://www.fakr.noaa.gov/npfmc/public-meetings/meeting-calendar.html http://alaskafisheries.noaa.gov/cdq/default.htm http://alaskafisheries.noaa.gov/cdq/allocations/annualmatrix2013.pdf	

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑**Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	Evidence	
2.1.2	**Rating determination** *In setting policies for the management of coastal areas, the fisheries management organizations involved in the management of the flatfish complex fisheries take into account the risks and uncertainties involved.* Risks and uncertainties related to the policies set up for the management of coastal areas are taken into account within and throughout the various NEPA processes, agencies and organizations and the NPFMC. Please see previous Clauses under fundamental 2 for further information and evidence.	

Clause: **2.2** **Representatives of the fisheries sector and fishing communities shall be consulted in the decision-making processes involved in other activities related to coastal area management planning and development.** ***FAO CCRF 10.1.2***		
Evidence adequacy rating: ☑**High**	☐ **Medium**	☐ **Low**
☑ **Full Conformity** ☐ **Critical Non-conformity**	☐ **Minor Non-conformity**	☐ **Major Non-conformity**

Clause:	Evidence	
2.2	**Rating determination** *Representatives of the fisheries sector and fishing communities are consulted in the decision-making processes and in other activities related to coastal area management planning and development*. Representatives of the fisheries sector and fishing communities are consulted in the decision-making processes and in other activities related to coastal area management planning and development. This happens through the NEPA processes, and especially through the NPFMC as well as through public review processes organized by the NMFS. Please refer to previous Clauses in this section for further information and evidence.	

Clause:

2.3 Fisheries practices that avoid conflict among fishers and other users of the coastal area shall be adopted.

2.3.1 Procedures and mechanisms shall be established at the appropriate administrative level to settle conflicts which arise within the fisheries sector and between fisheries resource users and other users of the coastal area.

FAO CCRF 10.1.4, 10.15

Evidence adequacy rating:

☑High **☐ Medium** **☐ Low**

☑ Full Conformity **☐ Minor Non-conformity** **☐ Major Non-conformity**

☐ Critical Non-conformity

Clause:	Evidence
2.3	**Rating Determination** *Fisheries practices that avoid conflict among fishers and other users of the coastal area are adopted.* In the flatfish complex fisheries, conflict is avoided by allocation to different user groups. The Amendment 80 sector is comprised of non-American Fisheries Act (AFA) trawl catcher/processor harvesters eligible to fish Amendment 80 species under this statutory mandate. The BSAI trawl limited access sector is comprised of AFA catcher/processors, AFA catcher vessels, and non-AFA catcher vessels. Allocations are made by area fished, sector of the fishery (Amendment 80 fleet, for example) and by gear type (trawl, and longline participants). In the BSAI, northern rock sole and flathead sole TACs are apportioned between the Western Alaska Community Development Program, the CDQ Program and the Amendment 80 sector. The yellowfin sole TAC is apportioned among the CDQ Program, the Amendment 80 sector, and the BSAI trawl limited access sector (i.e., non-Amendment 80 trawl vessels). Each year, NMFS will allocate amounts of Amendment 80 species and crab and halibut PSC to the two Sectors, based on the amount of TAC remaining after allocation to the CDQ Program and for incidental catch allowance requirements in other fisheries. This allocation amount is termed the initial TAC (ITAC). Allocations made to one sector would not be subject to harvest by participants in the other fishery sector except under a regulatory provision that allows reallocation to Amendment 80 cooperatives fish that are projected to be unharvested by the BSAI trawl limited access sector. Percentages of the BSAI arrowtooth flounder and Bering Sea only Greenland turbot TAC are apportioned to the CDQ program. Alaska plaice is not allocated to the CDQ

program. NMFS reallocates any portion of the TAC not projected to be harvested by the BSAI trawl limited access sector to Amendment 80 cooperatives during the fishing year.

Persons who receive Amendment 80 QS may, on an annual basis, elect to form a cooperative with other Amendment 80 QS holders to receive an exclusive harvest privilege for the portion of the ITAC resulting from their aggregated QS holdings. This “cooperative quota” (CQ) is the amount of annual Amendment 80 species ITAC dedicated for exclusive use by that cooperative. Amendment 80 establishes the requirements for forming an Amendment 80 cooperative as well as procedures for the allocation of annual CQ to a cooperative and transfers of CQ between cooperatives. The cooperative structure presents a number of operational and economic benefits to its members:

• Cooperative participants could consolidate fishing operations on a specific Amendment 80 vessel or subset of Amendment 80 vessels, thereby reducing monitoring and enforcement (M&E) and other operational costs, and harvest fish in a manner more likely to be economically efficient and less wasteful.

• Amendment 80 provides flexibility, encourages efficient harvesting, and discourages waste through the opportunity to trade harvest privileges with other cooperatives. An Amendment 80 cooperative cannot transfer CQ to the Amendment 80 limited access fishery, or to the BSAI trawl limited access sector.

• Amendment 80 provides dedicated allocations for use by a cooperative. In addition to annual CQ of Amendment 80 species, each Amendment 80 cooperative receives an exclusive limit on the amount of crab and halibut PSC the cooperative can use while harvesting in the BSAI. This halibut and crab PSC CQ is assigned to a cooperative proportional to the amount of Amendment 80 QS held by its members, and is not based on the amount of crab or halibut PSC historically used by the cooperative members.

• A cooperative structure may allow Amendment 80 vessel operators to better manage PSC rates than do operators who must race to harvest fish as quickly as possible before a PSC allocation causes fishery closures. By reducing PSC use through more efficient cooperative operations (such as through gear modifications) Amendment 80 vessel operators may also increase the harvest of valuable targeted groundfish species and improve revenues that would otherwise be foregone. Amendment 80 cooperative participants may have access to additional ITAC. Amendment 80 cooperatives may receive a rollover of an additional amount of CQ, if a portion of the Amendment 80 species or crab or halibut PSC allocated to the BSAI trawl limited access sector is projected to go unharvested. This rollover to the Amendment 80 cooperatives is at the discretion of NMFS, based on projected harvest rates in the BSAI trawl limited access sector and other criteria. Each Amendment 80 cooperative would receive an additional amount of CQ based on the proportion of the Amendment 80 QS held by that Amendment 80 cooperative as

	compared with all other Amendment 80 cooperatives. • Amendment 80 cooperatives allow more flexible application of groundfish retention standard (GRS) • Amendment 80 vessels harvesting in the BSAI under an Amendment 80 cooperative would be able meet the GRS requirements on an aggregate basis for that cooperative, instead of on a vessel-specific basis. The portion of the flathead sole, rock sole, and yellowfin sole TAC assigned to the Amendment 80 sector is further apportioned between Amendment 80 cooperatives and the Amendment 80 limited access fishery. Amendment 80 cooperatives receive an exclusive harvest privilege, cooperative quota (CQ), for each species that cannot be exceeded; NMFS retains management authority of the Amendment 80 limited access fishery. Participants in the flatfish complex trawl fisheries operate within industry cooperatives that allow the trading of quota between vessels to avoid overages. Amendment 80 QS holders that choose not to join an Amendment 80 cooperative can participate in the Amendment 80 limited access fishery. The Amendment 80 limited access fishery is allocated the amount of Amendment 80 species ITAC and halibut and crab PSC that remains after allocation to all of the Amendment 80 cooperatives. Participants fishing in the Amendment 80 limited access fishery continue to compete with each other, do not realize the same potential benefits from consolidation and coordination; and do not receive an exclusive harvest privilege available only to members of an Amendment 80 cooperative. Catch limits, commonly known as sideboards, limit the ability of Amendment 80 QS holders to expand their harvest efforts in the Gulf of Alaska (GOA). Otherwise, Amendment 80 participants could use economic advantages of the program to increase their participation in other (primarily GOA) fisheries adversely affecting the participants in those fisheries. GOA groundfish and halibut PSC sideboards prevent these undesirable effects by limiting the catch by Amendment 80 vessels to historic levels in the GOA. When there is conflict between cooperatives, there is resolution at the Council level (pers.comm. Groundfish Forum, 2013) http://alaskafisheries.noaa.gov/sustainablefisheries/amds/80/program_overview.pdf http://alaskafisheries.noaa.gov/sustainablefisheries/specs13_14/bsaitable8.pdf http://alaskafisheries.noaa.gov/sustainablefisheries/specs13_14/bsaitable1.pdf Harvest allocations and management are based on the calendar year. TACs are apportioned by regulatory area, and by district for some stocks. Areas or districts may also be managed together. Reserves are set at 20 percent of the TAC of pollock, Pacific cod, flatfish, sculpin, shark, squid, and octopus. At any time, the Regional	

Administrator may assess these fisheries and apportion to them any amounts from the reserves that is determined will be harvested.

Certain permits are required of participants in the GOA groundfish fisheries. A Federal groundfish license is required for harvesting vessels (including harvester/processors) participating in all directed GOA groundfish fisheries, other than fixed gear sablefish throughout the GOA and demersal shelf rockfish in the Southeast Outside area (east of 140 W. longitude). Vessels fishing in State of Alaska waters (0-3 miles offshore) will be exempt, as will vessels less than 26 ft LOA and vessels using jig gear, subject to gear restrictions. Vessels exempted from the GOA groundfish license program, will be limited to the use of legal fixed gear in the Southeast Outside area.

Access limitation may take the form of a limit on the number of licenses issued for a fishery, individual shares of the annual quota, taxes on catch, or high license or landing fees. Taxes and fees may be used in conjunction with license limitation or individual quotas. Should the Council wish to implement an access limitation program, the FMP will require amendment providing the supporting rationale and specific details of the measure.
http://alaskafisheries.noaa.gov/sustainablefisheries/specs13_14/goatable1.pdf
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf

NEPA

The NPFMC offers stakeholder involvement, eventually leading to the adoption of fisheries management regulations. In this way they serve partly as a conflict avoidance mechanism.

Fisheries are relevant to the NEPA process in two ways. First, each significant NPFMC fisheries package must go through the NEPA review process. Second, any project that could impact fisheries (i.e., oil and gas, mining, coastal construction projects, etc.,) that is either on federal lands, in federal waters, receives federal funds or requires a federal permit, must go through the NEPA process. In this manner, both fisheries and non-fisheries projects that have a potential to impact fisheries have a built in process by which concerns of the NPFMC, NMFS, state agencies, industry, other stakeholders or the public can be and are accounted for (http://www.epa.gov/oecaerth/basics/nepa.html#process).

BOEM

The Bureau of Ocean Energy Management (previously Minerals Management Service) (BOEM) is responsible for managing environmentally and economically responsible development and provide safety and oversight of the offshore oil and gas leases. This process routinely overlaps with evaluation of potential impacts to fisheries and marine ecosystems and therefore with some of the federal agencies reported in the above paragraphs such as NMFS and the NPFMC. Examples of

	Environmental Impact Statements and Major Environmental Assessments are available on their website and offer insights in how oil exploration EIAs routinely take into account other coastal uses such as fisheries as part of the NEPA process. http://www.boem.gov/About-BOEM/BOEM-Regions/Alaska-Region/Environment/Environmental-Analysis/Environmental-Impact-Statements-and--Major-Environmental-Assessments.aspx http://www.nmfs.noaa.gov/pr/permits/eis/arctic.htm http://www.boem.gov/About-BOEM/BOEM-Regions/Alaska-Region/Index.aspx http://www.fakr.noaa.gov/analyses/arctic/earirfrfa0809final.pdf **Please also see previous clauses in this Section for further information and evidence.**	
Evidence adequacy rating: ☑**High** ☐ **Medium** ☐ **Low**		
☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**		
Clause:	**Evidence**	
2.3.1	**Rating determination** *Procedures and mechanisms shall be established at the appropriate administrative level to settle conflicts which arise within the fisheries sector and between fisheries resource users and other users of the coastal area.* The NEPA process requires the assessment of potential impacts of Federal actions and deliberately takes into account all resources and users of coastal resources before project approvals are given. The NEPA process, through both administrative (through governmental agencies) and legal (through courts of law) procedures, tends to focus on conflict avoidance. In most cases project approvals are withheld until substantive conflicts are resolved. NMFS and NPFMC will participate in the NEPA processes whenever resources under their management may be affected by other developments. Similarly, the State of Alaska tends to resolves conflict through the BOF process, by virtue of integrating stakeholders in the decision making process. Please see prior clauses for further information and references.	

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

	implementation of such measures.
	FAO CCRF 7.1.10
2.4.1	**The public shall be kept aware on the need for the protection and management of coastal resources and the participation in the management process by those affected.**
	FAO CCRF 10.2.1

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑**Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	Evidence	
2.4	**Rating determination** *Conservation and management measures, laws, regulations and other legal rules governing their implementation are effectively disseminated.* National Public Radio (NPR) is the main source of information for Alaska fisherman (http://www.npr.org/). All fishery reports are passed out through NPR and keep fishermen informed of developments as they are implemented. In addition to local radio, the internet (NMFS, NPFMC and ADFG websites), printed news releases and Emergency Orders (available at local harbormaster's offices, marine supply outlets, etc) are also important sources of public information. The Marine Conservation Alliance (MCA) has a website that give links to all of the various state and federal plans and proposals, Industry and USCG information (http://www.marineconservationalliance.org/). NPR and MCA are widely used by industry and the fishing communities. The NPFMC and BOF public processes encourage fisheries stakeholders to become involved in all the decision-making processes relative to the fishery resource in question. Many of these processes will result in legislation. These agencies provide vast amounts of written and electronic information related to the fisheries under their management on their websites, at local offices, and via radio updates. Fishery users are educated about conservation and management measures by simple virtue of involvement in the process, and by the public nature of the management system, starting from decision making to the final stages of law/regulation publication. Stakeholder involvement allows for facilitation in application and support in the implementation of fisheries management measures. See previous clauses for evidence.	

<table>
<tr><td colspan="3">Evidence adequacy rating:

☑High ☐ Medium ☐ Low</td></tr>
<tr><td colspan="3">☑ Full Conformity ☐ Minor Non-conformity ☐ Major Non-conformity

☐ Critical Non-conformity</td></tr>
<tr><td>Clause:</td><td>Evidence</td><td></td></tr>
<tr><td>2.4.1</td><td>Rating determination
The public is kept aware (NPR) on the need for the protection and management of coastal resources and the participation in the management process by those affected.

NPR is a common source of information for Alaska fisherman. Additionally, both electronic and hard copies of regulatory actions are available from all NFMS offices. The NPFMC make upcoming agendas and scientific materials to be discussed available on their web site, and at local offices.

While NMFS Office for Law Enforcement (OLE) is tasked with enforcing the laws and regulations to manage Alaska's marine resources, continuous education of the American public and ocean resource users is key in protection and conservation. OLE special agents, enforcement officers and support personnel routinely make presentations to school, scout and civic groups. These presentations cover a vast array of subjects within enforcement and conservation.

Marine mammal protection, endangered species, sustainable fisheries, vessel monitoring systems, new Federal fishing regulations, and proper stranding procedures are just a few of the topics that they address. Special agents and enforcement officers are engaged in their communities and can be solicited directly through the local field office (http://www.nmfs.noaa.gov/pr/education/).

NOAA's NMFS Protected Resources Outreach and Education Plan of 2006 strives to give direction to the myriad efforts currently underway across the NMFS Protected Resources (PR) regional and headquarters offices and NMFS science centers. This plan incorporates visions and mandates from NOAA, NMFS, and PR into an outline and plan of action addressing outreach and education for the next three to five years. Workshop participants identified challenges to outreach and education, most effectively addressed at a national level, which form the basis of the Outreach and Education plan.

In all NMFS/PR offices and at NMFS science centers, outreach and education activities are successfully underway. The work is carried out by full time outreach specialists, program staff with partial outreach responsibilities, and by interested staff who integrate outreach and education into their regular duties.

Outreach and education will improve the public's perspective of Protected Resource's programs by increasing the public's knowledge of the status of species,</td><td></td></tr>
</table>

	threats to their continued survival, and how NMFS science and management are working to address these issues (http://www.nmfs.noaa.gov/pr/pdfs/education/strategic_plan.pdf).	

Clause:

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

- **Economic assessment**
- **Social and cultural assessment**

FAO CCRF 10.2.2

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	Evidence
2.5	**Rating determination** *The primary job of the NPFMC is to manage resources sustainably and to determine the allocation of resources to different users using biological and socio-economic information collected and analyzed by the NMFS and the ADFG.* The Regulatory Flexibility Act (RFA) requires agencies to consider the impact of their rules (Fishery Management Plans, Fishing Regulations) on small entities (fishing 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. http://www.eeoc.gov/eeoc/plan/regflexibilityact.cfm In addition, the White House, through Executive Order (E.O.) 12866, requires Executive Branch agencies to perform benefit-cost analyses for all rules it deems to be "significant" and to submit these analyses to the Office of Management and Budget for review. http://www.epa.gov/ttnecas1/econdata/Rmanual2/2.2.html 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.

Economic analyses are also required to varying degrees under the MSA, the NEPA, the Endangered Species Act, and other applicable laws.
http://www.nmfs.noaa.gov/sfa/domes_fish/OperationalGuidelines/OGeconomicanalysis_d.htm

MSA lists 10 National Standards, to be used to obtain policy objectives. National Standard five states that the federal government must consider efficiency in utilization; and not have economic allocation as a sole purpose in their decision making process. National Standard eight requires that the NPFMC consider fishing communities to provide for their sustained participation, while to the extent practicable, minimizing adverse economic impacts.

The primary job of the NPFMC is to manage resources sustainably and to determine the allocation of resources between different users. To do so, they use biological and socio-economic information collected and analyzed by the NMFS and the ADFG. The NPFMC, NMFS and ADFG all have staff economists that participate in the economic, social and cultural evaluation and review process of fishery management proposals informing and helping the regulation amendment process.

Secondarily, on a higher level, the NEPA process has the same requirements, as the biological and socio-economic aspects of the fishery must be taken into account before a decision for a change in management can take place.

The AFSC began a large scale socio-economic and cultural assessment of the Alaskan fishery users in 2005. In that year, the AFSC compiled baseline socioeconomic information about the 136 Alaska communities most involved in commercial fisheries. Communities were selected by assessing fishery-involvement indicators including landings, processors, vessel homeports, vessel ownership, crew licenses, and gear operator permits. The profiles compiled information from the US Census, ADFG, the Commercial Fisheries Entry Commission (CFEC), NMFS Restricted Access Management Division, Alaska Department of Community and Economic Development, and various community groups, websites, and archives.

The 5-page profiles for each community follow the same general outline:

- People and Place (Location, Demographics, History).
- Infrastructure (Current Economy, Governance, Facilities).
- North Pacific Fisheries involvement (Commercial, Recreational, Subsistence Fishing).

The AFSC has updated the Alaskan community profiles to include new U.S. Census data from 2010 and input from the communities and industry. A total of 195 communities have now been profiled. The new profiles add a significant amount of new information to help provide a better understanding of each community's reliance on fishing. The

	profiles include information collected from communities in the Alaska Community Survey, which was conducted during the summer of 2011 and again during the fall of 2012, and the Processor Profiles Survey, which was conducted in the fall of 2011. The Economic status of the fisheries off the GOA and BSAI area can be found in the Economic SAFE. These reports are published yearly along with the Ecosystem SAFEs and the various fishery Stock Assessment and Resource Evaluation (SAFE) reports. http://www.afsc.noaa.gov/REFM/Socioeconomics/Projects/CPU.php http://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-230.pdf The Alaska Fisheries Information Network (AKFIN) was established in 1997 under the direction of the Pacific States Marine Fisheries Commission (PSMFC) to consolidate, manage and dispense information related to Alaska's commercial fisheries. In addition to providing analysts with access to the data library, AFKIN fulfills requests from a wide range of organizations in need of consolidated commercial fisheries information including the NPFMC, NMFS, Alaska Department of Labor and the PSMFC. Their primary purpose is to provide complex data sets to fisheries analysts and economists to support research and the Council's decision-making process. http://www.akfin.org/about-akfi	

Clause:

2.6 **In accordance with capacities, measures shall be taken to establish or promote systems to monitor the coastal environment as part of the coastal management process using physical, chemical, biological, economic and social parameters.**

FAO CCRF 10.2.4, 10.2.5

2.6.1 **States shall promote multidisciplinary research in support and improvement of coastal area management, in particular on its environmental, biological, economic, social, legal and institutional aspects.**

FAO CCRF 10.2.5

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑**Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	**Evidence**

2.6	**Rating determination** *Monitoring of the coastal environment (biological, physical, chemical, geological parameters) in Alaska is largely performed by federal and state agencies. Economic and social parameters are assessed by the staff of the NPFMC, NMFS and ADFG either during the NEPA review of plan amendments or during their on-going studies and evaluations.* Monitoring of the coastal environment in Alaska is performed by federal and state agencies including the U.S. Forest Service, U.S. Fish and Wildlife Service, and the NMFS, ADFG as well as many institutions of higher learning (such as the University of Alaska Institute of Marine Science (IMS)). IMS faculty and research staff provides expertise in marine biology, biological oceanography, physical, chemical and geological oceanography. With an annual research budget of approximately $5.5 million, current IMS projects include Northeast Pacific near-surface monitoring of temperature, salinity and fluorescence, Bering Sea nearshore circulation, and Arctic ocean biodiversity. (http://www.ims.uaf.edu/) Economic and social parameters are assessed by the staff of the NPFMC, NMFS and ADFG either during the NEPA review of plan amendments or during their on-going studies and evaluations. For Oceanography, the North Pacific Research board (NPRB) has funded millions of dollars for numerous studies describing baseline oceanographic parameters and supported environmental buoy arrays (http://www.nprb.org). NPRB also have funded major ecosystem studies (currently ongoing) in the GOA and BSAI worth 10's of millions of US dollars (see GOAIERP and BSIERP). The NPRB joined with NSF and their BASIS program to augment the special funding of BSIERP to nearly $52 million. The NPRB also funded individual projects to support management and conservation of Council related fisheries. Each grant of the NPRB includes a requirement that a portion of the funds be directed to community education and outreach. Additionally, NMFS Pacific Marine Environmental Lab (PMEL) regularly collects oceanographic and environmental data, which is important to understanding the changing habitat of groundfish and other marine species. (http://www.pmel.noaa.gov). **ADEC** The Alaska Department of Environmental Conservation (ADEC) Division of Water establishes standards for water cleanliness; regulates discharges to waters and wetlands; provides financial assistance for water and wastewater facility construction, and waterbody assessment and remediation; trains, certifies and assists water and wastewater system operators; and monitors and reports on water quality. This agency also monitors and enforces the discharges associated with fish and shellfish processing (http://www.dec.alaska.gov/water/MoreAboutWater.htm). ADEC Division of Spill Prevention and Response prevents spills of oil and hazardous substances, prepares for when a spill occurs and responds rapidly to protect human health and the environment (http://dec.alaska.gov/spar/index.htm).	

	ADFG ADFG Habitat Division conducts research on watersheds, active mining sites, fire-impacted woodlands, anadromous fish streams, and coastal and marine environments throughout Alaska in an effort to document and mitigate human-related impacts, changes in habitat & species abundance (http://www.adfg.alaska.gov/index.cfm?adfg=habitatresearch.main). **AFSC** The AFSC's *Ecosystem Monitoring and Assessment Program* (EMA) main goal is to improve and reduce uncertainty in stock assessment models of commercially important fish and shellfish species through the collection of observations of survey catch and oceanography. Fishery observers and survey scientists collect information regarding fish abundance, size, distribution, diet and energetic status. Oceanographic observations include temperature, conductivity, salinity, density, light transmission, photosynthetically available radiation (PAR), oxygen, Chlorophyll a, and estimates of the composition and biomass of phytoplankton and zooplankton (includes jellyfish) species. These fisheries and oceanographic observations are used to connect climate change and variability in large marine ecosystems to early marine survival of commercially important fish species in the GOA, Bering Sea, and Arctic. The oceanographic component of EMA investigates various physical and biological parameters in the EBS. Spatial and temporal patterns illustrated by these data provide critical insight into how the ecosystem functions. Oceanographic data are analyzed alone and in conjunction with fisheries data for comparisons of water mass characteristics. Water samples collected above and below the pycnocline are analyzed for chlorophyll a concentration to explore productivity and are used in primary production experiments to explore growth rates. Phytoplankton is the base of the food web and plays a critical role in the BS ecosystem. Zooplankton and jellyfish are collected for species ID, biomass, and abundance. Zooplankton is an important prey item of numerous EBS fishes including forage fishes and the juvenile stages of many commercially important species. Understanding the links among phytoplankton, zooplankton, and fish will further AFSC's understanding of changes in the populations of fish stocks and the influence of climate change in this region (http://www.afsc.noaa.gov/ABL/EMA/EMA_Oceanography.php). In 2005, the AFSC also compiled baseline socioeconomic information about the 136 Alaska communities most involved in commercial fisheries. The AFSC has recently updated these profiles including information collected from communities in the Alaska Community Survey, which was conducted during summer 2011 and fall 2012, and the Processor Profiles Survey, which was conducted in fall 2011. http://www.afsc.noaa.gov/REFM/Socioeconomics/Projects/CPU.php http://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-230.pdf	

NMFS

The NMFS' Habitat Conservation Division (HCD) works in coordination with industries, stakeholder groups, government agencies, and private citizens to avoid, minimize, or offset the adverse effects of human activities on Essential Fish Habitat (EFH) and living marine resources in Alaska. This work includes conducting and/or reviewing environmental analyses for a large variety of activities ranging from commercial fishing to coastal development to large transportation and energy projects. HCD identifies technically and economically feasible alternatives and offers realistic recommendations for the conservation of valuable living marine resources. HCD focuses on activities in habitats used by federally managed fish species located offshore, nearshore, in estuaries, and in freshwater areas (http://www.fakr.noaa.gov/habitat/default.htm).

FATE

Fisheries and the Environment (FATE) is a NOAA program that supports NOAA's mission to ensure the sustainable use of US fishery resources under a changing climate. The focus of FATE is on the development, evaluation, and distribution of leading ecological and performance indicators. The mission of the 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.

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 forcing and the growth, distribution, or reproductive success of managed species.

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

USCG

Protecting the U.S. EEZ and key areas of the high seas is an important mission for the USCG. The Coast Guard enforces fisheries laws at sea, both domestic and international fishing agreements as tasked by the MSA. Furthermore, the goal of the USCG’s marine protected species program is to assist the NMFS and the FWS in the development and enforcement of those regulations necessary to help recover and maintain the country’s marine protected species and their marine ecosystems. Coast Guard objectives include assisting in preventing the decline of marine protected species populations, promoting the recovery of marine protected species and their habitats, partnering with other agencies and organizations to enhance stewardship of marine ecosystems and ensuring internal compliance with appropriate legislation, regulations and management practices (http://

www.uscg.mil/hq/cg5/cg531/LMR.asp).

RAM
The NMFS Alaska Regional Office's Restricted Access Management Program (RAM) is responsible for managing Alaska Region permit programs, including those that limit access to the Federally-managed fisheries of the North Pacific. RAM prepares and distributes reports on landings in the federal fisheries (http://alaskafisheries.noaa.gov/ram).

AFKIN
The Alaska Fisheries Information Network (AKFIN) was established in 1997 under the direction of the Pacific States Marine Fisheries Commission (PSMFC) to consolidate, manage and dispense information related to Alaska's commercial fisheries. AFKIN was founded in response to an increased need for detailed, organized fishery information to help in making management decisions with a mission to maintain an analytic database of both state and federal historic, commercial Alaska fisheries data relevant to the needs of fisheries analysts and economists and to provide that data in a usable format (http://www.akfin.org/about-akfin).

ANILCA
In addition, 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 conservation and management, tourism, and transportation work as a team to provide input throughout federal planning processes.
http://dnr.alaska.gov/commis/opmp/anilca/

OPMP
Moreover, 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/).

Evidence adequacy rating:

☑**High**	☐ **Medium**	☐ **Low**
☑ **Full Conformity**	☐ **Minor Non-conformity**	☐ **Major Non-conformity**

☐ Critical Non-conformity	
Clause:	**Evidence**
2.6.1	**Rating determination** *Alaska fisheries management agencies promote multidisciplinary research in support and improvement of coastal area management, in particular on its environmental, biological, economic, social, legal and institutional aspects.* The agencies reported above (in clause 2.6) and their efforts are continuously aimed at improving the management of the coastal areas of Alaska. Environmental, biological, economic, social, legal and institutional aspects of the coastal zone are routinely researched, many times using a multidisciplinary approach. Please see clause 2.6 for some examples and evidence.

Clause:		
2.7 In the case of activities that may have an adverse transboundary environmental effect on coastal areas, States shall: **a) Provide timely information and, if possible, prior notification to potentially affected States;** **b) Consult with those States as early as possible.** ***FAO CCRF 10.3.2***		
Evidence adequacy rating:		
☐**High**	☐ **Medium**	☐ **Low**
☐ **Full Conformity**	☐ **Minor Non-conformity**	☐ **Major Non-conformity**
☐ **Critical Non-conformity**		

Clause:	**Evidence**
2.7	**This clause is not applicable for most BSAI and GOA flatfish stocks**. The U.S. and Russia both consistently publish management data (TACs, catch data) and are both signatories of the Agreement on Mutual Fisheries Relations (first signed in 1988) for conservation, management and optimal utilization of shared fisheries resources between both nations. The agreement is not specific to flatfish alone, but does call for cooperation, shared science, conservation and management of fisheries resources. http://www.nmfs.noaa.gov/ia/slider_stories/2013/04/us_russia.html

	http://www.nmfs.noaa.gov/ia/slider_stories/2013/04/agreement.pdf **Please see clause 1.2 and 1.3 for further information.**	

Clause: **2.8 States shall cooperate at the sub-regional and regional level in order to improve coastal area management.** ***FAO CCRF 10.3.3***
Evidence adequacy rating: ☑**High** ☐ **Medium** ☐ **Low**
☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**

Clause:	**Evidence**	
2.8	**Rating determination** *There is intimate, routine and compatible collaboration between state and federal management systems in order to improve coastal area management. The NEPA process brings together the various federal and state agencies whenever a fishery specific development or proposal for change in management is brought forth regarding the coastal zone in Alaska.* There is intimate, routine and compatible collaboration between state and federal management. This is highlighted by the Joint Protocol of 1997 between the NPFMC and the Alaska Board of Fisheries (BOF), which intent is to provide long-term cooperative, compatible management systems that maintain the sustainability of the fisheries resources in State and Federal waters, setting up an annual Joint BOF/NPFMC meeting on coordinating state/federal issues. The September 1999 addendum to the Joint Protocol and State/Federal Action Plan designated a subgroup of the BOF and NPFMC to their joint protocol committee and specified staffing issues. The NEPA process brings together the various federal and state agencies whenever a fishery specific development or proposal for change in management is proposed over the coastal zone in Alaska. The Alaska National Interest Lands Conservation Act (ANILCA) directs federal agencies to consult and coordinate with the state of Alaska. Moreover, the Department of Natural Resources (DNR) Office of Project Management and	

	Permitting (OPMP) coordinates the review of larger scale projects in the state. **Evidence** http://www.adfg.alaska.gov/index.cfm?adfg=fisheriesboard.findings http://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/findings/ff97170a.pdf http://dnr.alaska.gov/commis/opmp/ http://dnr.alaska.gov/commis/opmp/anilca/	

Clause:

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

FAO CCRF 10.4.1

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	**Evidence**	
2.9	**Rating determination** *Alaska has established mechanisms for cooperation and coordination among national authorities involved in planning, development, conservation and management of coastal areas.* Alaska has established mechanisms for cooperation and coordination among national authorities involved in planning, development, conservation and management of coastal areas. The NMFS in connection with the NPFMC manage the flatfish complex resources in the BSAI and the GOA, and participate in coastal area management-related institutional frameworks through the NEPA processes. This usually happens whenever resources under their management may be affected by other developments. Federal agencies, including the NPFMC, are responsible for producing NEPA documents each time they renew or amend regulations. Therefore, all of the NPFMC proposed regulations include NEPA considerations. The 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/). 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 the Aleutian Island Ecosystem Plan, 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/).	

Clause:

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

FAO CCRF 10.4.2

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	**Evidence**	
2.10	**Rating determination** *The federal agencies involved in the management of the flatfish complex resources in the waters off Alaska have the appropriate technical capacity and financial resources to carry out their mandates.* The federal agencies involved in the management of the flatfish complex resources in the federal waters off Alaska have the appropriate technical capacity and financial resources to carry out their mandates. The technical capacities of these agencies are conducted by internationally recognized scientists, experienced fishery managers and policy makers, which in most cases devote their entire career to the agency they work for and the resource they manage. Also, please see discussion and evidence about the financing of fisheries in **clause 1.6**.	

<table>
<tr><td colspan="3">Clause:

2.11 States and fisheries management organizations and arrangements shall regulate fishing in such a way as to avoid the risk of conflict among fishers using different vessels, gear and fishing methods.

FAO CCRF 7.6.5</td></tr>
<tr><td colspan="3">Evidence adequacy rating:

☑High ☐ Medium ☐ Low</td></tr>
<tr><td colspan="3">☑ Full Conformity ☐ Minor Non-conformity ☐ Major Non-conformity

☐ Critical Non-conformity</td></tr>
<tr><td>Clause:</td><td>Evidence</td><td></td></tr>
<tr><td>2.11</td><td>Rating determination
The NPFMC public meeting process allows for stakeholder input towards rule making and allocation to the various gear groups to avoid conflict. The management system in Alaska uses applicable law and FMPs to regulate fisheries in such a way as to reduce conflict among participants.

In Alaska, for both state and federal waters, flatfish complex species are caught using trawl, and longline gear. The NPFMC management process follows FMPs and the MSA to set specific regulations for each species, species complex, gear type, area and fishery participant.

The NPFMC public meeting processes allows for stakeholder input towards rule making and allocation of catch to the various gear groups and cooperatives to avoid conflict. The flatfish fisheries also operate under prohibited species catch limits for important species like Pacific halibut, salmon and herring. There are well-established trawl closure areas where crabs are protected from groundfish gear, partly eliminating gear conflicts between the crab and groundfish fleets. In fact, flatfish fisheries are under capacity in many cases because of bycatch caps for other species being reached and the fishery closed.

Evidence
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf

http://alaskafisheries.noaa.gov/npfmc/catch-shares-allocation/AM80-cooperatives.html</td><td></td></tr>
</table>

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*						
Confidence Ratings	**Low**	**0 out of 6**	**Medium**	**0 out of 6**	**High**	**6 out of 6**

Clause: **3.1 Long-term management objectives shall be translated into a plan or other management document and be subscribed to by all interested parties.** ***FAO CCRF 7.3.3*** ***ECO 28.1***		
Evidence adequacy rating: ☑**High** ☐ **Medium** ☐ **Low**		
☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**		
Clause:	**Evidence**	
3.1	**Rating determination** *The MSA serves as the overarching fisheries management document for all fisheries in the U.S. The BSAI and GOA FMPs present long-term management objectives for the Alaskan flatfish complex fisheries.* 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. **These include FMPs for the flatfish complex fisheries in the GOA and the BSAI.** Both FMPs present long-term management objectives for the flatfish complex 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. They provide more detailed evidence for additional clauses in this section.

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 FMP for the groundfish fishery in the BSAI and the FMP for the GOA groundfish fishery. The historical and scientific information and analytical discussions contained herein 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)

A 2012 NPMFC discussion paper briefly reviews factors that may influence the timing for supplementing or updating the 2004 Groundfish PSEIS, and suggests an approach the Council might take to help in this deliberation. The paper also summarizes changes to the groundfish management program, which have occurred in the years since the adoption of the management policy. The management changes are mapped to the Council's management policy objectives, to provide a basis for Council review. Environmental changes since 2004 are also discussed briefly.
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/PSEISdiscuspap211.pdf

State Fisheries

State fisheries for flatfish follow the federal management guidelines under a parallel fishery emergency order from the state BOF. There is no conflict between state and federal authority.

Evidence

http://www.adfg.alaska.gov/index.cfm?adfg=fisheriesboard.pastmeetinginfo2011_2012
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf

Clause:

3.2 Management measures shall provide inter alia that:

3.2.1 Excess fishing capacity is avoided and exploitation of the stocks remains economically viable;

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

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

3.2.4 Biodiversity of aquatic habitats and ecosystems is conserved and endangered species are protected;

3.2.5 Depleted stocks are allowed to recover or, where appropriate, are actively restored;

FAO CCRF 7.2.2

ECO 28.2

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	**Evidence**
3.2.1	**Rating determination** *Excess fishing capacity is avoided and exploitation of the stocks remains economically viable.* **The License Limitation Program (LLP)** In the GOA, in 1996, a moratorium on entry of new vessels into the groundfish fishery was implemented. The large number of vessels fishing for a limited resource had created a "race for fish," characterized by short seasons and economic inefficiency. The intent of the moratorium was to prevent these problems from worsening while comprehensive solutions were being developed. The eligibility period for moratorium qualification was January 1, 1988 through February 9, 1992, during which time a vessel shall have made at least one legal landing of groundfish. In June 1997, the NPFMC adopted an LLP to supersede the vessel moratorium. The LLP is the first step in fulfilling the NPFMC's commitment to develop a comprehensive rationalization program for the Alaska groundfish and crab fleet. The LLP limits the

number, size, and specific operation of vessels that may be used in fisheries for groundfish, other than demersal shelf rockfish east of 140 deg. W. long. and sablefish managed under the Individual Fishing Quota (IFQ) program for Pacific halibut and sablefish, in the EEZ off Alaska. Licenses would be issued to eligible applicants based on fishing that occurred from a qualifying vessel in endorsement areas in the BSAI, GOA, or BSAI/GOA management areas during the general qualification period. Licenses would be issued to either catcher vessel or catcher/processor vessel categories. Minimum landings requirements vary according to vessel length category, the area, and vessel length designation. The LLP was approved by the Secretary in September 1997.

As of January 1, 2000 a Federal LLP license is required for vessels participating in directed fishing for LLP groundfish species in the GOA or BSAI, or fishing in any BSAI LLP crab fisheries. A vessel must be named on an original LLP license that is onboard the vessel. The LLP license requirement is in addition to all other permits or licenses required by federal regulations. The LLP is a Federal program and LLP licenses are not required for participation in fisheries that occur in the waters of the State of Alaska.

The Restricted Access Management (RAM) Program has prepared lists of License Limitation Program (LLP) groundfish and crab licenses. LLP licenses are initially issued to persons, based on the activities of original qualifying vessels.

There are four exceptions to the LLP license requirement:

1. vessels that do not exceed 26 feet in Length Overall (LOA) in the GOA;

2. vessels that do not exceed 32 feet LOA in the BSAI;

3. vessels that do not exceed 60 feet LOA and that are using jig gear (but no more than 5 jig machines, one line per machine, and 15 hooks per line) are exempt from the LLP requirements in the BSAI; and,

4. certain vessels constructed for, and used exclusively in, Community Development Quota fisheries.

http://alaskafisheries.noaa.gov/ram/llp.htm

GOA Flatfish Complex Allocations

The GOA groundfish fisheries are among the few remaining limited access (not rationalized) fisheries in Alaska. Flatfish are taken in the GOA with primarily trawl gear. Certain species may be caught on longline gear set for sablefish or Pacific halibut, however there is no directed longline fishery for flatfish. The flatfish fishery in the GOA is a combination of catcher vessels and catcher processors. The catcher vessels are generally smaller than the catcher processors and tend to deliver their catch to processing plants on shore. There were 59 vessels participating in the central GOA trawl fleet in 2010, by weight 34% of their overall catch was flatfish. The 2010 western GOA trawl fleet consists of 39 vessels and their flatfish take was 47% of their overall catch by weight. According to US Coast Guard 2012 data, there are approximately 85 vessels fishing the flatfish complex in the GOA.

To limit the ability of the Amendment 80 fleet to expand their harvest capacity in other fisheries not allocated under the Amendment 80 program, the fleet is constrained by sector wide harvest limits in the GOA, commonly known as sideboards, that limit the catch of pollock, Pacific cod, northern rockfish, Pacific ocean perch, and pelagic shelf rockfish, as well as halibut PSC based on harvest patterns during 1998 through 2004. Halibut PSC sideboard limits were designed to limit effort by GOA flatfish qualified Amendment 80 vessels in the GOA flatfish fisheries.

All Amendment 80 vessels, other than the Golden Fleece, may not exceed the halibut PSC sideboard limit. In addition, participation in the GOA flatfish fishery is prohibited for vessels with less than 10 weeks of history in the GOA flatfish fisheries. One vessel is exempt from the GOA halibut PSC sideboard limits (F/V Golden Fleece), having fished 80% of its weeks in the GOA flatfish fisheries from 2000 through 2003.

ABC for each flatfish species is divided amongst the four INPFC areas in the GOA (Western, Central, West Yakutat and East Yakutat/ Southeast).
http://alaskafisheries.noaa.gov/sustainablefisheries/specs13_14/goatable1.pdf
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/resources/FleetProfiles412.pdf
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/resources/FleetProfilesAdd1112.pdf

BSAI Flatfish Complex Allocations

Groundfish licenses are currently required to participate in the BSAI groundfish fisheries in Federal waters. Groundfish licenses contain endorsements that define what the vessel using the license is allowed to do. An area endorsement defines the geographic location the license allows a vessel to fish. Under the groundfish LLP, separate BS and AI area endorsements were earned and issued based on historic fishing patterns. Licenses may contain endorsements for both areas (BS and AI), or one of the two areas. Gear endorsements define what type of gear may be used: non-trawl, trawl, or both.

The Amendment 80 program, implemented in 2008, allocates several BSAI non-pollock trawl groundfish species among trawl fishery sectors and facilitates the formation of harvesting cooperatives in the non- AFA trawl catcher processor sector. The Amendment 80 program was designed to meet the broad goals of (1) improving retention and utilization of fishery resources by the non-AFA trawl catcher processor fleet; (2) allocating fishery resources among BSAI trawl harvesters in consideration of historic and present harvest patterns and future harvest needs; (3) establishing a limited access privilege program (LAPP) for the non-AFA trawl catcher processors and authorizing the allocation of groundfish species to harvesting cooperatives to encourage fishing practices with lower discard rates and to improve the opportunity for increasing the value of harvest species while lowering costs; and (4) limiting the ability of non-AFA trawl catcher processors to expand their harvest capacity into other fisheries not managed under a limited access privilege program.

Flatfish are taken in the BSAI with both trawl and longline gears. The BSAI flatfish fishery is almost entirely conducted by catcher processors. Catcher processors utilize onboard equipment to process and freeze the catch. These vessels range in size from 110 to 300 feet, and carry crews up to 50 people. In 2010, 21 vessels in the Amendment 80 catcher processor fleet fishing in the BSAI and 63% of their catch by weight is flatfish.

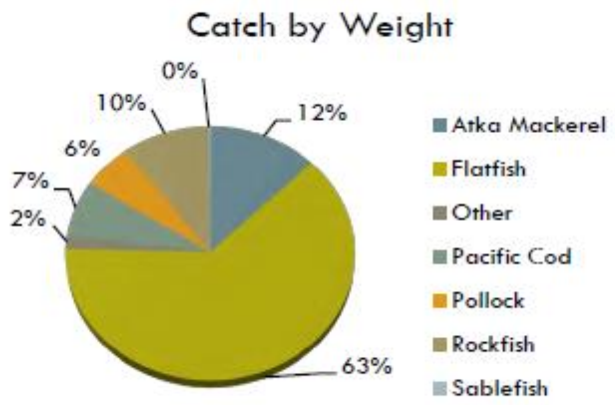


Figure 3.1. Amendment 80 fleet catch for 2010, by weight.

Additionally, 21 other trawl vessels make deliveries to the Amendment 80 catcher processors and shoreside fish plants. According to U.S. Coast Guard 2012 data, there are approximately 87 vessels fishing the flatfish complex in the BSAI. The longline vessels operating in the BSAI are typically freezer vessels, processing the catch at-sea, they catch half of the overall Greenland turbot quota.

http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/resources/FleetProfilesAdd1112.pdf
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/resources/FleetProfiles412.pdf

Economic Viability

The flatfish fisheries in Alaska provide a valuable economic input and the value of these fisheries has increased over the last 5 years.

Table 3.1. Ex-vessel value of the groundfish catch off Alaska by area, vessel category, gear, and species, 2007 - 2011 ($ millions) (top dataset is hook and line, bottom dataset is trawl fisheries).

		Gulf of Alaska			Bering Sea and Aleutian Islands			All Alaska		
	Year	Catcher vessels	Catcher proces-sors	Total	Catcher vessels	Catcher proces-sors	Total	Catcher vessels	Catcher proces-sors	Total
Flatfish	2007	0	0.1	0.1	*	0.2	0.2	0	0.3	0.3
	2008	0	0	0	*	0.1	0.1	0	0.2	0.2
	2009	0	0	0	*	0.1	0.1	0	0.1	0.1
	2010	0	0.1	0.1	*	0.1	0.1	0	0.2	0.2
	2011	0	0	0	*	0.9	0.9	0	1	1

	2007	7.2	2.6	9.8	2.3	63.6	65.9	9.5	66.2	75.7
	2008	8.3	2.7	11	1.6	83.2	84.8	9.9	85.9	95.7
Flatfish	2009	6.7	1.9	8.7	2.3	60.1	62.5	9.1	62	71.1
	2010	4.7	1.7	6.4	1	72.7	73.7	5.8	74.4	80.2
	2011	5	3.1	8.1	1.6	102.5	104.1	6.6	105.6	112.2

Evidence
http://alaskafisheries.noaa.gov/npfmc/catch-shares-allocation/AM80-cooperatives.html
http://www.afsc.noaa.gov/REFM/Docs/2012/economic.pdf

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	Evidence
3.2.2	**Rating determination**

The economic conditions (profitable and stable) under which the Alaskan flatfish complex fisheries operate promote responsible fisheries.

The Alaskan flatfish complex fisheries are very tightly managed and have largely remained economically stable since the 1990s.

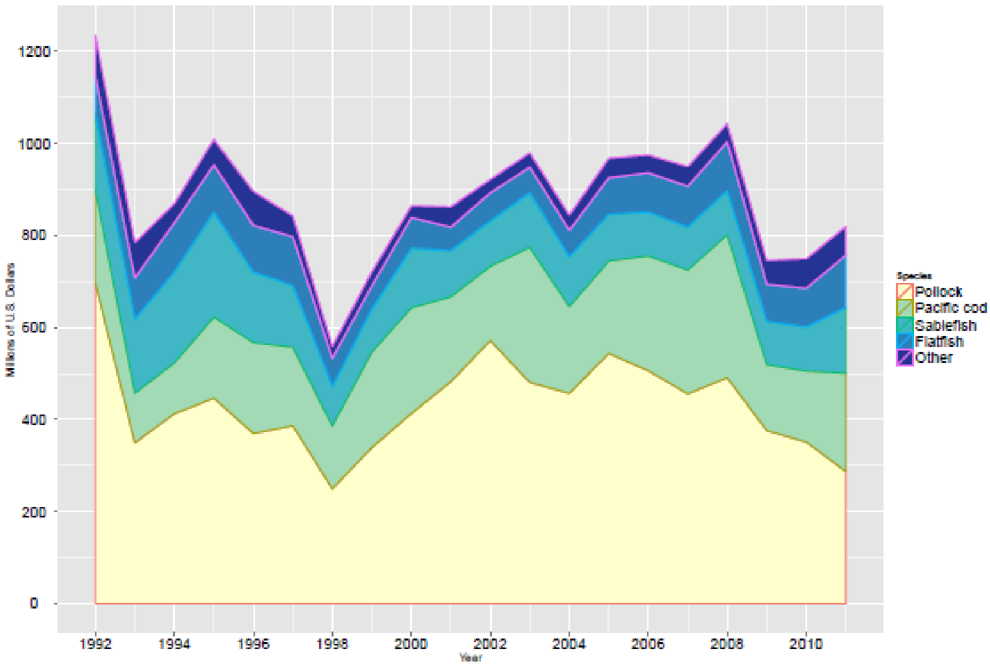


Figure 3.2. Real ex-vessel value of the groundfish catch in the domestic commercial fisheries of Alaska by species, 1992-2011 (base year = 2011).

	http://www.afsc.noaa.gov/refm/docs/2012/economic.pdf The groundfish fisheries off Alaska are required to harvest their target catch under the constraints of improved retention/improved utilization (IR/IU). This requires full retention of pollock, Pacific cod and the shallow water flatfish complex (in the GOA). Large incidental catches of non-target species can close a fishery. This program has reduced waste and improved efficiency and targeting. Highgrading and discarding was significantly reduced, increasing the economic cost/benefit ratio of the fishery. Amendments 79 & 80 have set the retention rate in BSAI trawl fisheries at 85% as of 2010. All Amendment 80 vessels, regardless of size, are required to meet GRS requirements in the BSAI. GRS requirements apply on a vessel-by-vessel basis for vessels fishing in the Amendment 80 limited access fishery, and within each Amendment 80 cooperative, on an aggregated basis for all vessels within that cooperative. http://alaskafisheries.noaa.gov/sustainablefisheries/amds/80/program_overview.pdf However, it is important to realize that the groundfish TACs in the BSAI and GOA 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 reliable estimates of total catch by species, not the disposition of that catch. http://www.afsc.noaa.gov/refm/docs/2012/economic.pdf http://alaskafisheries.noaa.gov/regs/part679_all.pdf	
Evidence adequacy rating: **☑High** ☐ **Medium** ☐ **Low**		
☑ Full Conformity ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**		
Clause:	**Evidence**	
3.2.3	**Rating determination** *The interests of fishers, including those engaged in subsistence, small-scale and artisanal fisheries are taken into account.* The GOA and BSAI FMPs describe management measures designed to take into account the interests of subsistence, small-scale, and artisanal fisheries. Specific FMP management objectives and sub-objectives include: CDQ allocations, the promotion of sustainable fisheries and communities, the promotion of equitable and efficient use of	

	fishery resources and increased Alaska native consultation (Further details can be found in the FMPs). **Community Development Quota Programs** The CDQ Program was created by the NPFMC in 1992 to provide western Alaska communities an opportunity to participate in the BSAI fisheries that had been closed to them before because of the high capital investment needed to enter the fishery. It allocates 10.7% of all BSAI quotas for groundfish (including flatfish), prohibited species, halibut, and crab to eligible communities. The purpose of the CDQ Program is to (i) to provide eligible western Alaska villages with the opportunity to participate and invest in fisheries in the Bering Sea and Aleutian Islands Management Area; (ii) to support economic development in western Alaska; (iii) to alleviate poverty and provide economic and social benefits for residents of western Alaska; and (iv) to achieve sustainable and diversified local economies in western Alaska. **State subsistence management** Although there are no targeted subsistence fisheries for flatfish occurring in the State of Alaska, ADFG is responsible for managing subsistence, commercial (in state waters), sport, and personal use fisheries. The highest priority use is for subsistence under both state and federal law. The Alaska BOF adopts regulations through a public process to conserve and allocate fisheries resources to various user groups. Subsistence fisheries management includes coordination with the Federal Subsistence Board and Office of Subsistence Management, which also manages subsistence uses by rural residents on federal lands and applicable waters under Title VIII of the Alaska National Interest Lands Conservation Act (ANILCA). http://www.legis.state.ak.us/basis/folioproxy.asp?url=http://wwwjnu01.legis.state.ak.us/cgi-bin/folioisa.dll/aac/query=[JUMP:'5+aac+77!2E015']/doc/{@1}/hits_only?firsthit http://www.doi.gov/subsistence/regulation/fish_shell/upload/entireFishRegbook.pdf The State of Alaska cooperated with the NPFMC to assure that small community based vessels would fish under the NPFMC rationalization programs, and also assured that consideration for CDQ groups were incorporated into the NPFMC plans, including CDQ allocations and vessel exemptions (see NPFMC archives). **Evidence** http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	Evidence
3.2.4	**Rating determination** *The NPFMC has developed a comprehensive approach to protect and conserve biodiversity of aquatic habitat and ecosystems. The NMFS is responsible for maintaining the endangered species list for marine species and managing those species once they are listed. By law, the Commissioners of ADFG and Natural Resources must take measures to preserve the natural habitat of fish and wildlife species that are recognized as threatened with extinction.* The NPFMC has developed a comprehensive approach to protect and conserve the biodiversity of aquatic habitat and ecosystems. The Groundfish FMPs for the GOA and the BSAI set regulations for the sustainable exploitation of the groundfish resources, including flatfish. In addition to this, the bycatch in each of these fisheries making up the groundfish complex are taken into account and managed accordingly in one form or another (i.e. PSC limits, Maximum Retainable Allowance etc..). The groundfish TACs in the BSAI and GOA 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 good estimates of total catch by species, not based on the disposition of that catch. http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf Also, management regulations are in place that recognize and protect EFH, define area closures to protect habitat or reduce bycatch impacts, prohibit the harvest of forage fish, split TAC harvest seasonally to limit impacts on spawning stocks and maintain total groundfish harvests below the OY ecosystem caps in the BSAI and the GOA. These frameworks are concerned with the overall conservation of biodiversity in aquatic habitats and ecosystems in the GOA and BSAI. There are two Forage Fish Amendments (BSAI FMP Amendment 36 and GOA FMP Amendment 39) accounting for herring, sandlance, euphausiids, etc... The amendments defined a forage fish species category and authorize that the management of this species category be specified in regulations in a manner that prevents the development of a commercial directed fishery for forage fish which are a critical food source for many marine mammal, seabird and commercial fish species. http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmpAppendix613.pdf http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmpAppendix613.pdf In addition to this, the purpose of the Endangered Species Act (ESA) is to conserve threatened and endangered species and their ecosystems. A species is considered endangered if it is in danger of extinction throughout all or a significant portion of its

range. Two federal agencies, the NMFS and the USFWS, are responsible for maintaining lists of species that meet the definition of threatened or endangered under the ESA. The NMFS is responsible for maintaining the endangered species list for marine species and managing those species once they are listed. The USFWS is responsible for maintaining the endangered species list for terrestrial and freshwater species and managing those species once they are listed. NMFS and USFWS must determine if any species is endangered due of any of the following factors:

- The present or threatened destruction, modification, or curtailment of its habitat or range;
- Overutilization for commercial, recreational, scientific, or educational purposes;
- Disease or predation;
- The inadequacy of existing regulatory mechanisms;
- Other natural or manmade factors affecting its continued existence.

These are the species in Alaska designated as endangered by NMFS and USFWS:

- Aleutian Shield Fern
- Blue Whale
- Bowhead Whale
- Cook Inlet Beluga Whale
- Eskimo Curlew
- Fin Whale
- Humpback Whale
- Leatherback Sea Turtle
- North Pacific Right Whale
- Sei Whale
- Short-tailed Albatross
- Sperm Whale
- Steller Sea Lion (west of 144º)

The listing of a species as endangered makes it illegal to "take" (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to do these things) that species. Federal agencies may be allowed limited take of species through interagency consultations with NMFS or USFWS. Non-federal individuals, agencies, or organizations may be granted limited take through special permits with conservation plans. Adverse effects on listed species must be minimized, and in some cases conservation efforts are required to offset the take.

The USFWS is also responsible for maintaining the threatened species list for terrestrial and freshwater species and managing those species once they are listed. NMFS and USFWS must determine if any species is threatened because of any of the following factors:

- The present or threatened destruction, modification, or curtailment of its habitat of range;
- Overutilization for commercial, recreational, scientific, or educational purposes;
- Disease or predation;
- The inadequacy of existing regulatory mechanisms;
- Other natural or manmade factors affecting its continued existence.

All states contain species that are listed as threatened under the ESA. Some states are home to hundreds of threatened species. Alaska has relatively few species (8 species) designated as threatened by NMFS and USFWS. These are:

- Green Sea Turtle
- Loggerhead Sea Turtle
- Northern Sea Otter (SW AK popn.)
- Olive Ridley Sea Turtle
- Polar Bear
- Spectacled Eider
- Steller Sea Lion (east of 144 º)
- Steller's Eider
- Wood Bison

Many species that are rare, endangered, or have been extirpated elsewhere in the United States are thriving in Alaska. The geographical isolation, relatively recent growth in population, limited development, small agricultural industry, conservative laws on the introduction and importation of exotic animals, all contribute to this favorable condition. Alaska's primary advantage has been the state's remoteness and isolation.

Critical Habitat

The ESA requires that management agencies identify and protect critical habitat for all endangered and threatened species. Critical habitat is defined as the land, water, and air necessary for the recovery of the endangered and threatened species, and the extent and location of critical habitat will be determined by the species needs of open space for individual and population growth, food, water, light (or other nutritional requirements), breeding sites, dispersal, seed germination, and lack of disturbance. Critical habitat has been designated for some, but not all, endangered/threatened species that occur in Alaska. Detailed information for species is available at the following websites.

http://www.adfg.alaska.gov/index.cfm?adfg=specialstatus.fedendangered

http://www.adfg.alaska.gov/index.cfm?adfg=specialstatus.fedthreatened

State Species of Concern

ADFG is responsible for determining and maintaining a list of endangered species in Alaska under AS 16.20.190. A species or subspecies of fish or wildlife is considered endangered when the Commissioner of ADFG determines that its numbers have decreased to such an extent as to indicate that its continued existence is threatened.

The State Endangered Species List currently includes two birds (Short-tailed Albatross and Eskimo Curlew) and three marine mammals (blue whale, humpback whale, and right whale). The five State listed species are also listed as endangered under the United States ESA. The parameters that define endangered species differ between State and Federal authorities.

Protection of Habitat

By law, the Commissioners of ADFG and Natural Resources must take measures to preserve the natural habitat of fish and wildlife species that are recognized as threatened with extinction. Details on protection of habitat can be found in AS 16.20.185.

The flatfish fleet in Alaska has quota for fishing Pacific cod. This species is considered to be a key prey species of Steller sea lions. In this regard, specific habitat protection measures are applicable. These are specified in the BSAI and GOA Groundfish FMPs:

- Maintain or adjust current protection measures as appropriate to avoid jeopardy of extinction or adverse modification of critical habitat for ESA-listed Steller sea lions.
- Encourage programs to review status of endangered or threatened marine mammal stocks and fishing interactions and develop fishery management measures as appropriate.
- For groundfish species identified as key prey of Steller sea lions (i.e., walleye pollock, Pacific cod, and Atka mackerel), directed fishing is prohibited in the event that the spawning biomass of such a species is projected in the stock assessment to fall below $B_{20\%}$ in the coming year.
- Gear testing exemptions must not be within a designated Steller sea lion protection area at any time of the year.

Federal Habitat Protection

Ocean habitat is essential for maintaining productivity of fishery resources, and is a key component of an ecosystem-oriented management approach.

Habitat that provides structural relief on an otherwise featureless bottom can be particularly important to fish for food, reproduction, and shelter from predators.

Structural habitat includes boulders, corals, anemones, kelp, and other living organisms attached to the ocean bottom. Because fishing gear has the potential to disturb structural habitat, regulations have been implemented to protect areas where this habitat type is known to occur. Vast areas of the North Pacific have been permanently closed to groundfish trawling and scallop dredging to reduce potential adverse impacts on sensitive habitat and to protect benthic invertebrates. These marine protected areas comprise a relatively large portion of the continental shelf, and in many respects, serve as marine reserves. In addition, fishery closures established in nearshore areas to

	reduce interactions with Steller sea lions have ancillary benefits of reducing habitat impacts as well. All fishery management plans include a description and identification of essential fish habitat, adverse impacts, and actions to conserve and enhance habitat. Maps of essential fish habitat areas are used for understanding potential effects of proposed development and other activities (see Figure 3.3 below).

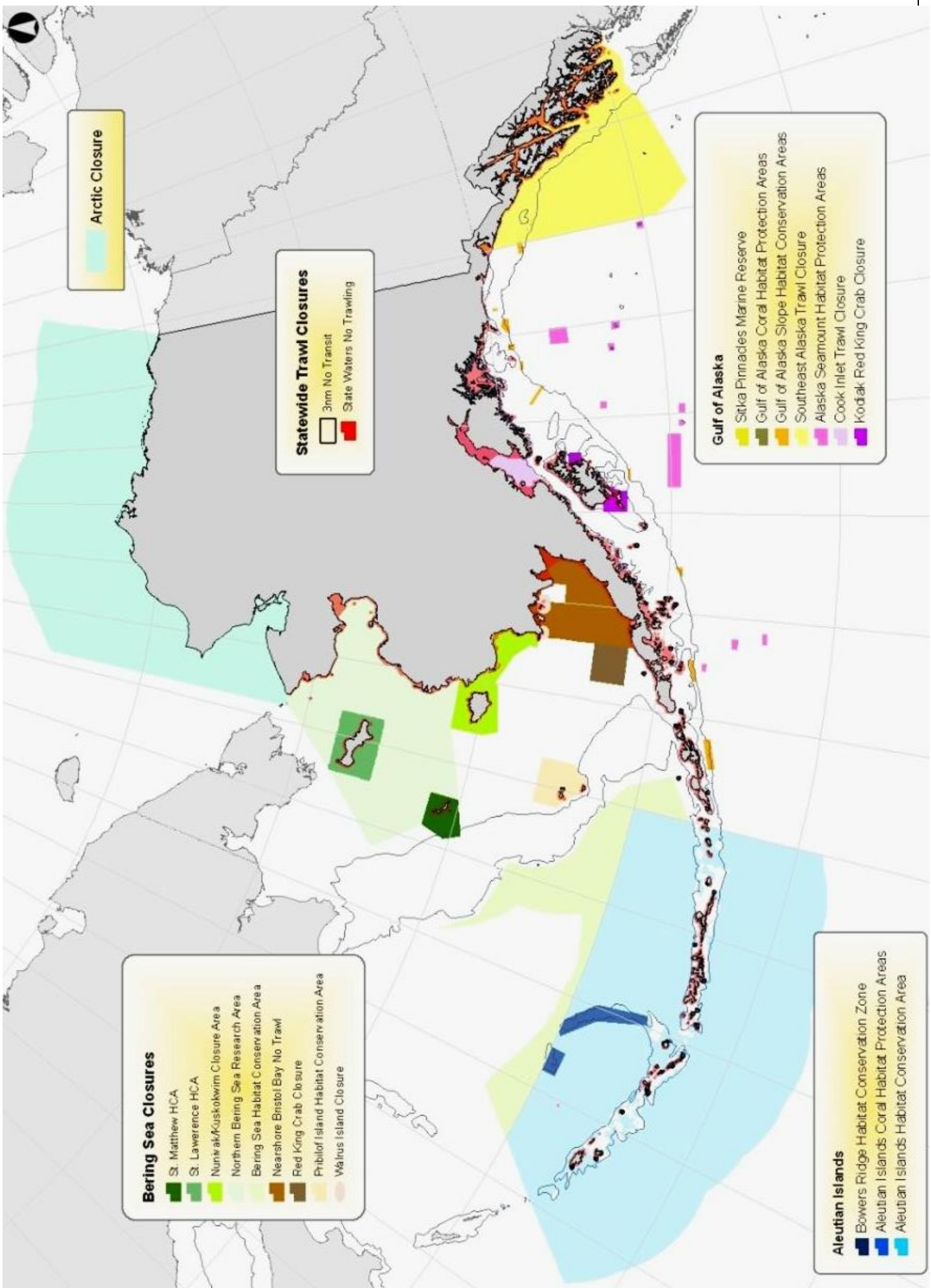


Figure 3.3. Closures and no-trawl areas throughout the BSAI and GOA.

Aleutian Islands

In February 2005, the Council adopted several new closure areas to conserve EFH. To minimize the effects of fishing on EFH, and more specifically to address concerns about the impacts of bottom trawling on benthic habitat (particularly on coral communities) in the Aleutian Islands, the Council took action to prohibit all bottom trawling in the Aleutians, except in small discrete “open” areas. Over 95% of the management area is closed to bottom trawling (277,100 nm2). Additionally, six Habitat Conservation Zones with especially high density coral and sponge habitat were closed to all bottom-contact fishing gear (longlines, pots, trawls). These “coral garden” areas, which total 110 nm2, are essentially marine reserves. To improve monitoring and enforcement of the Aleutian Island closures, a vessel monitoring system is required for all fishing vessels in the Aleutian management area.

Additionally, the Council adopted several new Habitat Areas of Particular Concern (HAPCs). The Alaska Seamount Habitat Protection Area encompasses all 16 seamounts in Federal waters off Alaska, named on NOAA charts, of which one occurs in the Aleutian Islands (Bowers). Bottom-contact fishing is prohibited in this HAPC. The Aleutian Islands Coral Habitat Protection Area designates six areas where submersible observations of high density coral have been made. All bottom-contact gear (longlines, trawls, pots, dinglebar gear, etc.) is prohibited in these areas. Additionally, the relatively unexplored Bowers Ridge is also identified as a HAPC. As a precautionary measure, the Council prohibited mobile fishing gear that contacts the bottom within this 5,286 nm2 area.

Bering Sea

In June 2007, the Council adopted precautionary measures to conserve benthic fish habitat in the Bering Sea by “freezing the footprint” of bottom trawling by limiting trawl effort only to those areas more recently trawled. Implemented in 2008, the new measures prohibit bottom trawling in a deep slope and basin area (47,000 nm2), and three habitat conservation areas around St Matthew Island, St Lawrence Island, and an area encompassing Nunivak Island-Etolin Strait-Kuskokwim Bay. The Council also established the Northern Bering Sea Research Area that includes the shelf waters to the north of St. Matthew Island (85,000 nm2). The entire Northern Bering Sea Research Area will be closed to bottom trawling while a research plan is developed.

Gulf of Alaska

Also in February 2005, bottom trawling for all groundfish species was prohibited in 10 designated areas along the continental shelf of the Gulf of Alaska. The GOA Slope Habitat Conservation Areas, which are thought to contain high relief bottom and coral communities, total 2,086 nm2.

	Additionally, the Council adopted several new HAPCs. The Alaska Seamount Habitat Protection Area encompasses all 16 seamounts in Federal waters off Alaska, named on NOAA charts, fifteen of which are in the Gulf of Alaska (Brown, Chirkikof, Marchand, Dall, Denson, Derickson, Dickins, Giacomini, Kodiak, Odessey, Patton, Quinn, Sirius, Unimak, and Welker). Bottom-contact fishing is prohibited in all of these HAPCs, an area which totals 5,329 nm2. In Southeast Alaska, three sites with large aggregations ("thickets") of long-lived Primnoa coral are also identified as HAPCs. These sites, in the vicinity of Cape Ommaney and Fairweather grounds, total 67 nm2. The Gulf of Alaska Coral Habitat Protection Area designates five zones within these sites where submersible observations have been made, totaling 13.5 nm2. All bottom-contact gear (longlines, trawls, pots, dinglebar gear, etc.) is prohibited in this area. **Arctic** In 2009, an Arctic Fisheries Management Plan was implemented. The plan covers the Arctic waters of the United States in the Chukchi and Beaufort seas. Warming ocean temperatures, migrating fish stocks and shifting sea ice conditions from a changing climate may potentially favor the development of commercial fisheries. The plan establishes a framework for sustainably managing Arctic marine resources. It initially prohibits commercial fishing in the Arctic waters of the region until more information is available to support sustainable fisheries management (an area roughly 150,000 sq nm2). **Evidence** http://www.adfg.alaska.gov/index.cfm?adfg=specialstatus.main http://www.fakr.noaa.gov/npfmc/bycatch-controls/GOA-salmon-bycatch.html http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf http://alaskafisheries.noaa.gov/npfmc/conservation-issues/habitat-protections.html http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Ecosystemapproach.pdf

Evidence adequacy rating:

☑ **High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	Evidence
3.2.5	**Rating determination** *Depleted stocks are allowed to recover or, where appropriate, are actively restored*

(through the harvest control rule, overfishing and overfished status determination). The BSAI and the GOA Alaska flatfish complex stocks are above the reference point and are not depleted, with the exception of Greenland turbot. Also, Kamchatka flounder and rex sole are conservatively managed using harvest rate reference points which are well below biomass estimates.

BSAI

Table 3.2. Biomass, OFL and ABC for BSAI flatfish.

BSAI	Year	$B_{35\%}$ (t)	$B_{40\%}$ (t)	Projected B_{SB} (t)	Projected B (t)	F_{OFL}	F_{ABC}	OFL (t)	Max ABC (t)
Alaska plaice	2013	133,000	152,000	260,500	588,500[3]	0.19	0.158	67,000	55,200
	2014			253,600	580,400[3]	0.19	0.158	60,200	55,800
arrowtooth flounder	2013	215,667	246,476	638,377	1,021,060[2]	0.21	0.17	131,985	111,204
	2014			642,518	1,014,250[2]	0.21	0.17	134,443	112,484
flathead sole	2013	112,250	128,286	245,175	748,454[3]	0.348	0.285	81,535	67,857
	2014			236,009	747,838[3]	0.348	0.285	80,069	66,657
Greenland turbot	2013	41,726	47,686	23,485	80,989[2]	0.14	0.12	2,539	2,064
	2014	41,726	47,686	26,537	94,752[2]	0.16	0.13	3,266	2,655
Kamchatka flounder	2013				108,800	0.13	0.098	16,300	12,200
	2014				108,800	0.13	0.098	16,300	12,200
northern rock sole	2013			260,000	1,465,600[1]	0.164	0.146	241,000	214,000
	2014			260,000	1,393,200[1]	0.164	0.146	229,000	204,000
yellowfin sole	2013			582,300	1,963,000[1]	0.112	0.105	220,000	206,000
	2014			601,000	1,960,000[1]	0.112	0.105	219,000	206,000

[1]—age 6+
[2]—age 1+
[3]—age 3+

The 2013 BSAI Alaska plaice stock spawning biomass is estimated to be well above $B_{40\%}$. BSAI spawning biomass for 2013 is estimated at a value of 260,500 t. This is above the BSAI $B_{40\%}$ value of 152,000 t, thereby placing Alaska plaice in sub-tier "a" of Tier 3. Given this, estimates of OFL, maximum permissible ABC, and the associated fishing mortality rates for 2013 and 2014 are found in the table above (2014 values are predicated on the assumption that 2013 catch will equal 2013 maximum permissible ABC; catches are for the entire BSAI).

The age 3+ Alaska plaice biomass projections for 2013 and 2014 are 588,500 t and 580,400 t.

The BSAI arrowtooth flounder stock spawning biomass is estimated to be well above $B_{40\%}$. BSAI spawning biomass for 2013 is estimated at a value of 638,377 t. This is above the BSAI $B_{40\%}$ value of 246,476 t, thereby placing arrowtooth flounder in sub-tier "a" of Tier 3. Estimates of OFL, maximum permissible ABC, and the associated fishing mortality rates for 2013 and 2014 are found in the table above (2014 values are predicated on the assumption that 2013 catch will equal 2013 maximum permissible ABC; catches are for the entire BSAI).

	The age 1+ arrowtooth flounder biomass projections for 2013 and 2014 are 1,021,060 t and 1,014,250 t. This year, the BSAI flathead sole stock spawning biomass is estimated to be well above $B_{40\%}$. BSAI spawning biomass for 2013 is estimated at a value of 245,175 t. This is above the BSAI $B_{40\%}$ value of 128,286 t, thereby placing flathead sole in sub-tier "a" of Tier 3. Estimates of OFL, maximum permissible ABC, and the associated fishing mortality rates for 2013 and 2014 are found in the table above (2014 values are predicated on the assumption that 2013 catch will equal 2013 maximum permissible ABC; catches are for the entire BSAI). The age 3+ flathead sole biomass projections for 2013 and 2014 are 748,454 t and 747,838 t. BSAI spawning biomass for 2013 is estimated at a value of 23,485 t. This is below the BSAI $B_{40\%}$ value of 47,686 t. Greenland turbot is a Tier 3b managed species. Given this, estimates of OFL, maximum permissible ABC, and the associated fishing mortality rates for 2013 and 2014 are found in the table above (2014 values are predicated on the assumption that 2013 catch will equal 2013 maximum permissible ABC; catches are for the entire BSAI). The age 1+ Greenland turbot biomass projections for 2013 and 2014 are 80,989 t and 94,752 t. Kamchatka flounder is a Tier 5 management species meaning there are reliable point estimates for the current biomass and the natural mortality rate, M. BSAI biomass for 2013 is estimated at a value of 108,800 t and the ABC is set at 75% of OFL. Kamchatka flounder is not a depleted stock, based on the conservative management principles applied to the stock. Estimates of OFL, maximum permissible ABC, and the associated fishing mortality rates for 2013 and 2014 are found in the table above (2014 values are predicated on the assumption that 2013 catch will equal 2013 maximum permissible ABC; catches are for the entire BSAI). The biomass projections for 2013 and 2014 are 108,800 t and 108,800 t. The BSAI northern rock sole stock B_0 is estimated to be well above B_{MSY}. B_{MSY} for 2013 is estimated at a value of 260,000 t. This divided into the B_0 value of 694,500 t, is greater than 1, thereby placing northern rock sole in sub-tier "a" of Tier 1. Estimates of OFL, maximum permissible ABC, and the associated fishing mortality rates for 2013 and 2014 are found in the table above (2014 values are predicated on the assumption that 2013 catch will equal 2013 maximum permissible ABC; catches are for the entire BSAI). The age 6+ biomass BSAI projections for 2013 and 2014 are 1,465,600 t and 1,393,200 t. The BSAI yellowfin sole stock B_0 is estimated to be well above B_{MSY}. Yellowfin sole B_{MSY} for 2013 is estimated at a value of 353,000 t. This divided into the B_0 value of 966,900 t, is greater than 1, thereby placing yellowfin sole in sub-tier "a" of Tier 1. Estimates of OFL, maximum permissible ABC, and the associated fishing mortality rates for 2013 and	

2014 are found in the table above (2014 values are predicated on the assumption that 2013 catch will equal 2013 maximum permissible ABC; catches are for the entire BSAI). The age 6+ biomass BSAI projections for 2013 and 2014 are 1,963,000 t and 1,960,000 t.

Table 3.3. Biomass, OFL and ABC for GOA flatfish.

GOA	Year	$B_{35\%}$ (t)	$B_{40\%}$ (t)	Projected B_{SB} (t)	Projected B (t)	F_{OFL}	F_{ABC}	OFL (t)	Max ABC (t)
arrowtooth flounder	2012	421,953	482,231	1,263,150	2,161,690[3]	0.207	0.174	250,100	212,882
	2013	421,953	482,231	1,278,530	2,133,320[3]	0.207	0.174	249,066	212,033
flathead sole	2012	36,354	41,547	104,301	292,189[3]	0.593	0.45	59,380	47,407
	2013	36,354	41,547	105,127	286,274[3]	0.593	0.45	60,219	48,081
northern rock sole	2013	17,600	20,100	42,700	89,300[3]	0.18	0.152	11,400	9,700
	2014	17,600	20,100	36,500	80,000[3]	0.18	0.152	9,900	8,500
southern rock sole	2013	39,500	45,100	82,800	208,800[3]	0.23	0.193	21,900	18,600
	2014	39,500	45,100	72,500	192,700[3]	0.23	0.193	19,300	16,400
rex sole	2012				87,162	0.17	0.128	12,561	9,612
	2013				85,528	0.17	0.128	12,326	9,432

[3]—age 3+

GOA

For the GOA arrowtooth flounder stock; spawning stock biomass for 2013 is estimated at a value of 1,278,530 t. This is above the $B_{40\%}$ value of 482,231 t, thereby placing arrowtooth flounder in sub-tier "a" of Tier 3. See the table above for the estimates of ABC and OFL. Arrowtooth flounder spawning stock biomass appears to be increasing. The age 3+ biomass projections for 2012 and 2013 are 2,161,690 t and 2,133,320 t.

The GOA flathead sole stock spawning biomass is estimated to be well above $B_{40\%}$. GOA spawning biomass for 2013 is estimated at a value of 105,127 t. This is above the GOA $B_{40\%}$ value of 41,547 t, thereby placing flathead sole in sub-tier "a" of Tier 3. Estimates of OFL, maximum permissible ABC, and the associated fishing mortality rates for 2012 and 2013 are found in the table above (2013 values are predicated on the assumption that 2012 catch was equal to 2012 maximum permissible ABC; catches are for the entire GOA).

The age 3+ flathead sole biomass projections for 2012 and 2013 are 292,189 t and 286,274 t.

The GOA northern rock sole stock spawning biomass is estimated to be well above $B_{40\%}$. GOA spawning biomass for 2013 is estimated at a value of 50,300 t. This is above the GOA $B_{40\%}$ value of 20,100 t, thereby placing northern rock sole in sub-tier "a" of Tier 3. Estimates of OFL, maximum permissible ABC, and the associated fishing mortality rates for 2013 and 2014 are found in the table above (2014 values are predicated on the assumption that 2013 catch will equal 2013 maximum permissible ABC; catches are for the entire GOA).

The age 3+ northern rock sole biomass projections for 2013 and 2014 are 89,300 t and 80,000 t.

The GOA southern rock sole stock spawning biomass is estimated to be well above $B_{40\%}$. GOA spawning biomass for 2013 is estimated at a value of 112,900 t. This is above the GOA $B_{40\%}$ value of 45,100 t, thereby placing arrowtooth flounder in sub-tier "a" of Tier 3. Estimates of OFL, maximum permissible ABC, and the associated fishing mortality rates for 2013 and 2014 are found in the table above (2014 values are predicated on the assumption that 2013 catch will equal 2013 maximum permissible ABC; catches are for the entire GOA).
The age 3+ southern rock sole biomass projections for 2013 and 2014 are 208,800 t and 192,700 t.

GOA rex sole is a Tier 5 management species meaning there are reliable point estimates for biomass and the natural mortality rate, M. GOA biomass for 2013 is estimated at a value of 85,528 t and the ABC is set at 75% of OFL. Estimates of OFL, maximum permissible ABC, and the associated fishing mortality rates for 2012 and 2013 are found in the table above (2013 values are predicated on the assumption that 2012 catch was equal to 2012 maximum permissible ABC; catches are for the entire GOA).
The biomass projections for 2012 and 2013 are 87,162 t and 85,528 t.

Overfishing and Overfished 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 (see also clause 7.1).

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 minimum stock size threshold (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 maximum fishing mortality threshold (MFMT), also referred as the "OFL control rule". MFMT is

	the level fishing mortality (F), on an annual basis, used to compute the smallest annual level of catch that would constitute overfishing. 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 MSA. 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 MSA 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 overfishing 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 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. In other words, fishing will be decreased or stopped accordingly. **Evidence** http://www.afsc.noaa.gov/refm/stocks/assessments.htm http://www.fakr.noaa.gov/npfmc/fishery-management-plans/bsai-groundfish.html http://www.fakr.noaa.gov/npfmc/fishery-management-plans/goa-groundfish.html	

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*** ***FAO Eco 29.1-29.3***						
Confidence Ratings	**Low**	**0 out of 14**	**Medium**	**0 out of 14**	**High**	**9 out of 14**

Clause:

4.1 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 shall be collected.

4.1.1 These data shall be collected, at an appropriate time and level of aggregation, by relevant management organizations connected with the fishery.

FAO CCRF 7.4.6, 7.4.7, 12.4

Eco 29.1-29.3

4.1.2 Timely and reliable statistics shall be compiled on catch and fishing effort and maintained in accordance with applicable international standards and practices and in sufficient detail to allow sound statistical analysis for stock assessment. Such data shall be updated regularly and verified through an appropriate system. The use of research results as a basis for the setting of management objectives, reference points and performance criteria, as well as for ensuring adequate linkage, between applied research and fisheries management shall be promoted.

FAO CCRF 7.4.4, 12.13

Eco 29.1

Evidence adequacy rating:

☑High **☐ Medium** **☐ Low**

☑ Full Conformity **☐ Minor Non-conformity** **☐ Major Non-conformity**

☐ Critical Non-conformity

Clause:	**Evidence**
4.1	**Rating determination** *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 flatfish stocks, abundance and ecosystems in the GOA and BSAI areas. GOA and BSAI SAFE documents provide complete descriptions of the data types and years collected.

The scheduled assessments for BSAI and GOA flatfish species use data collected from commercial landings and transhipment 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). A Stock Assessment and Fishery Evaluation report (SAFE) is produced for all of the flatfish species fisheries in the Bering Sea and Gulf of Alaska annually. However, the Aleutian Islands survey and the Gulf of Alaska survey alternate biennially and in years where no new survey data are available no new analysis is done. Thus, only model projections are contained in the 2012 SAFE reports for Gulf of Alaska flathead sole, arrowtooth flounder and rex sole.

Table 4.1. Data used for the AFSC flatfish complex assessments.

Species	Area	Year last assessed	Catch	Survey	Age composition	Length composition
Yellowfin sole	BSAI	2012	✓	✓	✓	✓
Flathead sole	BSAI	2012	✓	✓	✓	✓
N. Rock sole	BSAI	2012	✓	✓	✓	✓
Arrowtooth flounder	BSAI	2012	✓	✓	✓	✓
Alaska Plaice	BSAI	2012	✓	✓	✓	✓
Kamchatka flounder	BSAI	2012	✓	✓		
Greenland Turbot	BSAI	2012	✓	✓	✓	✓
Flathead sole	GOA	2011	✓	✓	✓	✓
Arrowtooth flounder	GOA	2011	✓	✓	✓	✓
Rex sole	GOA	2011	✓	✓	✓	✓
N. Rock sole	GOA	2012	✓	✓	✓	✓
S. Rock sole	GOA	2012	✓	✓	✓	✓

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, in many cases covering 100% of the fleet activity, is also 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, in many cases amounting to 100% coverage. The AFSC and NPRB conduct numerous research studies to increase the understanding of individual species and ecosystems.

The size of the groundfish stock area necessitates an extensive survey program http://www.afsc.noaa.gov/RACE/groundfish/survey_data/data.htm. Many of the commercial groundfish fisheries are managed on a limited entry basis, this necessitates in-season management that monitors TAC uptake on a daily basis to ensure that the

	TAC is not overshot http://alaskafisheries.noaa.gov/2013/2013.htm. **Fishery dependent data** Alaskan flatfish are distributed across a wide area in the North Pacific in both federal and state managed waters. The flatfish complex is fished with non-pelagic trawl (virtually all catch) and longline (only half of the Greenland turbot catch, about 1000 t). Flatfish species are associated with two federally managed fisheries, the GOA and the BSAI groundfish fisheries. 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, regulatory areas of the IPHC and offshore reporting areas under the jurisdiction of NMFS (Figure 4.1).

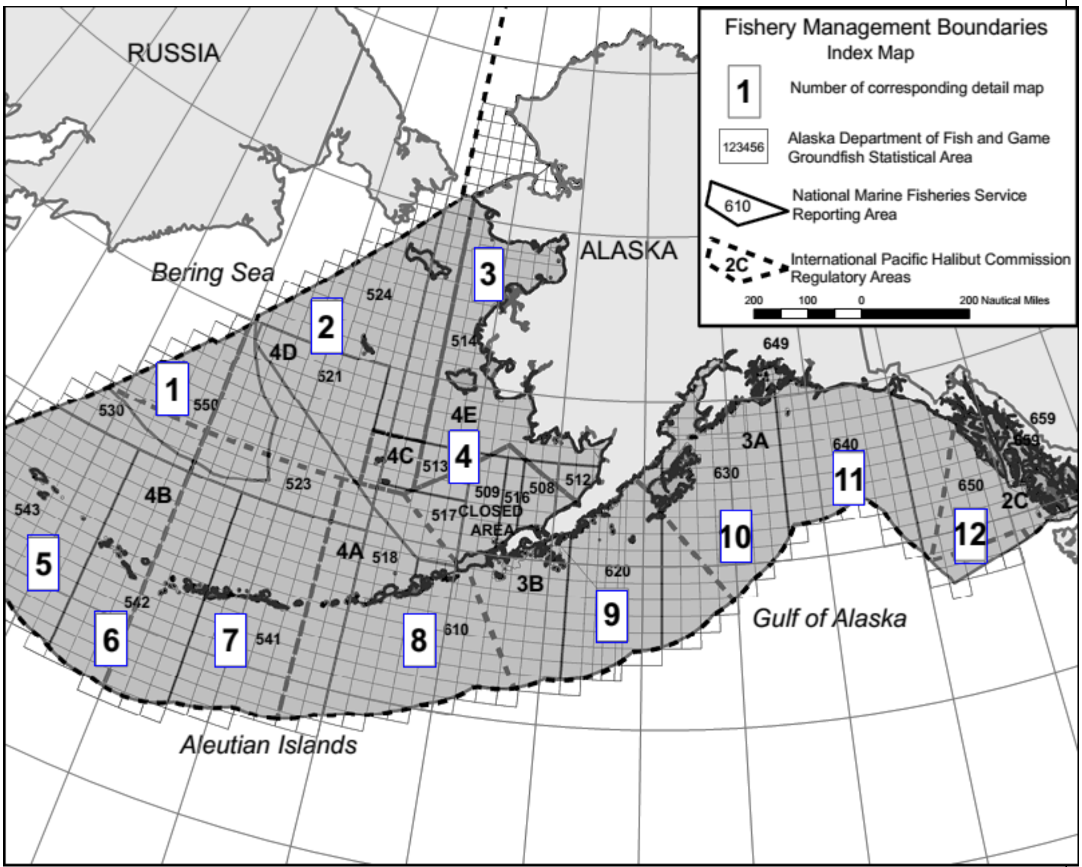


Figure 4.1. State and Federal groundfish reporting areas in the BSAI and the GOA.
Source: http://alaskafisheries.noaa.gov/maps/reporting_areas/index.pdf

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 the training and oversight of at-sea and shoreside 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. Data from the FMA Division is updated weekly on the Alaska Regional Office website.

Table 4.2. Gulf of Alaska catch report through September 14, 2013 (catch data shown in mt)

Western Gulf

Seasons	Account	Total Catch	Quota	Remaining Quota	% Taken	Last Week Catch
	Arrowtooth Flounder	801	14,500	13,699	6%	22
	Shallow Water Flatfish	152	13,250	13,098	1%	0
	Flathead Sole	573	8,650	8,077	7%	3
	Rex Sole	98	1,300	1,202	8%	0

Central Gulf

Seasons	Account	Total Catch	Quota	Remaining Quota	% Taken	Last Week Catch
	Arrowtooth Flounder	14,006	75,000	60,994	19%	329
	Deep Water Flatfish	137	2,308	2,171	6%	7
	Shallow Water Flatfish	4,217	18,000	13,783	23%	622
	Flathead Sole	1,705	15,400	13,695	11%	71
	Rex Sole	3,227	6,376	3,149	51%	55

West Yakutat

Seasons	Account	Total Catch	Quota	Remaining Quota	% Taken	Last Week Catch
	Arrowtooth Flounder	48	6,900	6,852	1%	0
	Deep Water Flatfish	4	1,581	1,577	0%	0
	Shallow Water Flatfish	1	4,647	4,646	0%	0
	Flathead Sole	0	4,686	4,686	0%	0
	Rex Sole	0	832	832	0%	0

Southeast

Seasons	Account	Total Catch	Quota	Remaining Quota	% Taken	Last Week Catch
	Arrowtooth Flounder	70	6,900	6,830	1%	2
	Deep Water Flatfish	4	1,061	1,057	0%	1
	Shallow Water Flatfish	2	1,180	1,178	0%	0
	Flathead Sole	0	1,760	1,760	0%	0
	Rex Sole	0	1,052	1,052	0%	0

http://alaskafisheries.noaa.gov/2013/car110_goa.pdf

Table 4.3. Bering Sea and Aleutian Islands catch report through September 14, 2013 (catch data shown in mt)

Bering Sea

Seasons	Account	Total Catch	Quota	Remaining Quota	% Taken	Last Week Catch
	Greenland Turbot	890	1,369	479	65%	110
	Greenland Turbot CDQ	75	172	97	44%	0

Aleutian Islands

Seasons	Account	Total Catch	Quota	Remaining Quota	% Taken	Last Week Catch
	Greenland Turbot (includes CDQ)	293	383	90	76%	2

Bering Sea Aleutian Islands

Seasons	Account	Total Catch	Quota	Remaining Quota	% Taken	Last Week Catch
	Alaska Plaice (includes CDQ)	21,165	17,000	-4,165	125%	645
	Arrowtooth Flounder	18,007	21,250	3,243	85%	177
	Arrowtooth Flounder CDQ	857	2,675	1,818	32%	26
	Flathead Sole	15,251	20,270	5,019	75%	178
	Flathead Sole CDQ	451	2,429	1,978	19%	16
	Kamchatka Flounder (includes CDQ)	7,567	8,500	933	89%	29

http://alaskafisheries.noaa.gov/2013/car110_bsai_with_cdq.pdf

Table 4.4. Catch data for Alaskan flatfish species through September 21, 2013. Data are from weekly production and Observer Reports (includes CDQ).

	Retained catch (mt)	Discarded catch (mt)
BSAI Alaska plaice	14462	7132
BSAI arrowtooth flounder	16236	2800
BSAI flathead sole	14550	1424
BSAI Greenland turbot	1010	336
BSAI Kamchatka flounder	6874	718
BSAI northern rock sole	54160	3118
BSAI yellowfin sole	113538	4604
GOA arrowtooth flounder	10708	4440
GOA flathead sole	2004	322
GOA rex sole	3287	55
GOA shallow water flatfish	4516	218

http://alaskafisheries.noaa.gov/2013/car230_disc_ret.csv

As well as increased observer coverage on all vessels >40' (vessels <40' are exempted for the first year) and the introduction of full coverage in fleets previously subject partial coverage criteria, vessels remaining within the partial coverage grouping will be selected based on a random draw system with a mandatory obligation to carry an observer. The new observer plan began operations in January, 2013, and makes provisions for the use of electronic monitoring technology as an alternative to sea going observers for certain vessel categories.

During the first year of the new Observer Program, carrying an electronic monitoring (EM) system instead of a human observer will not be an option. NMFS is developing EM technologies in conjunction with Saltwater, Inc., to collect catch, discard, and fishing effort data aboard commercial vessels. Operators of vessels in the Vessel Selection pool may volunteer to assist in this study. The number of EM units is limited in the first year; therefore, not all operators who volunteer will be provided EM equipment. Selected vessels will be eligible to carry EM equipment for a set period of time when fishing. Once completed, the equipment and video footage will be removed, and a copy of any data collected from the vessel will be provided. http://alaskafisheries.noaa.gov/sustainablefisheries/observers/overview.pdf

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

To facilitate reporting of commercial catch from 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. A schema of the CAS system is shown in Figure 4.2. CAS data is posted on the Alaska Regional Office website.

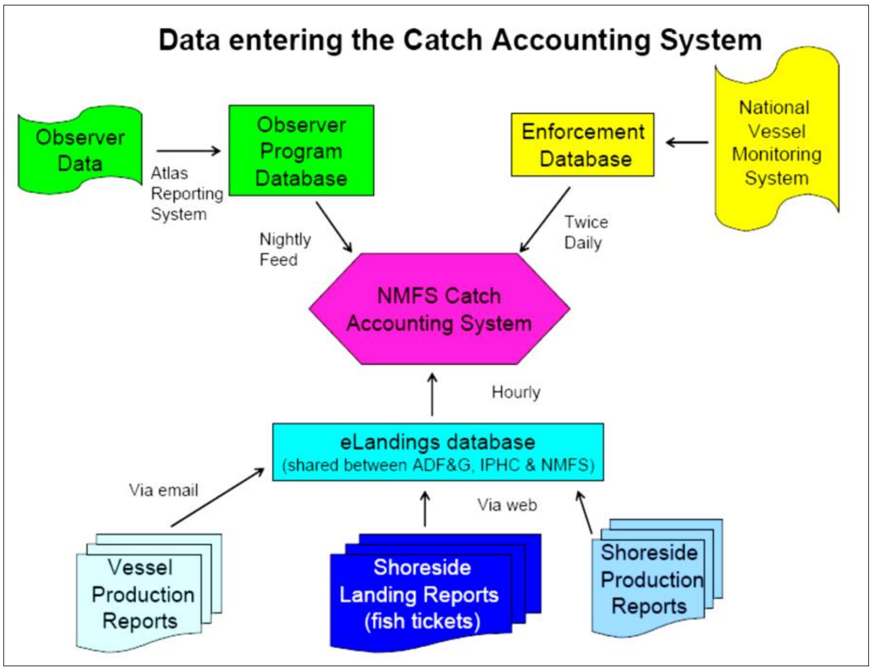


Figure 4.2. Schema of the inter-agency and Catch Accounting System (CAS).

A detailed description of the catch sampling and catch estimation procedures used for groundfish fisheries of Alaska can be found here:
http://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-205.pdf

The 2013 observer sampling manual can be found here:
http://www.afsc.noaa.gov/FMA/default.htm

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/). The surveys use chartered commercial vessels outfitted with standardized fishing gear, net mensuration equipment and a science staff. The surveys are mandated by the MSA and funded by NMFS.

Annual NOAA EBS shelf groundfish trawl survey and biennial AI trawl survey data are used for the BSAI stock assessments. Sub-samples of length and age measurements are taken from the surveys to be used for assessments. The NOAA biennial GOA groundfish trawl survey data is used for the assessment for flatfish species in the GOA. Data from the NOAA Auke Bay Lab's annual longline survey is utilized in the BSAI Greenland turbot assessment.

The Bering Sea slope survey is conducted over a range of 200 to 1,200 m on the eastern Bering Sea slope from Unalaska and Akutan Island in Alaska (54° N) to the U.S-Russian border at 61° N. Sampling was stratified by six subareas running south to north and by five depth strata within each subarea. Stations are chosen randomly and target sampling density is proportional to the area (km^2) in each subarea and depth stratum. Mean sampling density is approximately one tow per 204 km^2.

The Bering Sea shelf survey encompasses 492,897.5 km^2. Sampling stations are established randomly based on a 37.04 km (20 nm) square grid. The survey area is divided into strata corresponding to 0 – 50 m, 50 – 100 and > 100 m. The "standard" survey area has been sampled annually since 1982, while a "northwest extension" has been sampled since 1987.

The Aleutian Island survey area is divided into 45 area-depth strata based on bathymetry. Survey depth strata include: 1-100 m, 101-200 m, 201-300 m, and 301-500 m. Stations are allocated randomly without replacement within each stratum using a 5 by 5 km grid. A minimum of two stations are allocated to any given stratum. Assigned sample densities are highest in the 101-200 m and 201-300 m depth intervals at about 9 tows per 1,000 km^2. The overall sample density for the survey is 6.5 tows per 1,000 km^2.

The GOA survey includes the entire continental shelf and upper portion of the continental slope to a depth of 1,000 m. The total area the survey represents is approximately 320,000 km^2. Depths shallower than 200 m make up about 79% of the total area. Gullies intrude into the shelf and make up about 16% of the total survey area. The survey covers six INPFC (International North Pacific Fisheries Commission) areas.

The NMFS conducts longline surveys throughout Alaskan waters. Stations in the Bering Sea have been sampled in odd years since 1997; stations in the Aleutian Islands have been sampled in even years since 1996 while stations in the Gulf of Alaska have been sampled every year since 1987. The survey provides information on a number of important species including Greenland turbot.

All three trawl 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, skipping 2008 and continuing with the biennial schedule since 2010. The survey schedule in the GOA has been a trawl survey every 3 years from 1984 to 1999 and since 1999 the trawl survey has been 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 and the AI survey area. For each survey year, on average 825 stations are 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. The RACE groundfish survey program follows well defined and detailed survey protocols. These multispecies surveys are conducted on the scale of hundreds of thousands of km^2. The depth stratification scheme ensures relatively even coverage over the entire area while the random allocation of stations meets the requirement for most statistical analyses. The random allocation of stations also allows for the direct calculation of the observation error associated with each survey. However, these surveys cannot be optimized for a single species. This decreases the precision of the estimates compared to single species surveys. However, the cost of single species surveys makes them prohibitive for many assessments. The coefficient of variation (CV) has been widely used as a measure of the utility of trawl survey data. Starr and Schwarz outline a calculation of a biomass change that would be detectable from a given level of CV. A target sampling CV of 20% gives the ability to detect a relative biomass change of 50% between two observations with 95% confidence (assuming an underlying log normal distribution) (Starr and Schwarz, 2000). A CV of 30% can detect a 70% relative change. This calculation is approximate and the actual level of detection depends on the number of available data, the true underlying distribution and some level of process error (Francis et al. 2001). All of the CVs for the Bering Sea Shelf Survey are below 20%. All of the CVs for Northern rock sole and Southern rock sole from the Gulf of Alaska are below 20% except for 1999 where the CV for Northern rock sole was 25%. CVs for Kamchatka flounder and Greenland Turbot from the Aleutian Islands survey are mainly higher than 20% indicating it will be more difficult to detect a change of biomass among years for these species. Starr, P.J. and C. Schwarz. 2000. Feasability of a bottom trawl survey for three slope groundfish species in Canadian waters. Canadian Stock Assessment Secretariat. Research Document 2000/156, 42 p. Francis, R.I.C., R.J. Hurst and J.A. Renwick. 2001. An evaluation of catchability assumptions in New Zealand Stock Assessments. New Zealand Fishery Evaluation Report 2001/1. 37 p. 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." Suggestions for improvements from the Chen CIE review include: • An experiment be conducted to evaluate if it is feasible to reduce the tow duration from 30 minutes to 15-20 minutes. • The recommendation that impacts of any change/modification on survey catchability should be carefully evaluated and necessary corrections/adjustments should be done for the whole time series to ensure the consistency and comparability of data before and after a change/modification. • The suggestion of using the historical data to conduct a Monte Carlo simulation study to evaluate and identify an optimal (cost-effective) sampling size for measuring size composition at each sampling station for each species. • The suggestion of analyzing the historical data collected from the survey stations in the hotspots and high density areas to evaluate their effectiveness in achieving the goal of setting these 14 sampling stations in the first place. Incorporation of an adaptive survey design may be more effective. • The continuation of conducting more experiments to improve understanding of impacts of different variables on survey catchability. I suggest that such experiments should be designed and conducted in a systematic way. • The recommendation that variance of abundance index within a stratum be estimated based on systematic design or developing a bootstrap type of approach, which mimics how sampling stations are surveyed in a systematic design, to estimating variance. • The research effort of complementing the bottom trawl surveys with the acoustic surveys to improve our understanding of fish vertical distribution and its impacts on survey catchability. • For a given species, in-depth analysis of historical data should be conducted to quantify spatial variability among the strata and determine if such variability is consistent over time. • Developing an official policy/protocol for data distributions and utilizations to ensure proper interpretation of the data. • Standardizing survey abundance index using a general linear model (GLM) and/or general additive model (GAM) including variables that are considered to be important in influencing survey catchability (e.g., boat, temperature, bottom type, location, depth, etc.). • Because the survey follows a systematic design and lasts for 2 months in a season when many species are experiencing migrations, uncertainty associated with the abundance index derived from the survey may also include biases (i.e., not all errors are random from year to year), it is necessary to standardize survey abundance index to improve data quality BEFORE the data are used in the stock assessment model. Trying to resolve all uncertainties, especially biased errors, within stock assessment models (e.g., SS3) may complicate parameter estimation, resulting in difficulty in the model convergence. • More studies be done to re-scale actual sample sizes to effective sample sizes used in the stock assessment. Such re-scaling should reflect temporal differences in data quality among years (rather than current practice of using the same number for all the	

years).

• A habitat suitability modeling approach (e.g., Chang et al. 2010) can be used to quantify he relationship between fish/crab abundance and environmental variables. The developed model can then be used to identify suitable habitats for the fish/crab, based on the environmental variables (e.g., substrates and ocean observatory or model data). This can lead to the development of potential habitat maps in the EBS for the fish/crab species. For a given species, the map can be used to evaluate whether survey sampling stations cover all the effective habitats. Such an approach can also be used to project possible changes in fish/crab spatial distribution if key habitat variables (e.g., temperature) change.

BSAI federal fishery

The SAFE analyses for BSAI federal fisheries are based on commercial catch data and survey data. Groundfish surveys are conducted annually by the Resource Assessment and Conservation Engineering (RACE) Division of the AFSC on the continental shelf in the EBS using bottom trawl gear. These surveys are conducted using a fixed grid of stations and have used the same standardized research trawl gear since 1982. The "standard" survey area has been sampled annually since 1982, while the "northwest extension" has been sampled since 1987. In 2010, RACE extended the groundfish survey into the northern Bering Sea and conducted standardized bottom trawls at 142 new stations. The data generated by this survey extension may have important implications for the future management of Bering flounder, in particular.

Other RACE surveys include the EBS slope bottom trawl survey (every two to three years, 1979-1991 and biennially 2000-present), the Aleutian Islands bottom trawl survey (selected years only, every 3 years from 1980-1986, 1991-2000, biennially 2002 – present (2008 cancelled)), and the Auke Bay Lab annual longline surveys with Japan (Japan-U.S. cooperative longline survey, 1978-94) and alone (1987-present, domestic longline survey). The survey has covered the upper continental slope (1978-present) and selected gullies (1987-present) of the Gulf of Alaska and the upper continental slope of the eastern Bering Sea (1982-94, biennially since 1997) and Aleutian Islands region (1980-94, biennially since 1996).

The stock assessment models are continually reviewed, with many changes between each year's models and data inputs.

BSAI Alaska plaice

Prior to 2002, Alaska plaice (*Pleuronectes quadrituberculatus*) were managed as part of the "other flatfish" complex. Since then an age-structured model has been used for the stock assessment allowing Alaska plaice to be managed separately from the "other flatfish" complex as a single species. This assessment uses fishery catches from 1971 through 2012. Fishery length compositions from 1978-89, 1995, and 2001 for each sex were also used, as well as sex-specific age compositions from 2000, 2002 and 2003. Length data were also added for 2008-2011 for this assessment due to the modest increase in catch and observer coverage since 2008.

Because Alaska plaice are usually taken incidentally in target fisheries for other species, CPUE from commercial fisheries is considered unreliable information for determining trends in abundance for these species. It is therefore necessary to use research vessel survey data to assess the condition of these stocks.

NPFMC groundfish species profiles 2011: http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Species_Profiles2011.pdf

BSAI Alaska plaice SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIplaice.pdf

BSAI Arrowtooth flounder

Since 2010, input data includes arrowtooth flounder only, and is not managed as the *Atheresthes* complex (separating from Kamchatka flounder). Arrowtooth flounder was separated from the Greenland turbot assessment complex beginning in 1985. The data used in the current assessment include estimates of total catch, trawl survey biomass estimates and standard error from the Bering Sea shelf, Bering Sea slope and Aleutian Islands surveys, sex-specific trawl survey size composition and fishery length-frequencies from observer sampling.

Age data from the 1996 and 1998 shelf surveys are included as well. Fishery catch data from 1976 – October 15, 2012 and fishery length-frequency data from 1978-91 and 2000-2011 are used in the assessment. Actual arrowtooth flounder catch is available from observer at-sea sampling applied to the Alaska regional office blend estimates for 2007-2012. For 1976-2006 the annual arrowtooth flounder catch is calculated as 93% of the combined arrowtooth flounder- Kamchatka flounder catch on record, based on their average annual proportions in trawl surveys since 1992 (the first year of reliable identification by species).

BSAI Arrowtooth flounder SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIatf.pdf

NPFMC groundfish species profiles 2011: http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Species_Profiles2011.pdf

BSAI Flathead sole

Accurate identification between flathead sole and Bering flounder occurs in the annual EBS trawl survey. The fisheries observer program also provides information on Bering flounder in haul and port sampling for fishery catch composition. The most recent assessment used fishery catches from 1977 through Sept. 22, 2012, estimates of the fraction of animals caught annually by age class and sex (i.e., age compositions) for several years, and estimates of the fraction of animals caught annually by size class and sex (i.e., size compositions).

Fishery age compositions for 2000, 2001, 2004-2007 and 2009-2011 were included in the assessment model. Although age compositions were available for 1994, 1995, and 1998, the sample sizes for these age compositions are small and they have not been used in the assessment model. Size compositions were available for 1977-2011. To avoid over-weighting data used to estimate parameters in the assessment model, the size compositions were excluded in the model optimization when the age composition from the same year was included. Thus, only the fishery size compositions for 1977-1999, 2002-2003, 2008 and 2012 were included in the assessment model.

Because *Hippoglossoides* spp. are often taken incidentally in target fisheries for other species, CPUE from commercial fisheries seldom reflects trends in abundance for flathead sole and Bering flounder. It is therefore necessary to use fishery-independent survey data to assess the condition of these stocks.

BSAI Flathead sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIflathead.pdf

NPFMC groundfish species profiles 2011: http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Species_Profiles2011.pdf

BSAI Greenland turbot

Fisheries data in this assessment were split into the Longline (including all fixed gear) and trawl fisheries. Both the trawl and longline data include observations and catch from targeted catch and bycatch. There are also data from three surveys, the Shelf and Slope surveys are bottom trawl surveys conducted by the RACE Division of the Alaska Fisheries Science Center and the Auke Bay Laboratory (ABL) longline survey has been conducted by the ABL out of Juneau, Alaska. The trawl-survey area-swept data for the Aleutian Islands component of the Greenland turbot stock is not presently included in the stock assessment model.

The catch data were used for both the longline and trawl fisheries. The early catches included Greenland turbot and arrowtooth flounder together. To separate them, the ratio of the two species for the years 1960-64 were assumed to be the same as the mean ratio caught by USSR vessels from 1965-69.

Recent analyses examining the bycatch of Greenland turbot in directed halibut fisheries indicate an average of just over 109 t from 2001-2010 with about 49 t average since 2006 (NMFS Regional Office).

BSAI Greenland turbot SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIturbot.pdf

NPFMC groundfish species profiles 2011: http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Species_Profiles2011.pdf

BSAI Kamchatka flounder

In the eastern part of their range, Kamchatka flounder overlap with arrowtooth flounder (*Atheresthes stomias*) which are very similar in appearance and were not routinely distinguished in the commercial catches until 2007. Until about 1992, these species were also not consistently separated in trawl survey catches and were combined in the arrowtooth flounder stock assessment. However, managing the two species as a complex became undesirable in 2010 due to the emergence of a directed fishery for Kamchatka flounder in the BSAI management area. Since the ABC was determined by the large amount of arrowtooth flounder relative to Kamchatka flounder (complex is about 93% arrowtooth flounder) the possibility arose of an overharvest of Kamchatka flounder as the *Atheresthes sp.* ABC exceeded the Kamchatka flounder biomass. Beginning with the 2011 fishing season, arrowtooth flounder and Kamchatka flounder are managed separately.

The data used in this assessment includes estimates of total catch and bottom trawl survey biomass estimates from the Bering Sea shelf, slope and Aleutian Islands surveys. Given the limited amount of biological information available for Kamchatka flounder, they are qualified to be managed under Tier 5 of Amendment 56 to the BSAI groundfish management plan, and thus have harvest recommendations which are directly calculated from estimates of biomass and natural mortality.

BSAI Kamchatka flounder SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIkamchatka.pdf

NPFMC groundfish species profiles 2011: http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Species_Profiles2011.pdf

BSAI Northern rock sole

The data used in the 2012 assessment include estimates of total catch, trawl fishery catch-at-age, trawl survey age composition, trawl survey biomass estimates and sampling error, maturity observations from observer sampling and mean weight-at-age. Since rock sole are lightly exploited and are often taken incidentally in target fisheries for other species, CPUE from commercial fisheries are considered an unreliable method for detecting trends in abundance. It is therefore necessary to use research vessel survey data to assess the condition of these stocks. The biomass estimates from the AI survey are less than 3% of the combined BSAI total, and therefore are not included in the stock assessment.

Rock sole otoliths have been routinely collected during the trawl surveys since 1979 to provide estimates of the population age composition. For the 2012 assessment all fishery and survey age compositions (1979-2010) were calculated to estimate age composition by sex. Fishery size composition data from 1979-89 (prior to 1990 observer coverage was sparse for this species and the small age collections did not reflect the catch-at-age composition) were applied to age-length keys from these surveys to provide a time-series of catch-at-age assuming that the mean length-at-age from the trawl survey was the same as the fishery in those years. Estimation of the fishery age composition since 1990 use age-length keys derived from age structures collected annually from the fishery.

BSAI Northern rock sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIrocksole.pdf

NPFMC groundfish species profiles 2011: http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Species_Profiles2011.pdf

BSAI Yellowfin sole

The data used in this assessment include estimates of total catch, bottom trawl survey biomass estimates and their attendant 95% confidence intervals, catch-at-age from the fishery and population age composition estimates from the bottom trawl survey. Weight-at-age and proportion mature-at-age are also available from studies conducted during the bottom trawl surveys.

This assessment uses fishery catch data from 1955- 2011, including an estimate of the 2012 catch, and fishery catch-at-age (numbers) from 1964-2011. The 2011 fishery age composition is primarily composed of fish older than 9 years with a large amount of 20+ fish.

BSAI Yellowfin sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIyfin.pdf

NPFMC groundfish species profiles 2011: http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Species_Profiles2011.pdf

GOA federal fishery

The SAFE analysis for GOA federal fisheries are based on commercial catch data and survey data. Commercial catch data includes a catch biomass series for the Gulf of Alaska, a CPUE series; and a catch size composition series. Survey data are from a combination of biennial surveys conducted by the Alaska Fisheries Science Centre.

The stock assessment models are continually reviewed, with many changes between each year's models and data inputs.

GOA Arrowtooth flounder

The model simulates the dynamics of the population and compares the expected values of the population characteristics to those observed from surveys and fishery sampling programs.

The following data sources (and years of availability) were used in the model:

Data component	Years
Fishery catch	1960-2011
IPHC trawl survey biomass and S.E.	1961-1962
NMFS exploratory research trawl survey biomass and S.E.	1973-1976
NMFS triennial trawl survey biomass and S.E.	1984,1987,1990,1993,1996,1999,2001, 2003,2005,2007,2009, 2011
Fishery size compositions	1977-1981,1984-1993,1995-2011
NMFS survey size compositions	1975,2011
NMFS triennial trawl survey age composition data	1984,1987,1990,1993,1996,1999,2001, 2003,2005,2007,2009

Sample sizes for the fishery length data were adequate for the 1970's and 1980's. However, sample sizes in recent years have decreased. No fishery length samples were collected in 1994. Otoliths from the 1984 to 2009 NMFS trawl surveys have been aged and used in the model. Size composition data for the surveys from 1975 and 2011 are used in the model since age data are not yet available for 2011 and only length data are available from 1975.

GOA Arrowtooth flounder SAFE 2011: http://www.afsc.noaa.gov/REFM/docs/2011/GOAatf.pdf

GOA Flathead sole

The most current assessment used fishery catches from 1984 through Sept. 24, 2011, as well as estimates of the proportion of individuals caught by length group and sex for the years 1985-2011 from fishery observer sampling (as of Sept. 24). Age composition data from the fishery is not currently used in the assessment model. Limited age data is available from observer sampling for this stock, although some ageing of observer samples has been completed. Because flathead sole are often taken incidentally in target fisheries for other species, CPUE from commercial fisheries seldom reflects trends in abundance for this species. It is therefore necessary to use fishery-independent survey data to assess the condition of this stock. This assessment used estimates of total biomass for flathead sole in the Gulf of Alaska from triennial (1984-1999) and biennial (2001-2011) groundfish surveys conducted by the Alaska Fisheries Science Center's Resource Assessment and Conservation Engineering (RACE) division to provide an index of population abundance. Size and age compositions (numbers of individuals by size or age group) from the RACE GOA groundfish surveys were also

	incorporated into the assessment model. GOA Flathead sole SAFE 2011: http://www.afsc.noaa.gov/REFM/docs/2011/GOAflathead.pdf **GOA Northern and Southern rock sole** Northern and Southern rock sole were assessed separately from the shallow flatfish grouping for the first time in 2012. They have been moved up into the Tier 3 management scheme. They are still managed as a part of the shallow flatfish grouping in the GOA. The data available include total shallow-water flatfish catch, retained and discarded by year and area; fishery observer catch-at-length data for 1977 through 2012 for U/N/S rock sole; NMFS GOA bottom trawl survey biomass estimates by area for 1984, 1987, 1990, 1993, 1996, 1999, 2001, 2003, 2005, 2007, 2009, and 2011; survey numbers-at-length for all survey years; survey numbers-at-age for all survey years; survey estimates of mean length-at-age for all survey years. The survey data for 1984, 1987, 1990, and 1993 are for U rock sole; the survey data for N and S rock sole are separated out by species from 1996 on, and the fishery observer data for N and S rock sole are separated out by species from 1997 on. GOA Northern and Southern rock sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/GOAnsrocksole.pdf **GOA Rex Sole** Because estimates of $F_{40\%}$ and $F_{35\%}$ (required for Tier 3 calculations) from the assessment model are considered unreliable while estimates of current and projected biomass are considered reliable, harvest specifications are based on Tier 5 calculations using estimated “adult biomass” from an age-structured assessment model (rather than survey biomass). This assessment used fishery catches from 1982 through 24 September, 2011, as well as estimates of the proportion of individuals caught by length group and sex for the years 1982-2011. Two years of fishery age composition data were made available in 2011, but the assessment model did not incorporate fishery age data. Direct incorporation of fishery age data in the assessment awaits completion of a new assessment model in 2013. The assessment used estimates of total biomass for rex sole in the Gulf of Alaska from triennial (1984-1999) and biennial (2001-2011) groundfish surveys conducted by the AFSC’s Resource Assessment and Conservation Engineering (RACE) division to provide an index of population abundance. GOA Rex sole SAFE 2011: http://www.afsc.noaa.gov/REFM/docs/2011/GOArex.pdf	

<table>
<tr><td colspan="2">Evidence adequacy rating:

☑High ☐ Medium ☐ Low</td></tr>
<tr><td colspan="2">☑ Full Conformity ☐ Minor Non-conformity ☐ Major Non-conformity

☐ Critical Non-conformity</td></tr>
<tr><td>Clause:</td><td>Evidence</td></tr>
<tr><td>4.1.1</td><td>Rating determination
These data are collected, at an appropriate time and level of aggregation (BSAI and GOA) by relevant management organizations connected with the fishery, and provided to relevant fisheries organizations (NPFMC/ADFG, available on websites).

Catch data from observers and from the mandatory reporting requirements for at-sea and on-shore activities are updated on a daily basis and uploaded to the centralized (CAS) system. Data from the observer program is collated daily and applied through intra-seasonal management including the triggering of area and fishery closures. Catch data, including both landings, discard data and TAC uptake data are reported daily. Effort data is reported and updated daily.

The EBS component of the Alaska flatfish complex stocks are surveyed annually by the RACE division of AFSC, while the AI and GOA components of the stocks are surveyed bi-annually, with the RACE survey schedule alternating between AI and GOA each year. 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. All AFSC surveys occur during the summer months (June- September). Since the surveys cover the entire basin, seasonality is less of an issue.

The Fisheries Monitoring and Analysis Division (FMA) of the AFSC are responsible for the timely transmission of fisheries sampling data from both at-sea and onshore sampling program http://www.afsc.noaa.gov/fma/default.htm. Data transmission is near real-time and used by both the Sustainable Fisheries Division of the Alaskan Regional Office for real time monitoring of quota uptake and scientists at the AFSC for stock assessment purposes. Data transmission is facilitated by the Information and Monitoring Technologies Program, who support the information needs for real time monitoring of quota uptake and supply the data necessary for stock assessment purposes http://www.afsc.noaa.gov/fma/imt.htm.

The annual assessment process follows a standard timeline, culminating in the presentation of the assessment of flatfish stocks (and other groundfish species) during the winter (December) meeting of the NPFMC. The Groundfish Plan Team and assessment authors rollover the previous year's ABC for the October NPFMC meeting.</td></tr>
</table>

	NPFMC adopts this as a Proposed ABC/TAC so that the public is notified that a new assessment is occurring and may receive public comment. The proposed ABC/TAC does not go into effect. It is simply there for public comment under the new multiyear plan cycle. During the spring and summer period commercial catch and survey abundance, including length and age data for FMP species, are in preparation for the final assessment model runs by NMFS scientists and presented during the November Plan Team meeting, this is followed by the December NPFMC meeting where final assessment proposals are acted upon by the SSC, AP and the NPFMC. The selection of these limits is used as the basis for setting fishing opportunities in the following year by the NPFMC. The entire process is transparent, with detailed minutes of the SSC (and other NPFMC committees) available on the web. http://www.fakr.noaa.gov/npfmc/resources-publications/meeting-minutes.html	
Evidence adequacy rating: ☑**High** ☐ **Medium** ☐ **Low**		
☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**		
Clause:	**Evidence**	
4.1.2	**Rating determination** *Timely (annual and biennial SAFE reports), complete and reliable statistics are compiled on catch and fishing effort and maintained in accordance with applicable international standards and practices and in sufficient detail to allow sound statistical analysis for stock assessment. Such data are updated regularly (yearly) and verified through an appropriate system (peer review). These research results are used as a basis for the setting of management objectives, reference points and performance criteria.* Ultimately, the REFM division utilizes the catch and sampling data to undertake annual and biennial stock assessments of Alaskan flatfish stocks. There is a well-established system where assessments are undertaken by stock assessment scientists from the AFSC and reviewed by Plan Teams. These are subsequently used as the basis of TAC setting by the NPFMC. All necessary catch and landings statistics are updated in near real-time through the centralized CAS system. Biological samples and data from at-sea and onshore monitoring programs are collected by the FMA Division, stored and transmitted in near real-time through the Information Monitoring and Technologies Program and are available at appropriate timelines for the undertaking of stock assessments by AFSC scientists. • The Age and Growth Program of the REFM Division is responsible for the	

	analysis of age structures, otoliths in the case of the flatfish species http://www.afsc.noaa.gov/REFM/Age/default.htm. The program ages otoliths obtained from fishery independent surveys undertaken by the RACE division and otoliths collected by field personnel from the at-sea and onshore sampling programs. The Age and Growth program operates a centralized data base (AGEDATA) and an online tracking system which provides status reports including: • Daily updates of ageing status • Request details • Number of ages requested • Number of current ages entered into AGEDATA database • Age and Growth group responsible for ageing • AGEDATA table name • Cruise and vessel info • Age reader information The AFSC and the NMFS Alaskan Regional Office operate an efficient, streamlined data management system which is transparent, updated in near-real time, and open. The system is state of the art. Within the NPFMC process, the use of scientific research culminating in the yearly SAFE (species, economic, ecosystem) reports has been used as the basis for setting and updating management objectives (reduction of bycatch, improved utilization of catches, SSL protection measures etc...), computing reference points and performance criteria (OFL, ABC, ACL etc...) and has ensured a direct link between applied research and fisheries management, with full participation and integration of views and proposals from the public, industry and other interested stakeholders in the decision making process. http://www.fakr.noaa.gov/npfmc/public-meetings/committees-related-meetings.html	

Clause: **4.2 An observer scheme designed to collect accurate data for research and support compliance with applicable fishery management measures shall be established.** ***FAO CCRF 8.4.3*** ***FAO Eco 29.2bis***		
Evidence adequacy rating:		
☑**High**	☐ **Medium**	☐ **Low**

☑ Full Conformity	☐ Minor Non-conformity	☐ Major Non-conformity
☐ Critical Non-conformity		

Clause:	Evidence
4.2	**Rating determination** *An observer scheme designed to collect accurate data for research and support compliance with applicable fishery management measures is established. Data gathered under the auspices of the restructured North Pacific Groundfish Observer Program (NPGOP) covers all biological information associated with commercial fisheries, and interactions with sharks, rays, seabirds, marine mammals and other species.* 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 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 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

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.

The new Observer Program (2013)

Annual 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

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: -<u>No selection</u>: Vessels less that 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. -<u>Vessel selection</u>: 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.

Observer Program Fees

Starting in 2013, processors and registered buyers will be required to pay an ex-vessel value-based fee to NMFS to support the funding and deployment of observers on vessels and in plants in the new partial observer coverage category. The fee is intended to be split evenly between the vessel owner/operator and processor or registered buyer. The observer fee is 1.25% of the ex-vessel value of the groundfish and halibut subject to the fee. Ex-vessel value will be based on standard ex-vessel prices from prior years. The fee liability will start to accrue on January 1, 2013. The first fee submission by processors and registered buyers for 2013 landings will be due to NMFS by February 15, 2014. Full payment of the observer fee liability will be required before NMFS will issue a new or renewed Federal Processor Permit (FPP) or Registered Buyer permit.

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 cathes

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.

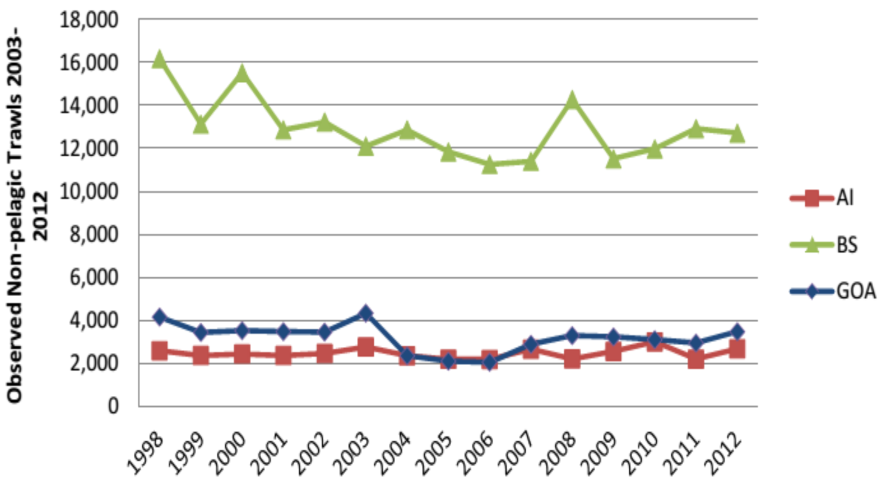


Figure 4.3. Gulf of Alaska, Bering Sea, and Aleutian Islands observed number of bottom trawl tows, 1990-2012 (include coverage up to 2013 when the new observer program has been implemented). http://www.afsc.noaa.gov/REFM/stocks/plan_team/ecosystem.pdf

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. As can be seen below, 6 out of 37 Catcher Processor vessels in the GOA flatfish trawl fishery are subject to 100% coverage starting 2013, and 29 out of 32 vessels in the BSAI flatfish trawl fishery are subject to 100% coverage (but note that Amendment 80, of which 28 vessels qualify, carries two observers on board).

	Gulf of Alaska			Bering Sea and Aleutian Islands			All Alaska		
Year	Catcher vessels	Catcher proces-sors	Total	Catcher vessels	Catcher proces-sors	Total	Catcher vessels	Catcher proces-sors	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.

Determining the Trip Target

Determining the trip target is a three-step process that is implemented in the catch accounting system: (1) if 95% or more of the retained catch is pollock, then a pollock target is assigned; (2) if the sum of all flatfish is greater than the amount of any other species, then flatfish is assigned as the trip target; 3) if neither pollock nor flatfish is determined as the target, then the groundfish species that has the highest proportion of the retained catch is assigned as the target.

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

Table 4.5. 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 4.6. 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/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.

Evidence

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

Clause:

4.3 Sufficient knowledge of social, economic and institutional factors relevant to the fishery in question shall be developed through data gathering, analysis and research.

FAO CCRF 7.4.5

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

FAO CCRF 7.4.6, 7.4.7

Evidence adequacy rating:

☑High **☐ Medium** **☐ Low**

☑ Full Conformity **☐ Minor Non-conformity** **☐ Major Non-conformity**

☐ Critical Non-conformity

Clause:	Evidence
4.3	**Rating determination** *Sufficient knowledge of social, economic and institutional factors relevant to the fisheries in question is developed through data gathering, analysis and research (Economic and Social Sciences Research Program within NMFS's REFM). The economic and social importance of Alaskan flatfish fisheries are contrasted and considered with biological and ecological considerations under the various NEPA evaluations required when significant changes in management are proposed.* The Regulatory Flexibility Act (RFA) requires federal agencies 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. http://www.eeoc.gov/eeoc/plan/regflexibilityact.cfm In addition, the White House, through Executive Order (E.O.) 12866, requires Executive Branch agencies to perform benefit-cost analyses for all rules it deems to be "significant" and to submit these analyses to the Office of Management and Budget for review. http://www.epa.gov/ttnecas1/econdata/Rmanual2/2.2.html 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. The NMFS has a staff of economists that directly contribute to the assessment documents. Economic analyses are also required to varying degrees under the MSA, the NEPA, the Endangered Species Act, and other applicable laws. http://www.nmfs.noaa.gov/sfa/domes_fish/OperationalGuidelines/OGeconomicanalysis_d.htm The economic and social importance of Alaskan flatfish fisheries are contrasted and considered with biological and ecological considerations under the NEPA (http://ceq.hss.doe.gov/welcome.html) evaluation. The act requires the pertinent management authority to have their own implementing procedures and as such NPFMC policy decisions must include a NEPA evaluation that describes the potential social and economic impact assessment of any proposed new or amendment to fishery management measures (i.e. restructuring of observer program in the GOA and BSAI, fishery rationalization, SSL measures etc...). These procedures must also be in accordance with other mandatory requirements such as the MSA e.g. attainment of MSY considerations. In addition, the MSA requires that a regional and economic evaluation be undertaken for any management policy. The annual *Fisheries Economics of the US* report and the periodic *Fishing Communities of the US* report are part of the Fisheries Economics & Socio-cultural Status & Trends series. These reports provide detailed descriptive statistics relating to commercial fisheries from both an economic and social (community) perspective http://www.st.nmfs.noaa.gov/st5/publication/index.html. The NOAA Fisheries Human Dimensions Program is responsible for undertaking community profiles and the gathering of quantitative social indicators used to monitor and understand the wellbeing of communities (and individuals) that are reliant on commercial fisheries. http://www.st.nmfs.noaa.gov/humandimensions/index http://www.st.nmfs.noaa.gov/economics/fisheries/commercial/regional-economic-impacts/index. The Human Dimensions program also undertakes oral interviews (Voices from the Fisheries) which document human interactions with commercial fisheries, associated industries and the broader ecosystem. This provides a powerful means of exploring and mapping the role and interrelationship of stakeholders. Individual transcripts can be found at the following link: http://www.st.nmfs.noaa.gov/voicesfromthefisheries/index.html The REFM division presents an annual Economic Status Report of the Groundfish fisheries in Alaska http://www.afsc.noaa.gov/REFM/docs/2012/economic.pdf. The	

	figures and tables in the report provide estimates of total groundfish catch, groundfish discards and discard rates, prohibited species catch (PSC) and PSC rates, the ex-vessel value of the groundfish catch, the ex-vessel value of the catch in other Alaska fisheries, the gross product value of the resulting groundfish seafood products, the number and sizes of vessels that participated in the groundfish fisheries off Alaska, vessel activity, and employment on at-sea processors. The report contains analysis and comment of the performance of a range of indices for different sectors of the North Pacific fisheries relate changes in value, price, and quantity, across species, product and gear types, to aggregate changes in the market. In addition, broader macro-economic external factors, such as exchange rates, consumer trends in seafood consumption, seafood imports, had impact on of pricing, volume, supply and demand. NOAA operate an extensive research and monitoring program aimed at the gathering and analysis of socio-economic data from fishery dependent areas and communities under its "Community Profile Series" http://www.st.nmfs.noaa.gov/humandimensions/community-profiles/index In 2005, the AFSC also compiled baseline socioeconomic information about the 136 Alaska communities most involved in commercial fisheries. The new profiles from 2011 add a significant amount of new information to help provide a better understanding of each community's reliance on fishing. The profiles include information collected from communities in the Alaska Community Survey, which was conducted during summer 2011 and 2012, and the Processor Profiles Survey, which was conducted in fall 2011. http://www.afsc.noaa.gov/REFM/Socioeconomics/Projects/CPU.php http://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-230.pdf

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	Evidence
4.3.1	**Rating determination** *Regional fisheries management organizations (NMFS/ADFG) compile data (SAFE report, ADFG Scientific and Technical Publications) and make them available (NMFS and ADFG websites), in a manner consistent with any applicable confidentiality requirements (NOAA administrative order 216-100, memorandum of agreement signed between NOAA, ADFG and the Alaska Commercial Fishery Entry Commission), timely and in the public domain.* Alaskan flatfish fisheries are managed under the auspices of the NPFMC, one of eight

regional fishery management councils established under the MSA (1976). For each species covered under an FMP, annual (or biennial) assessment SAFE reports are presented to the NPFMC each year. The stock assessments are compiled by authors and Plan Teams with input from the NMFS-AFSC and other institutions such as the ADFG. Each SAFE report contains a detailed biological assessment of each stock as well as prognosis of future catch options relative to biological and exploitation reference points as well as an economic status report. The NPFMC are reliant on the NMFS and other bodies such as the ADFG for the collection and provision of both biological and economic data.

Commercial catch data are collated at an almost real-time rate. To facilitate reporting of commercial catch from both state and federally managed fisheries, data from a wide range of sources is gathered in the 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 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. Observer data is delivered each 24 hrs and is available online within a few days and weekly catch reports are available here http://www.fakr.noaa.gov/2013/2013.htm. To protect confidentiality both observer and weekly catch reports are aggregated to a minimum of 3 processing operations.

All fisheries in the BSAI and GOA are subject to total allowable limits on Prohibited Species Catch (PSC). Under the FMP, once the total allowable limits are reached, commercial fishing activity must cease. This necessitates the availability of up to date catch information which is updated weekly. As well as posting up to date catch statistics, NOAA publishes detailed updates on any changes in regulation. The NPFMC operates in a fully transparent manner with meeting minutes and sub-committee reports freely available on the NPFMC web site:

http://www.fakr.noaa.gov/npfmc/resources-publications/meeting-minutes.html

Scientific and Technical Publications relating to state-managed fisheries are available on the ADFG website:
http://www.adfg.alaska.gov/index.cfm?adfg=librarypublications.main
http://www.adfg.alaska.gov/sf/publications/index.cfm?ADFG=main.fullTextSearchSubmit

NOAA administrative order 216-100 prescribes policies and procedures for protecting the confidentiality of data submitted to and collected by the NMFS. Confidential data are those identifiable with a person. Before release to the public, data must be aggregated to protect the individual identities. For fisheries data, this requires that there must be at least 3 entities contributing to any level of aggregated data. Only authorized users have access to confidential data, they must have a need to collect or use these data in the performance of an official duty, and they must sign a statement of nondisclosure affirming their understanding of NMFS obligations with respect to confidential data and the penalties for unauthorized use and disclosure. Confidential

	data must be maintained in secure facilities. Data collected by a contractor, such as an observer contractor, must be transferred timely to authorized Federal employees; no copies of these data may be retained by the contractor. NMFS may permit contractors to retain aggregated data. A data return clause shall be included in the agreement. All procedures applicable to Federal employees must be followed by contractor employees collecting data with Federal authority. Under agreements with the State, each State data collector dealing with confidential data will sign a statement at least as protective as the one signed by Federal employees, which affirms that the signer understands the applicable procedures and regulations and the penalties for unauthorized disclosure. In addition, a memorandum of agreement was signed in September 1999 between the NOAA, ADFG and the Alaska Commercial Fishery Entry Commission (CFEC). The purpose of this agreement is to outline the understanding between the NOAA, U.S. Department of Commerce (DOC), ADFG and the CFEC, regarding reciprocal provision of direct access to, and subsequent storage and usage of, confidential data regarding marine fisheries in and off Alaska, such as fishery landings data and port sampling data. https://docs.google.com/viewer?a=v&q=cache:Hit556BFZOwJ:www.reginfo.gov/public/do/DownloadDocument%3FdocumentID%3D363353%26version%3D1+agreement+between+NOAA,+ADFG,+CFEC+on+confidential+fishery+data&hl=en&gl=ie&pid=bl&srcid=ADGEESi7De3rnfRg8PAgSaE3mqGRToAPmBPgyDt6_qReJD3Hm7S9b_pWTBVKQA7k7GyxEOGGBfcJaQHt0K_oisc9YVXl3oLPDt_5RKS0_j4x8FBfxlFwOSv3f7EMCXnSa3jfgGyXUVjr&sig=AHIEtbSUNn7ep_0PXSVirN4FYkumumXnRg **Evidence** http://www.st.nmfs.noaa.gov/st1/recreational/documents/Intercept_Appendices/Appendix%20M%20031408%20NOAA%20administrative%20order%20216-100.pdf	

Clause: **4.4 States shall stimulate the research required to support national policies related to fish as food.** ***FAO CCRF 12.7***		
Evidence adequacy rating: ☑**High**	☐ **Medium**	☐ **Low**
☑ **Full Conformity**	☐ **Minor Non-conformity**	☐ **Major Non-conformity**

☐ Critical Non-conformity	
Clause	**Evidence**
4.4	**Rating determination** *State and national policies regarding seafood are guided and driven by the Alaska Seafood Marketing Institute (ASMI), Food and Drug Administration (FDA), Department of Agriculture (USDA), the National Institute of Health (NIH) and many others.* State and national policies regarding seafood are guided and driven by the Alaska Seafood Marketing Institute (ASMI), Food and Drug Administration (FDA), Department of Agriculture (USDA), the National Institute of Health (NIH) and many others. ASMI is the state agency primarily responsible for increasing the economic value of Alaskan seafood through marketing programs, quality assurance, industry training, and sustainability certification. The powers of the ASMI board include: conducting or contracting for scientific research to develop and discover health, dietetic, or other uses of seafood harvested and processed in the state, and prepare market research and product development plans for the promotion of any species of seafood and their byproducts (Alaska Statute 16.51.090 Powers of Board). The State of Alaska also operates the Kodiak Seafood and Marine Science Center, previously named the Fishery Industrial Technology Center, as a component of the University of Alaska (UAF). The mission of the UAF Kodiak Seafood and Marine Science Center is to increase the value of Alaska's fishing industry and marine resources through research, technological development, education and service. Promoting the sustainable use of Alaska fisheries through collaborative research, application, education and information transfer in areas of**:** - Seafood safety - Seafood quality - Bycatch reduction - Product market and development - Environmental concerns - Marine Advisory Program extension http://www.sfos.uaf.edu/ksmsc/about/

Clause:

4.5 States shall ensure that the economic, social, marketing and institutional aspects of fisheries are adequately researched and that comparable data are generated for ongoing monitoring, analysis and policy formulation.

FAO CCRF 12.9
Evidence adequacy rating: ☑**High** ☐ **Medium** ☐ **Low**
☑ Full Conformity ☐ Minor Non-conformity ☐ Major Non-conformity ☐ Critical Non-conformity

Clause:	**Evidence**	
4.5	The adequacy rating is considered high**. Supporting information and evidence are presented under supporting clauses 4.3 and 4.4.**	

Clause: **4.6 States shall investigate and document traditional fisheries knowledge and technologies, in particular those applied to small-scale fisheries, in order to assess their application to sustainable fisheries conservation, management and development**. ***FAO CCRF 12.12***
Evidence adequacy rating: ☑**High** ☐ **Medium** ☐ **Low**
☑ Full Conformity ☐ Minor Non-conformity ☐ Major Non-conformity ☐ Critical Non-conformity

Clause	**Evidence**	
4.6	**Rating determination** *Scientists document traditional fisheries knowledge and technologies, in particular those applied to small-scale fisheries, in order to assess their application to sustainable fisheries conservation, management and development.* Fisheries targeting flatfish species occur in federal waters off Alaska in the GOA and BSAI and are an important species for many local, small scale coastal fishing communities (e.g. CDQ communities in Western Alaska). The NOAA Fisheries Human Dimensions Program collates and analyses tacit and community knowledge through the Voices from the Fisheries program. These fisheries are very well	

	established and have included traditional fisheries knowledge and practices through the years, by a natural process of passing knowledge from one fisherman to another, and by virtue of progressing research, trials and fisheries regulations. http://www.st.nmfs.noaa.gov/humandimensions/publications/index	

Clause:

4.7 **States conducting scientific research activities in waters under the jurisdiction of another State shall ensure that their vessels comply with the laws and regulations of that State and international law.**

FAO CCRF 12.14

Evidence adequacy rating:

☐**High** ☐ **Medium** ☐ **Low**

☐ Full Conformity ☐ Minor Non-conformity ☐ Major Non-conformity

☐ Critical Non-conformity

Clause	Evidence	
4.7	**Not applicable to the flatfish complex as all fisheries are contained within the U.S. EEZ.**	

Clause:

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

FAO CCRF 12.15, 12.16

Evidence adequacy rating:

☐ **High** ☐ **Medium** ☐ **Low**

☐ Full Conformity ☐ Minor Non-conformity ☐ Major Non-conformity ☐ Critical Non-conformity		
Clause	**Evidence**	
4.8	The U.S. and Russia have signed an Agreement on Mutual Fisheries Relations (first signed in 1988) for conservation, management and optimal utilization of shared fisheries resources between both nations. The agreement is not specific to flatfish alone, but does call for cooperation, shared science, conservation and management of fisheries resources. http://www.nmfs.noaa.gov/ia/slider_stories/2013/04/us_russia.html http://www.nmfs.noaa.gov/ia/slider_stories/2013/04/agreement.pdf	

Clause: **4.9** **States and relevant international organizations shall promote and enhance the research capacities of developing countries, *inter alia*, in the areas of data collection and analysis, information, science and technology, human resource development anti provision of research facilities, in order for them to participate effectively in the conservation, management and sustainable use of living aquatic resources.** ***FAO CCRF 12.18***		
Evidence adequacy rating: ☐**High** ☐ **Medium** ☐ **Low**		
☐ Full Conformity ☐ Minor Non-conformity ☐ Major Non-conformity ☐ Critical Non-conformity		
Clause	**Evidence**	
4.9	**Not applicable to the flatfish complex as all fisheries are contained within the U.S. EEZ.**	

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

FAO CCRF 12.19
Evidence adequacy rating: ☐**High** ☐ **Medium** ☐ **Low**
☐ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**

Clause	**Evidence**	
4.10	**Not applicable** to the flatfish complex stocks of Alaska as they are neither overfished nor very lightly fished. These stocks have been exploited for several decades.	

Clause: **4.11 Relevant technical and financial international organizations shall, upon request, support States in their research efforts, devoting special attention to developing countries, in particular the least developed among them and small island developing countries.** ***FAO CCRF 12.20***
Evidence adequacy rating: ☐**High** ☐ **Medium** ☐ **Low**
☐ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**

Clause	**Evidence**	
4.11	Not applicable to the Alaskan flatfish complex as no small island developing country is involved with these fisheries.	

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***					
Confidence Ratings	**Low**	**0 out of 11**	**Medium**	**0 out of 11**	**High**	**10 out of 11**

Clause:

5.1 States shall ensure that appropriate research is conducted into all aspects of fisheries including biology, ecology, technology, environmental science, economics, social science, aquaculture and nutritional science. The research shall be disseminated accordingly. States shall also ensure the availability of research facilities and provide appropriate training, staffing and institution building to conduct the research, taking into account the special needs of developing countries.

FAO CCRF 12.1, 7.4.2

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

FAO CCRF 12.2, 12.6

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	**Evidence**
5.1	**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 institutes. 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 persons, 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 5.1 shows the structure of the organization and the various programs that the AFSC undertakes.

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

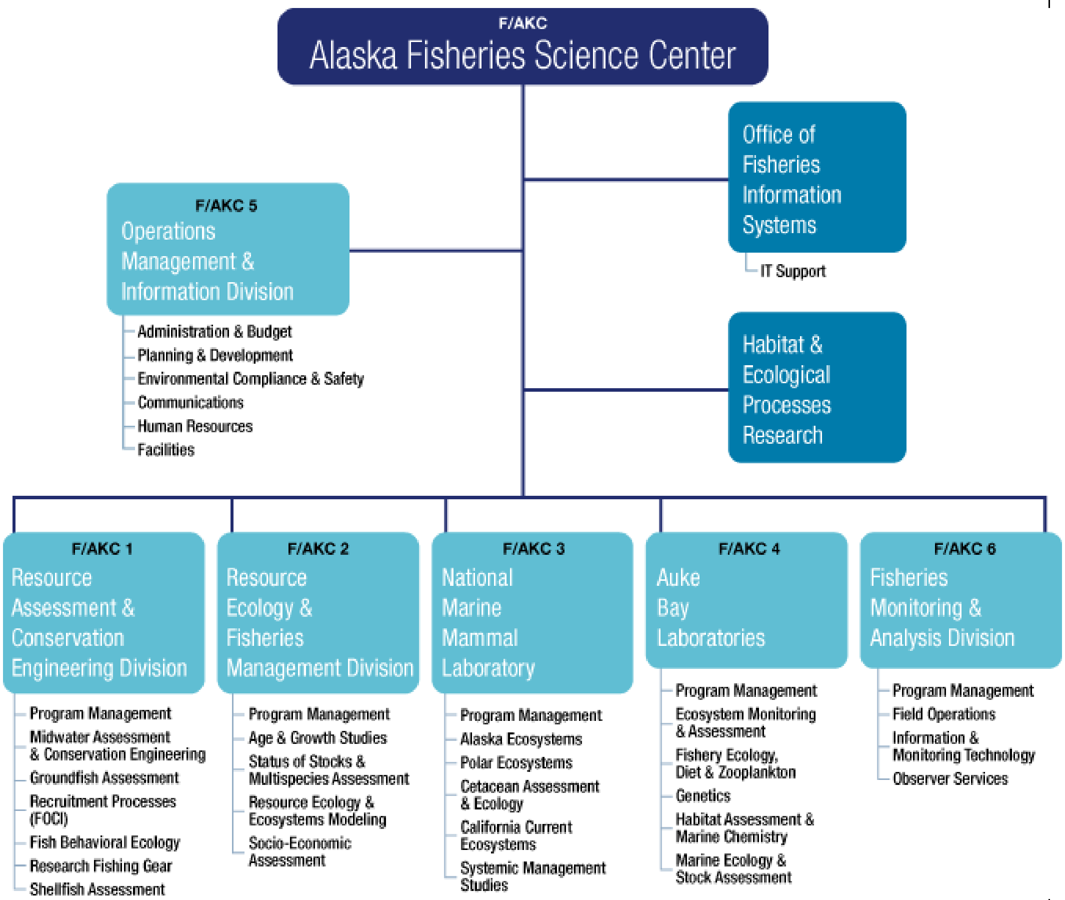


Figure 5.1. Alaska Fisheries Science Center structure.

Within AFSC, the Resource Ecology and Fisheries Management Division (REFM) is responsible for the provision of stock assessments. REFM scientists work as part of Plan Teams who have the primary responsibility of presenting the outcomes of stock assessments to the Statistical and Scientific Committee (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.

Specifically relating to the assessment and management of the flatfish complex, the RACE division is responsible for annual groundfish surveys, developing by-catch reduction techniques to enable the commercial fisheries to manage and limit catches of PSC species and other unwanted catches, assessing and quantifying discard mortality and to undertaking research into the benthic impact of commercial gears.

The Auke Bay Laboratory 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. ABL is also responsible for the annual longline survey for sablefish, which provides data for the Greenland turbot SAFE report.

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 onboard fishing vessels and at onshore processing plants and for quality control/quality assurance of the data provided by these observers.

NOAA operates an extensive research program into resource economics and social sciences

The current areas of research include some studies relevant to the flatfish fisheries:

- Cooperative Formation and Peer Effects in Fisheries
- Management Institutions, Incentives, and the Margins of Selectivity in Fishing: Evidence from the Amendment 80 Trawl Fishery
- Using Indicators to Assess the Vulnerability and Resiliency of Alaskan Communities to Climate Change

http://www.afsc.noaa.gov/Quarterly/CurrentIssue/tocREFM.htm

Also, an important document is the Economic SAFE, an economic status report for the groundfish fisheries off Alaska published every year and presenting data for the groundfish stocks and fisheries in Alaska.

http://www.afsc.noaa.gov/REFM/Docs/2012/economic.pdf

The entire data collation, analysis and assessment procedures are periodically subject to extensive external peer review through the Center for Independent Experts (CIE).

Most recent CIE reviews of flatfish species SAFEs:

BSAI yellowfin sole- 2012 GOA southern rock sole- 2012

GOA northern rock sole- 2012 GOA rex sole- 2012

	The current assessment does not deal with state fisheries for the flatfish complex, but where they occur, they are managed via parallel fisheries. In state waters (0-3 nm), Alaska flatfish fisheries are managed by the Alaska Department of Fish & Game (ADFG) and the Alaska Board of Fisheries (BOF). Most flatfish fisheries in state waters are managed concurrent to the federal BSAI or GOA fishery, and are referred to as parallel fisheries. ADFG issues emergency orders for state waters that duplicate NMFS management actions, except that gear or other restrictions may vary. These emergency orders establish parallel fishing seasons (termed "parallel fisheries") allowing vessels to fish for groundfish in state waters with the same seasons as the federal fisheries. The parallel fishery is managed by adopting most NMFS rules and management actions, including seasons, and catch in this fishery is counted towards federal quotas. In the BSAI, parallel fisheries occur for Greenland turbot, arrowtooth flounder, rock sole, yellowfin sole, flathead sole and an aggregated flatfish species complex. There is a history of non-pelagic trawl closures around Kodiak Island and along the Alaska Peninsula. Generally, bays have been closed year-round since 1986. In 1999, seasonal openings along the west side of Kodiak Island were designed to allow non-pelagic trawl vessels access to flatfish resources during parallel fisheries. ADFG BSAI report 2011: http://www.adfg.alaska.gov/FedAidpdfs/FMR11-28.pdf **Marketing of fisheries products** 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/).

Evidence adequacy rating:

☑ **High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	**Evidence**

5.1.1	**Rating determination** *An appropriate institutional framework (National Standard Guidelines for Fishery Management Plans published by the NMFS) is established to determine the applied research which is required and its proper use (i.e. assess/evaluate stock assessment model/practices) for fishery management purposes (SAFE reports).* The SAFE report summarizes the best available scientific information concerning the past, present, and possible future condition of the stocks, marine ecosystems, and fisheries that are managed under Federal regulation. It provides information to the NPFMC for determining annual harvest levels from each stock, documenting significant trends or changes in the resource, marine ecosystems, and fishery over time, and assessing the relative success of existing state and Federal fishery management programs. The SAFE reports are published in three sections: a "Stock Assessment" section, which comprises the bulk of this document, and "Economic Status of Groundfish Fisheries off Alaska" and "Ecosystem Considerations" sections, which are bound separately. The adequacy and appropriateness of the stock assessments are ensured by extensive peer review. For BSAI and GOA groundfish assessments, the review process begins with an internal review of assessments by the AFSC. Following that review, assessments are reviewed annually by the Groundfish Plan Teams who provide comments to the assessment authors on revisions to the assessment as well as to make recommendations to the SSC regarding OFL and ABC levels for each stock. The majority of the Groundfish Plan Team members have expertise in stock assessment and fisheries biology with some additional members bringing in expertise in fishery management, in-season catch accounting, seabirds, marine mammals, and economics. The assessments as well as the Plan Team recommendations are then subsequently reviewed by the SSC who make the final OFL and ABC recommendations to the NPFMC. The SSC may modify the recommendations from the Plan Team based upon additional considerations. The NPFMC sets TAC at or below the ABC recommendations of the SSC. The AFSC periodically requests a more comprehensive review of groundfish stock assessments by the Center for Independent Experts (CIE). These reviews are intended to lay a broader groundwork for improving the stock assessments outside the annual assessment cycle. CIE recommendations are provided to the stock assessment author, the AFSC, the Plan Team, and the SSC for review, comment, and consideration of priorities for improving the assessment. See clause 5.1 for CIE review schedule. **Stock Synthesis model** The Greenland turbot assessment employed the stock synthesis model (SSM). The	

SSM allows for the use of differing types, amounts and quality of data and can be configured to fit numerous cases. For catch-age analysis it uses survey estimates of biomass and age composition as auxiliary information. The model simulates the dynamics of the population and compares the expected values of the population characteristics to the characteristics observed from surveys and fisheries sampling programs. This is accomplished by the simultaneous estimation of the parameters in the model using a maximum likelihood estimation procedure. The fit of the simulated values to the observable characteristics is optimized by maximizing a log likelihood function given distributional assumptions about the observed data. The model also allows the inclusion and estimation of spawner-recruitment functions. When detailed age composition data are lacking, the estimated spawner-recruitment curve is used to generate the entire time series of recruitments, thus turning SSM into a simple production model. The inclusion of the spawner-recruitment information in data-rich models allows estimation of this relationship while taking into account all available information. The SSM also accommodates a body size dimension to the population to allow full use of size-based data, and estimation of growth curves while taking into account size-selectivity of the sample and variability in the age determination process.

Generalized model

The general model form used for the other species was usually age structured and allowed the use of auxiliary information including survey estimates of biomass and age composition time series as well as information species specific information on growth and maturation. The model was used to simulate the dynamics of the population and compare the expected values of the population characteristics to those observed from surveys and fishery sampling programs. It employed simultaneous estimation of the model parameters using a maximum likelihood estimation procedure. The fit of the simulated values to the observable characteristics was optimized by maximizing a log (likelihood) function given distributional assumptions about the data. In cases where the data was available it allowed for the input of sex-specific estimates of fishery and survey age composition and weight-at-age to provide sex-specific estimates of population numbers and fishing mortality. A stock recruit relationship was incorporated in the analysis to allow SPR for the estimation of biological reference points.

Stock Assessment Of Flatfish Stocks

BSAI Alaska Plaice

Prior to 2002, Alaska plaice (*Pleuronectes quadrituberculatus*) were managed as part of the “other flatfish” complex. Since then an age-structured model has been used for the stock assessment allowing Alaska plaice to be managed separately from the “other flatfish” complex as a single species. The Alaska plaice assessment is based on a catch at age model that was developed with the software program Automatic Differentiation Model Builder. Since the sex-specific weight-at-age for Alaska plaice diverges after the age of maturity (about age 10 for 50% of the stock) with females growing larger than males, the assessment model is configured to accommodate the sex-specific aspects of the population dynamics of Alaska plaice. The model is coded to allow for the input of sex-specific estimates of fishery and survey age composition and weight-at-age and provides sex-specific estimates of population numbers, fishing mortality, selectivity, fishery and survey age composition and allows for the estimation of sex-specific natural mortality and catchability. The catch-at-age population dynamics model was used to obtain estimates of several population variables of the Alaska plaice stock, including recruitment, population size, and catch.

This model incorporates fishery dependent data and fishery independent data from the NMFS EBS shelf bottom trawl survey. Alaska plaice fall under Tier 3a of the ABC/OFL control rules. Fisheries falling under the Tier 3 management scheme use $B_{35\%}$ and/or $_{B40\%}$ as a surrogate for MSY. Clark (1991) has shown that calculations made with life history parameters typical of North Pacific and Atlantic demersal fish and a range of realistic spawner-recruit relationships show that yield will be at least 75% of maximum sustainable yield so long as the spawning biomass is maintained in the range of about 20-60% of the unfished level.

The following changes have been made to this assessment relative to the November 2011 SAFE:

Changes in the assessment input data: 1) The 2011 catch data was updated, and the 2012 catch was estimated from Alaska Region total catch through September 15 in consideration of the weekly catch pattern for Alaska plaice. 2) The 2012 shelf survey biomass estimate and standard error, and the 2012 survey length composition were included in the assessment. 3) The 2011 survey ages were read and the 2011 survey age composition was added to the assessment. 4) The 2008-2011 fishery length compositions were added as a data component. No modifications were made to the assessment methodology.

Results of the Assessment:

Table 5.1. Principal results of the 2012 BSAI Alaska plaice stock assessment, based on the authors' (of the SAFE report) preferred model, and compared with the results of the 2011 model. Biomass and catch figures in tons. From the 2012 BSAI groundfish SAFE report, Alaska plaice section.

Quantity/Status	Last year 2012	2013	This year 2013	2014
M (natural mortality)	0.13	0.13	**0.13**	0.13
Specified/recommended Tier	3a	3a	**3a**	3a
Projected biomass (ages 3+)	606,000	599,500	**588,500**	580,400
Female spawning biomass (t)				
Projected	260,800	259,800	**260,500**	253,600
$B_{100\%}$	376,300		**380,000**	
$B_{40\%}$	150,500		**152,000**	
$B_{35\%}$	131,700		**133,000**	
F_{OFL}	0.19	0.19	**0.19**	**0.19**
$maxF_{ABC}$ (maximum allowable = F40%)	0.151	0.151	**0.158**	**0.158**
Specified/recommended F_{ABC}	0.151	0.151	**0.158**	**0.158**
Specified/recommended ABC (t)	53,400	54,000	**55,200**	67,000
Specified/recommended OFL (t)	64,600	65,000	**55,800**	60,200
Is the stock being subjected to overfishing?	No	No	No	No
Is the stock currently overfished?	No	No	No	No
Is the stock approaching a condition of being overfished?	No	No	No	No

BSAI Arrowtooth flounder

This stock assessment utilizes AD Model Builder software to model the population dynamics of Bering Sea and Aleutian Islands arrowtooth flounder. The model is a length-based approach where survey and fishery length composition observations are used to calculate estimates of population numbers-at-age by the use of a length-age (growth) matrix. The model simulates the dynamics of the population and compares the expected values of the population characteristics to those observed from surveys and fishery sampling programs. This is accomplished by the simultaneous estimation of the parameters in the model using the maximum likelihood estimation procedure. The fit of the simulation values to the observed characteristics is optimized by maximizing the likelihood function given some distributional assumptions about the observed data.

The recruitment parameters are comprised of 21 initial ages in 1976 and 37 subsequent age sex-specific recruitment estimates from 1976-2012. Recruitment in 2012 was set at the average from 1976-2012. The difference in the number of parameters estimated in this assessment compared to last year can be accounted for by an additional year (2012) of shelf survey data, slope survey data, Aleutian Islands survey data, and fishery catch and the estimate of one more year of recruitment. In addition, two more parameters are estimated in a later stage to estimate the annual relationship between bottom water temperature (to 200 m) and shelf survey catchability and the overall value of catchability which relates to the capture process and availability of the stock. It was assumed that the shelf and slope surveys measure non-overlapping segments of the arrowtooth flounder stock. Biomass was apportioned between the three areas by a linear fit to the 3 survey time series and the averages of the annual proportions were estimated from the linear regressions.

The resulting proportions are 76% shelf, 10% slope and 14% in the Aleutian Islands. Equal emphasis was placed on fitting all data components for this assessment. The relationship between annual bottom water temperature and shelf survey catchability

	was modeled to improve the fit to the shelf survey biomass estimates. Results are closely linked to fitting the general trend of increasing shelf survey biomass estimates during the 1980s to the present high level, and to fitting the male and female size compositions and sex ratios from the shelf, slope and Aleutian Islands surveys. This model incorporates fishery data and fishery independent data from the NMFS EBS shelf and slope bottom trawl surveys and the Aleutian bottom trawl survey. Changes to the input data relative to the November 2011 SAFE. Since the 2010 SAFE, input data includes arrowtooth flounder only as this assessment is no longer for the *Atheresthes* complex. The following new data was included in the model: Size compositions from the 2012 Eastern Bering Sea shelf survey, 2012 Aleutian Islands survey, and 2012 Eastern Bering Sea slope survey. Biomass point-estimates and standard errors for the 2012 Eastern Bering Sea shelf survey, 2012 Aleutian Islands survey, and 2012 Eastern Bering Sea slope survey. Fishery size composition for 2010 and 2011 (2010: n = 3402 females and n=1467 males, 2011: n=1004 females, n = 820 males). Estimates of catch and discard rate through October 15, 2012. Estimates of the retained and discarded portion of the 2011 and 2012 catch through October 15, 2012. Female natural mortality was changed to values in Stark 2008. Age data is in preparation from the 2012 shelf, slope, and Aleutian Islands surveys to be incorporated in the 2013 assessment. Arrowtooth flounder fall under Tier 3a of the ABC/OFL control rules. **Results of the Assessment:** **Table 5.2**. Principal results of the 2012 BSAI arrowtooth flounder stock assessment, based on the authors' (of the SAFE report) preferred model, and compared with the results of the 2011 model. Biomass and catch figures in tons. From the 2012 BSAI groundfish SAFE report, arrowtooth flounder section.	

Quantity/Status	Last year 2012	2013	This year 2013	2014
M (natural mortality)	0.35, 0.2	0.35, 0.2	0.35, 0.2	0.35, 0.2
Specified/recommended Tier	3a	3a	3a	3a
Projected biomass (ages 1+)	1,127,050	1,129,760	1,021,060	1,014,250
Female spawning biomass (t)				
Projected	818,286	811,932	638,377	642,518
$B_{100\%}$	702,721	--	616,191	--
$B_{40\%}$	281,088	--	246,476	--
$B_{35\%}$	245,852	--	215,667	--
F_{OFL}	0.27	0.27	0.21	0.21
$maxF_{ABC}$ (maximum allowable = F40%)	0.22	0.22	0.17	0.17
Specified/recommended F_{ABC}	0.22	0.22	0.17	0.17
Specified/recommended OFL (t)	181,000	186,000	131,985	134,443
Specified/recommended ABC (t)	150,000	152,000	111,204	112,484
Is the stock being subjected to overfishing?	no	no	no	no
Is the stock currently overfished?	no	no	no	no
Is the stock approaching a condition of being overfished?	no	no	no	no

BSAI Flathead sole

The assessment for BSAI flathead sole is conducted using a split-sex, age-based model with length-based formulations for fishery and survey selectivity. The model structure was developed following Fournier and Archibald’s (1982) methods for separable catch-at-age analysis, with many similarities to Methot (1990). The assessment model simulates the dynamics of the stock and compares expected values of stock characteristics with observed values from survey and fishery sampling programs in a likelihood framework, based on distributional assumptions regarding the observed data.

Model parameters are estimated by minimizing an associated objective function (the negative total loglikelihood plus imposed penalty functions) that describes the error structure between model estimates and observed quantities. The model was implemented AD Model Builder, automatic differentiation software developed as a set of C++ libraries. Age classes included in the model run from age 3 to 21. Age at recruitment was set at 3 years in the model because few fish are caught at younger ages in either the survey or the fishery. The oldest age class in the model (21 years) serves as a plus group in the model; the maximum age of flathead sole in the BSAI, based on otolith age determinations, is 32 years. Details of the population dynamics and estimation equations, description of variables and likelihood components are presented in Appendix A of the 2012 SAFE for the species. A total of 81 parameters were estimated in the preferred model.

Changes from the November 2011 SAFE: Input Data.

1) The 2011 fishery catch data was updated and the 2012 catch through Sept. 22, 2012 was added to the assessment. 2) Sex-specific size compositions based on

observer data from the 2012 fishery were added to the assessment. Fishery size compositions from 2011 were updated. 3) Sex-specific age compositions based on observer data from the 2010 and 2011 fisheries were added to the assessment. 4) The estimated survey biomass and standard error from the 2012 EBS Trawl Survey were added to the assessment. Sex-specific size compositions from the 2012 EBS Trawl Survey were added to the assessment. The mean bottom temperature from the 2012 EBS trawl survey was added to the assessment. 5) Sex-specific age compositions from the 2011 EBS Trawl Survey were added to the assessment.

The preferred model in the 2012 SAFE is identical to that selected in last year's assessment.

This model incorporates fishery data and fishery independent data from the NMFS EBS shelf bottom trawl survey and the Aleutian bottom trawl survey. BSAI flathead sole fall under Tier 3a of the ABC/OFL control rules.

Results of the Assessment:

Table 5.3. Principal results of the 2012 BSAI flathead sole stock assessment, based on the authors' (of the SAFE report) preferred model, and compared with the results of the 2011 model. Biomass and catch figures in tons. From the 2012 BSAI groundfish SAFE report, flathead sole section.

Quantity	As estimated or specified last year (2011)		As estimated or specified this year (2012)	
	2012	2013	2013	2014
M (natural mortality)	0.2	0.2	**0.2**	**0.2**
Specified/recommended tier	3a	3a	**3a**	**3a**
Total biomass (Age 3+; t)	810,936	814,898	**748,454**	747,838
Female Spawning Biomass (t)	250,224	244,283	**245,175**	236,009
$B_{100\%}$	333,610	333,610	**320,714**	320,714
$B_{40\%}$	133,444	133,444	**128,286**	128,286
$B_{35\%}$	116,763	116,763	**112,250**	112,250
$F_{OFL} = F_{35\%}$	0.340	0.340	**0.348**	0.348
$max\ F_{ABC} = F_{40\%}$	0.279	0.279	**0.285**	0.285
$recommended\ F_{ABC}$	0.279	0.279	**0.285**	0.285
OFL (t)	84,500	83,100	**81,535**	80,069
max ABC (t)	70,377	69,180	**67,857**	66,657
ABC (t)	70,400	69,200	**67,857**	66,657
Status	**As determined last year (2011) for:**		**As determined this year (2012) for:**	
	2010	2011	**2011**	**2012**
Overfishing	no	n/a	**no**	n/a
Overfished	n/a	no	n/a	**no**
Approaching overfished	n/a	no	n/a	**no**

BSAI Northern Rock Sole

The abundance, mortality, recruitment and selectivity of rock sole were assessed with a stock assessment model using the AD Model builder software. The conceptual model is a separable catch-age analysis that uses survey estimates of biomass and age composition as auxiliary information (Fournier and Archibald 1982). The model simulates the dynamics of the population and compares the expected values of the population characteristics to the characteristics observed from surveys and fishery sampling programs. This is accomplished by the simultaneous estimation of the parameters in the model using the maximum likelihood estimation procedure. The fit of the simulated values to the observable characteristics is optimized by maximizing a log (likelihood) function given some distributional assumptions about the data. Since the sex-specific weight-at-age for northern rock sole diverges after about age 6, with females growing larger than males, the current assessment model is coded to accommodate the sex-specific aspects of the population dynamics of northern rock sole. The model allows for the input of sex-specific estimates of fishery and survey age composition and weight-at-age and provides sex-specific estimates of population numbers, fishing mortality, selectivity, fishery and survey age composition and allows for the estimation of sex-specific natural mortality and catchability. The model retains the utility to fit combined sex data inputs. The model of rock sole population dynamics was evaluated with respect to the observations of the time-series of survey and fishery age compositions and the survey biomass trend since 1982, and the estimates of natural mortality, catchability and sex ratio.

BSAI northern rock sole fall under Tier 1a of the ABC/OFL control rules. The following changes have been made to this assessment relative to the November 2011 SAFE. 1) 2011 fishery age composition. 2) 2011 survey age composition. 3) 2012 trawl survey biomass point estimate and standard error. 4) Estimate of catch (t) and discards for 2012. 5) Estimate of retained and discarded portions of the 2011 catch. 6) Recalculated the weight at age of fish in 2008-2011 from survey length-at-age samples.

Results of the Assessment:

Table 5.4. Principal results of the 2012 BSAI Northern rock sole stock assessment, based on the authors' (of the SAFE report) preferred model, and compared with the results of the 2011 model. Biomass and catch figures in tons. From the 2012 BSAI groundfish SAFE report, northern rock sole section.

Quantity	As estimated or *specified last* year for: 2012	2013	As estimated or *recommended this* year for: 2013	2014
M (natural mortality rate)	0.15	0.15	0.15	0.15
Tier	1a	1a	1a	1a
Projected total (age 6+)	1,857,000	1,841,400	1,465,600	1,393,200
Female spawning biomass (t)	605,600	622,800	628,300	638,300
Projected				
B_0	683,400		694,500	
B_{MSY}	255,000	255,000	260,000	260,000
F_{OFL}	0.146	0.146	0.164	0.164
$maxF_{ABC}$	0.131	0.131	0.146	0.146
F_{ABC}	0.131	0.131	0.146	0.146
OFL (t)	231,000	216,700	241,000	229,000
maxABC (t)	208,000	195,500	214,000	204,000
ABC (t)	208,400	195,500	214,000	204,000
Status	As determined *last* year for: 2010	2011	As determined *this* year 2011	2012
Overfishing	No	No	No	No
Overfished	No	No	No	No
Approaching overfished	No	No	No	No

BSAI Yellowfin sole

The abundance, mortality, recruitment and selectivity of yellowfin sole were assessed with a stock assessment model using the AD Model Builder language. The conceptual model is a separable catch-age analysis that uses survey estimates of biomass and age composition as auxiliary information (Fournier and Archibald 1982). The assessment model simulates the dynamics of the population and compares the expected values of the population characteristics to the characteristics observed from surveys and fishery sampling programs. This is accomplished by the simultaneous estimation of the parameters in the model using the maximum likelihood estimation procedure. The fit of the simulated values to the observable characteristics is optimized by maximizing a log (likelihood) function given some distributional assumptions about the observed data. Since the sex-specific weight-at-age for yellowfin sole diverges after age of maturity (about age 10 for 50% of the stock) with females growing larger than males, the current assessment model is coded to accommodate the sex-specific aspects of the population dynamics of yellowfin sole. The model allows for the input of sex-specific estimates of fishery and survey age composition and weight-at-age and provides sex-specific estimates of population numbers, fishing mortality, selectivity, fishery and survey age composition and allows for the estimation of sex-specific natural mortality and catchability. The model retains the utility to fit combined sex data inputs.

Sharp increases in trawl survey abundance estimates for most species of Bering Sea flatfish between 1981 and 1982 indicate that the 83-112 trawl was more efficient for capturing these species than the 400-mesh eastern trawl used in 1975, and 1979-81. Allowing the model to tune to these early survey estimates would most likely underestimate the true pre-1982 biomass, thus exaggerating the degree to which biomass increased during that period. Although this underestimate would have little effect on the estimate of current yellowfin sole biomass, it would affect the spawner and recruitment estimates for the time-series. Hence, the pre-1982 survey biomass estimates were omitted from the 2012 stock assessment analysis. The model of yellowfin sole population dynamics was evaluated with respect to the observations of the time-series of survey and fishery age compositions and the survey biomass trend since 1982.

BSAI yellowfin sole fall under Tier 1a of the ABC/OFL control rules. Changes to the input data from the November 2011 SAFE. 1) 2011 fishery age composition. 2) 2011 survey age composition. 3) 2012 trawl survey biomass point estimate and standard error. 4) Estimate of the discarded and retained portions of the 2011 catch. 5) Estimate of total catch made through the end of 2012. No changes were made to the assessment methodology from the previous year.

Results of the Assessment:

Table 5.5. Principal results of the 2012 BSAI yellowfin sole stock assessment, based on the authors' (of the SAFE report) preferred model, and compared with the results of the 2011 model. Biomass and catch figures in tons. From the 2012 BSAI groundfish SAFE report, yellowfin sole section.

Quantity	As estimated or *specified last* year for:		As estimated or *recommended this* year for:	
	2012	2013	2013	2014
M (natural mortality rate)	0.12	0.12	0.12	0.12
Tier	1a	1a	1a	1a
Projected total (age 6+) biomass (t)	1,945,000	1,985,000	1,963,000	1,960,000
Female spawning biomass (t)				
Projected	592,700	604,900	582,300	601,000
B_0	954,100		966,900	
B_{MSY}	341,000		353,000	
F_{OFL}	0.114	0.114	0.112	0.112
$maxF_{ABC}$	0.104	0.104	0.105	0.105
F_{ABC}	0.104	0.104	0.105	0.105
OFL (t)	222,000	226,400	220,000	219,000
maxABC (t)	203,000	206,700	206,000	206,000
ABC (t)	203,000	206,700	206,000	206,000
Status	As determined *last* year for:		As determined *this* year for:	
	2011	2012	2012	2013
Overfishing	No	No	No	No
Overfished	No	No	No	No
Approaching overfished	No	No	No	No

BSAI Geenland Turbot

There was a major revision of the Greenland turbot stock assessment model and data in the 2012 cycle. The changes in the weight at age and selectivities had the net effect of reducing the current biomass estimate while increasing the reference points for this species.

	A version of the stock synthesis program (Methot 1990) has been used to model the eastern Bering Sea component of Greenland turbot since 1994. The software and assessment model configuration has changed over time, particularly in the past five years as newer versions have become available. Total catch estimates used in the model were from 1960 to 2011. Model parameters were estimated by maximizing the log posterior distribution of the predicted observations given the data. The model included two fisheries, those using fixed gear (longline and pots) and trawls, together with three surveys covering various years. Three new modeling approaches as well as the 2011 Reference model configuration were examined in the 2012 assessment. The new models configurations primarily differ in how recruitment prior to 1975 was modeled. All continue to use the Beverton-Hold curve, but in two (Models 2 and 3) the early recruitment series is carried back to 1945 and in one (Model 4) the time-series is truncated to 1977. The results from these models were similar. In addition to changes to the assessment model and data, there was a input error in 2009-2011 projection models that resulted in underestimates of the initial female spawning biomass (B100%), and therefore all biomass reference points. From the 2012 Authors' preferred reference model (Model 2) the estimate for B100% of 119,217 t is more than double last year's estimate of 53,900 t, but similar to the 2008 estimate of 109,328 t. The 2012 status of the stock is B21%, much lower than last year's projected status for 2012 of B89% and the 2008 estimate of B52%. The change in status was mostly due to fixing the input error and improvements in the shapes of the selectivity curves chosen in 2012. Due to these changes the stock is now in Tier 3b and therefore the ABC and OFL recommendations were further reduced by the descending portion in the control rule. The 2013 recommended ABC is only 26% of the projected 2013 ABC from last year's model. However, the projected 2013 estimated total biomass in this year's model is higher than projected from the 2011 Reference model. This is due to strong 2008 and an especially large 2009 year classes observed in both the survey and fisheries size composition data. These two year classes are expected to be larger than any other recruitment event since the 1970's and will begin to have an increasing influence on spawning stock biomass starting in 2014. Model 2 estimated that the BSAI Greenland turbot fishery is not overfishing the stock, that the stock is not currently overfished, and that the stock is not approaching an overfished condition. It should be noted however, that Model 3 in this assessment estimates that the BSAI Greenland turbot stock is in an Overfished condition. The only difference between Model 3 and Model 2 is the inclusion of autocorrelation in the recruitment deviations. Model 3 is the best fitting model and the only reason this model was not selected by the stock assessment authors is due to the fact that inclusion of autocorrelation in SS3 has not yet been thoroughly vetted. Summary of Changes in Assessment Inputs. 1) A new weight at length relationship has been developed using the combined weight and length data from all bottom trawl	

surveys conducted by the AFSC in the BSAI from 1983 to 2011. 2) Slope survey abundance index values for surveys conducted prior to 2002 were not included in 2012 due to differences with the more recent year's surveys. 3) There were new Slope, Shelf, and Auke Bay Laboratory (ABL) longline surveys in 2012. The abundance estimate (or RPN for the ABL longline survey) and length data were added to this assessment. Fishery catch and length frequency data were updated to the 2012 numbers. The 2009 through 2012 ABL longline survey length data have become available and added to the assessment. 4) Fishery length composition data were treated differently this year than in previous years. The raw Trawl and Longline fishery length composition data were proportioned to catch numbers by haul to obtain a more accurate representation of the catch composition. 5) Change in fishery multinomial sample sizes for the length data. 6) Change in recruitment estimation. 6) There was focused effort to explore appropriate selectivity curves for the 2012 assessment. The main difference between the 2011 Reference model selectivity and the 2012 candidate model selectivities is in how the male and female selectivity curves were allowed to differ.

Results of the Assessment:

Table 5.6. Principal results of the 2012 BSAI Greenland turbot stock assessment, based on the authors' (of the SAFE report) preferred model, and compared with the results of the 2011 model. Biomass and catch figures in tons. From the 2012 BSAI groundfish SAFE report, Greenland turbot section.

	As estimated or *specified last* year for:		As estimated or *recommended this* year for:	
Quantity	2012	2013	2013	2014
M (natural mortality rate)	0.112	0.112	0.112	0.112
Tier	3a	3a	3b	3b
Projected total (age 1+)	76,850	73,910	80,989	94,752
Female spawning biomass (t)				
Projected	47,687	41,441	23,485	26,537
$B_{100\%}$	53,900	53,900	119,217	119,217
$B_{40\%}$	21,560	21,560	47,686	47,686
$B_{35\%}$	18,870	18,870	41,726	41,726
F_{OFL}	0.453	0.453	0.14	0.16
$maxF_{ABC}$	0.367	0.367	0.12	0.13
F_{ABC}	0.367	0.367	0.12	0.13
OFL (t)	11,658	9,697	2,539	3,266
maxABC (t)	9,660	8,029	2,064	2,655
ABC (t)	9,660	8,029	2,064	2,655
EBS	7,226	6,006	1,612	2,074
Aleutian Islands	2,434	2,023	452	581
	As determined *last* year		As determined *this* year	
Status	2010	2011	2011	2012
Overfishing	No	n/a	No	n/a
Overfished	n/a	No	n/a	No
Approaching overfished	n/a	No	n/a	No

BSAI Kamchatka Flounder

Despite current management under tier 5, a provisional analysis to assess the Kamchatka Flounder stock in the Bering Sea and Aleutian Islands using Tier 3 age and length structured modeling methodology has been performed and provided in the Appendix of the 2012 SAFE report for the species. A mortality of 0.13 derived from the assessment model has been used for the 2013 projections. Given the development of an age and size structured model, the species could be moved formally in tier 3 management in the 2013 or 2014 assessment cycle. This would provide biomass reference point in addition to the existing fishing mortality reference points for the species.

This stock assessment utilized the AD Model Builder software to model the population dynamics of BSAI Kamchatka flounder since 1991. The model is a sex-specific length based approach where survey and fishery length composition observations are used to calculate estimates of population numbers-at-age by the use of a length-age (growth) matrix. The model simulates the dynamics of the population and compares the expected values of the population characteristics to those observed from surveys and fishery sampling programs. This is accomplished by the simultaneous estimation of the parameters in the model using the maximum likelihood estimation procedure. The fit of the simulation values to the observed characteristics is optimized by maximizing the log (likelihood) function given the following distributional assumptions about the observed data.

The recruitment parameters are comprised of the 24 initial ages in 1991 (ages 2-25), the 20 subsequent recruitment deviation estimates from 1976-2007 and the mean log of all recruitment. Fishing mortality (F) parameters include the log of average F and the 21 annual fishing mortality deviations. Selectivity parameters are from the logistic model for 3 surveys and a single fishery, for each sex. In addition, two more parameters are estimated in a later stage to estimate the annual relationship between bottom water temperature and shelf survey catchability and bottom water temperature and the overall value of catchability which relates to the capture process and availability of the stock (discussed in the next section).

It was assumed that the shelf, slope and Aleutian Islands surveys measure non-overlapping segments of the Kamchatka flounder stock. Biomass was apportioned between the three areas by calculating the average of the annual proportions estimated from the trawl surveys. The resulting proportions are 37% shelf, 18% slope and 45% in the Aleutian Islands. The length-age conversion matrices (sex specific) were constructed using fitted von Bertalanffy growth curves to the available age data. The variability in length at age was estimated to reflect a CV of about 8% (in cm). This provided the variance in growth for the length-age conversions.

Summary of Changes in Assessment Inputs and methodology. Trawl survey biomass estimates from the 2012 Bering Sea shelf and slope surveys and the Aleutian Islands survey were used to update the assessment. Also, the natural mortality rate of

Kamchatka flounder was evaluated from 4 separate methods for the 2012 assessment and was re-estimated at a lower value (0.13) than in 2011 (0.2).

Results of the Assessment:

Table 5.7. Principal results of the 2012 BSAI Kamchatka flounder stock assessment, based on the authors' (of the SAFE report) preferred model, and compared with the results of the 2011 model. Biomass and catch figures in tons. From the 2012 BSAI groundfish SAFE report, Kamchatka flounder section.

Quantity	As estimated or *specified last* year for: 2012	2013	As estimated or *recommended this* year for: 2013	2014
M (natural mortality rate)	0.2	0.2	0.13	0.13
Tier	5	5	5	5
Biomass (t)	125,200	125,200	108,800	108,800
F_{OFL}	0.2	0.2	0.13	0.13
$maxF_{ABC}$	0.15	0.15	0.098	0.098
F_{ABC}	0.15	0.15	0.098	0.098
OFL (t)	24,800	24,800	16,300	16,300
maxABC (t)	18,600	18,600	12,200	12,200
ABC (t)	18,600	18,600	12,200	12,200
Status	As determined *last* year for: 2012	2013	As determined *this* year for: 2013	2014
Overfishing	n/a	n/a	n/a	n/a

GOA Arrowtooth flounder

The model structure is developed following Fournier and Archibald's (1982) methods, with many similarities to Methot (1990). The authors implemented the model using automatic differentiation software developed as a set of libraries under C++ (ADModel Builder). There were a total of 138 parameters estimated in the model. The 18 selectivity parameters estimated in the model for the smooth selectivity functions were constrained so that the number of effectively free parameters would be less than 18. There were 51 fishing mortality deviates in the model which were constrained to be small, plus one mean fishing mortality parameter, to fit the observed catch closely. Twelve initial recruitment deviations were estimated to start the population in 1961. Recruitments deviations from 1961 to 2011 account for 51 parameters, plus one parameter for the mean recruitment. Survey selectivity was estimated separately for males and females (4 parameters total). The instantaneous natural mortality rate, catchability for the survey and the Von Bertalanffy growth parameters were fixed in the model.

Changes in the input data

In the 2011 SAFE, the 2011 survey biomass and length data were added to the model. Catch for 2009 was updated and 2010 and 2011 catch (to September 17, 2011) were added to the model. Fishery length data for 2009 was updated and 2010 and 2011 added to the model. Survey age data were added for 2007 and 2009. In the 2012 SAFE, the following were added: 1) the total catch for 2011 (30,890 t) and 2) the current catch for 2012 (16,284 t as of Oct. 6, 2012).

An age-based model was used with the same configuration as the 2009 assessment, except the added constraint on the last three estimated recruitments was removed. GOA arrowtooth flounder fall under Tier 3a of the ABC/OFL control rules.

Results of the Assessment:

Table 5.8. Principal results of the 2012 GOA arrowtooth flounder stock assessment update, based on the authors' (of the SAFE report) preferred model, and compared with the results of the 2011 model. Biomass and catch figures in tons. From the 2012 GOA groundfish SAFE report, arrowtooth flounder update.

Quantity	As estimated or *specified last* year for: 2012	2013	As estimated or *recommended this* year for: 2013	2014
M (natural mortality rate)	0.2 females, 0.35 males	0.2 females, 0.35 males	0.2 females, 0.35 males	0.2 females, 0.35 males
Tier	3a	3a	3a	3a
Projected total (age 3+) biomass (t)	2,161,690	2,133,320	2,055,560	2,104,150
Female spawning biomass (t)	1,263,150	1,278,530	1,274,290	1,271,940
Projected				
$B_{100\%}$	1,205,580	1,205,580	1,205,580	1,205,580
$B_{40\%}$	482,231	482,231	482,231	482,231
$B_{35\%}$	421,953	421,953	421,953	421,953
F_{OFL}	0.207	0.207	0.207	0.207
$maxF_{ABC}$	0.174	0.174	0.174	0.174
F_{ABC}	0.174	0.174	0.174	0.174
OFL (t)	250,100	249,066	247,196	245,262
maxABC (t)	212,882	212,033	210,451	208,811
ABC (t)	212,882	212,033	210,451	208,811
Status	As determined *last* year for: 2010	2011	As determined *this* year for: 2011	2012
Overfishing	No	No	No	n/a
Overfished	No	No	No	No
Approaching overfished	No	No	No	No

GOA Flathead Sole

The assessment was conducted using a split-sex, age-structured model with parameters evaluated in a maximum likelihood context. The model structure was developed following Fournier and Archibald's (1982) methods, with many similarities to Methot (1990). The model was implemented using automatic differentiation software developed as a set of libraries under C++ (ADModel Builder). The current assessment model covers 1984-2011. Age classes included in the model run from age 3 to 20. Age at recruitment was set at 3 years in the model due to the small number of fish caught at younger ages. The oldest age class in the model, age 20, serves as a plus group; the typical maximum age of flathead sole based on otolith age determinations has been estimated at 25 years. Details of the population dynamics and estimation equations, description of variables and likelihood components are presented in

Appendix A of the 2011 SAFE. A total of 81 parameters were estimated in the final model. GOA flathead sole fall under Tier 3a of the ABC/OFL control rules.

Changes in the Input Data in the 2011 SAFE. 1) The fishery catch and length compositions for 2010 and 2011 (through Sept. 24, 2011) were incorporated in the model. 2) The 2009 fishery catch and length compositions were updated. 3) The 2011 GOA groundfish survey biomass estimate and length composition data were added to the model. Survey biomass increased from 225,377 t in 2009 to 235,639 t in 2011. Survey biomass estimates and length compositions were recalculated for all survey years. 4) Age compositions from the 2001 and 2009 groundfish surveys were added to the model. The 2012 SAFE new information available to update the projection model consisted of the total catch for 2011 (2,728 t) and the current catch for 2012 (1,629 t as of Sept. 22, 2012).

Results of the Assessment:

Table 5.9. Principal results of the 2012 GOA flathead sole stock assessment update, based on the authors' (of the SAFE report) preferred model, and compared with the results of the 2011 model. Biomass and catch figures in tons. From the 2012 GOA groundfish SAFE report, flathead sole update.

Quantity	As estimated or specified last year (2011) for:		As estimated or specified this year (2012) for:	
	2012	2013	**2013**	**2014**
M (natural mortality)	0.2	0.2	**0.2**	**0.2**
Specified/recommended tier	3a	3a	**3a**	**3a**
Total biomass (Age 3+; t)	292,189	286,274	**288,538**	285,128
Female Spawning Biomass (t)	104,301	105,127	**106,377**	107,178
$B_{100\%}$	103,868	103,868	**103,868**	103,868
$B_{40\%}$	41,547	41,547	**41,547**	41,547
$B_{35\%}$	36,354	36,354	**36,354**	36,354
$F_{OFL} = F_{35\%}$	0.593	0.593	**0.593**	0.593
$max\ F_{ABC} = F_{40\%}$	0.450	0.450	**0.450**	0.450
$recommended\ F_{ABC}$	0.450	0.450	**0.450**	0.450
OFL (t)	59,380	60,219	**61,036**	62,296
max ABC (t)	47,407	48,081	**48,738**	49,771
ABC (t)	47,407	48,081	**48,738**	49,771
Status	As determined last year (2011) for:		As determined this year (2012) for:	
	2010	2011	**2011**	**2012**
Overfishing	no	n/a	**no**	n/a
Overfished	n/a	no	n/a	**no**
Approaching overfished	n/a	no	n/a	**no**

GOA Northern and Southern rock sole

The stock assessment model is a two species two sex mixed fishery statistical catch-at-age population dynamics model using maximum likelihood estimation built with AD Model Builder (ADMB Project, 2009). There were several structural changes made to the 2011 model configuration in order to address selectivity and recruitment issues.

The fishery selectivity was changed from 1 to 3 periods to allow for changes over time in fishing; the three periods are pre-1990, 1990-1999, and 2000 on. The selectivity curves for the first two selectivity periods for both fishery and survey selectivity have been changed from species- and sex-specific to sex-specific only, as most of the data for the fishery and all of the data for the survey for these two periods are for undifferentiated (U) rock sole. A penalty was added to the likelihood to restrict recruitment for southern (S) rock sole for 1974-1983 in order to address the high recruitment in 1979 in last year's results. The weight on fitting to the survey biomass indices was changed from 5.0 to 1.0 and the weight on fitting to the fishery observer catch-at-length data was changed from 0.5 to 1.0, as the extrapolated fishery observer data represent on average 20% on the shallow-water flatfish catch, not less than 1%, which the sampled fishery observer data represent.

Seven new model configurations were evaluated, differentiated by the data used in the model. The model evaluation criteria included how well the model estimates fit to the survey estimates of biomass, the survey numbers-at-age, the annual U/N/S rock sole catch and the scaled fractions of shallow-water flatfish catch that is N and S rock sole, reasonable curves for fishery selectivity-at-length (logistic versus exponential), reasonable values for annual fishing mortality so that the catch did not come primarily from one species, reasonably smooth changes over time in annual fishing mortality, and that the model estimated the variance-covariance matrix.

New Input data used in the 2012 SAFE. 1) 2011 and 2012 total shallow-water flatfish catch, total rock sole catch for 1991 through 2012, and fishery observer undifferentiated (U)/northern (N)/southern (S) rock sole catch-at length. 2) Survey: 2011 N and S rock sole age composition and mean size-at-age from the NMFS GOA bottom trawl survey. Both species are managed under tier 3a recommendations.

Assessment Results:

Table 5.10. Principal results of the 2012 GOA northern rock sole stock assessment, based on the authors' (of the SAFE report) preferred model, and compared with the results of the 2011 model. Biomass and catch figures in tons. From the 2012 GOA groundfish SAFE report, northern and southern rock sole section.

Quantity	As estimated or *specified last* year for: 2012	2013	As estimated or *recommended this* year for: 2013	2014
M (natural mortality rate)	0.2,0.263*	0.2, 0.263*	0.2,0.275*	0.2, 0.275*
Tier	3a	3a	3a	3a
Projected total (age 3+) biomass (t)	86,900	75,700	89,300	80,000
Female spawning biomass (t)	43,700	37,600	42,700	36,500
Projected				
$B_{100\%}$	47,500	47,300	50,300	50,300
$B_{40\%}$	19,000	18,900	20,100	20,100
$B_{35\%}$	16,600	16,500	17,600	17,600
F_{OFL}	0.186	0.186	0.180	0.180
$maxF_{ABC}$	0.157	0.157	0.152	0.152
F_{ABC}	0.157	0.157	0.152	0.152
OFL (t)	12,600	10,800	11,400	9,900
maxABC (t)	10,800	9,300	9,700	8,500
ABC (t)	10,800	9,300	9,700	8,500
Status	As determined *last* year for: 2010	2011	As determined *this* year for: 2011	2012
Overfishing	no	n/a	no	n/a
Overfished	n/a	no	n/a	no
Approaching overfished	n/a	no	n/a	no

* for males; estimated

Table 5.11. Principal results of the 2012 GOA southern rock sole stock assessment, based on the authors' (of the SAFE report) preferred model, and compared with the results of the 2011 model. Biomass and catch figures in tons. From the 2012 GOA groundfish SAFE report, northern and southern rock sole section.

Quantity	As estimated or *specified last* year for: 2012	2013	As estimated or *recommended this* year for: 2013	2014
M (natural mortality rate)	0.2, 0.260*	0.2, 0.260*	0.2, 0.267*	0.2, 0.267*
Tier	3a	3a	3a	3a
Projected total (age 3+) biomass (t)	220,400	198,200	208,800	192,700
Female spawning biomass (t)	93,600	84,000	82,800	72,500
Projected				
$B_{100\%}$	123,000	122,500	112,900	112,900
$B_{40\%}$	49,200	49,000	45,100	45,100
$B_{35\%}$	43,000	42,800	39,500	39,500
F_{OFL}	0.228	0.228	0.230	0.230
$maxF_{ABC}$	0.191	0.191	0.193	0.193
F_{ABC}	0.191	0.191	0.193	0.193
OFL (t)	26,700	23,600	21,900	19,300
maxABC (t)	22,700	20,000	18,600	16,400
ABC (t)	22,700	20,000	18,600	16,400
Status	As determined *last* year for: 2010	2011	As determined *this* year for: 2011	2012
Overfishing	no	n/a	no	n/a
Overfished	n/a	no	n/a	no
Approaching overfished	n/a	no	n/a	no

* for males; estimated

GOA Rex Sole

Consequently, they have developed harvest recommendations for the GOA rex sole stock using a Tier 5 approach (FOFL=M, FABC=0.75·M) applied to estimates of adult biomass from a Tier 3-type age-structured assessment model. Current stock levels were estimated for 2011 and projected for 2012-2013 using the "base" model formulation as in 2009: a split-sex, age-structured model with parameters evaluated in a maximum likelihood context. The model structure (Appendix A) was developed following Fournier and Archibald's (1982) methods, with many similarities to Methot (1990). They implemented the model using automatic differentiation software developed as a set of libraries under C++ (ADModel Builder). Age classes included in the model run from age 3 to 20. Age at recruitment was set at 3 years in the model due to the small number of fish caught at younger ages. The oldest age class in the model, age 20, serves as a plus group in the model; the maximum age of rex sole based on otolith age determinations has been estimated at 27 years. Details of the population dynamics and estimation equations, description of variables and likelihood components are presented in Appendix A of the 2011 SAFE. A total of 89 parameters were estimated in the model.

Changes in the Input Data in the 2011 SAFE. 1) The fishery catch and length compositions for 2010 and 2011 (through Sept. 24, 2011) were incorporated in the model. 2) The 2009 fishery catch and length compositions were updated. 3) The 2011 GOA groundfish survey biomass estimate and length composition data were added to the model. Survey biomass declined from 124,744 t in 2009 to 95,134 t in 2011. Survey biomass estimates and length compositions were recalculated by the RACE GOA Groundfish Survey for all survey years. 4) Survey age compositions for two years (1999 and 2009) were added to the model. The 2012 SAFE report update the projection model with total catch for 2011 (2,876 t) and the current catch for 2012 (2,048 t as of Sept. 22, 2012).

Assessment Results:

Table 5.12. Principal results of the 2012 GOA rex sole stock assessment update, based on the authors' (of the SAFE report) preferred model, and compared with the results of the 2011 model. Biomass and catch figures in tons. From the 2012 GOA groundfish SAFE report, rex sole update.

Quantity	As estimated or specified last year (2011) for:		As estimated or recommended this year (2012) for:	
	2012	2013	**2013**	**2014**
M (natural mortality)	0.17	0.17	**0.17**	**0.17**
Specified/recommended tier	5	5	**5**	**5**
Biomass (adult; t)	87,162	85,528	**86,684**	85,778
F_{OFL} =M	0.170	0.170	**0.170**	0.170
max F_{ABC} =0.75*M	0.128	0.128	**0.128**	0.128
recommended F_{ABC}	0.128	0.128	**0.128**	0.128
OFL (t)	12,561	12,326	**12,492**	12,362
max ABC (t)	9,612	9,432	**9,560**	9,460
ABC (t)	9,612	9,432	**9,560**	9,460
Status	**As determined last year (2011) for:**		**As determined this year (2012) for:**	
	2010	2011	**2011**	**2012**
Overfishing	no	n/a	**no**	n/a
$B_{35\%}$		19,434		**19,434**
Female spawning biomass (t)		52,849		**53,164**
Overfished	n/a	no	**n/a**	no

Evidence

BSAI Alaska plaice SAFE 2012:
http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIplaice.pdf

BSAI arrowtooth flounder SAFE 2012:
http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIatf.pdf

BSAI flathead sole SAFE 2012:
http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIflathead.pdf

BSAI Greenland turbot SAFE 2012:
http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIturbot.pdf

BSAI Kamchatka flounder SAFE 2012:
http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIkamchatka.pdf

BSAI northern rock sole SAFE 2012:
http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIrocksole.pdf

BSAI yellowfin sole SAFE 2012:
http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIyfin.pdf

GOA flathead sole SAFE 2011:
http://www.afsc.noaa.gov/REFM/Docs/2011/GOAflathead.pdf

GOA arrowtooth flounder SAFE 2011:
http://www.afsc.noaa.gov/REFM/Docs/2011/GOAatf.pdf

GOA rex sole SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOArex.pdf

GOA northern and southern rock sole SAFE 2012:
http://www.afsc.noaa.gov/REFM/Docs/2012/GOAnsrocksole.pdf

GOA shallow water flatfish SAFE 2011:
http://www.afsc.noaa.gov/REFM/Docs/2011/GOAshallowflat.pdf

Other 2012 SAFE assessments:

	http://www.afsc.noaa.gov/REFM/Stocks/assessments.htm Clark, W.G., 1991. Groundfish exploitation rates based on life history parameters. Can. J. Fish. Aquat. Sci. 48, 734–750. (http://www.iphc.int/papers/f35.91.pdf) Fournier, D.A. and C.P. Archibald. 1982. A general theory for analyzing catch-at-age data. Can. J.Fish.Aquat.Sci. 39:1195-1207. Methot, R. D. 1990. Synthesis model: An adaptable framework for analysis of diverse stock assessment data. Int. N. Pac. Fish. Comm. Bull. 50:259-277.	

Clause:

5.2 The state of the stocks under management jurisdiction, including the impacts of ecosystem changes resulting from fishing pressure, pollution or habitat alteration shall be monitored.

Eco 31

5.2.1 The research capacity necessary to assess the effects of climate or environment change on fish stocks and aquatic ecosystems shall be established. The state of the stock under State Jurisdiction, including the impacts of ecosystem changes resulting from fishing pressure, pollution or habitat alteration shall be established.

FAO CCRF 12.5

Evidence adequacy rating:

☑High **☐ Medium** **☐ Low**

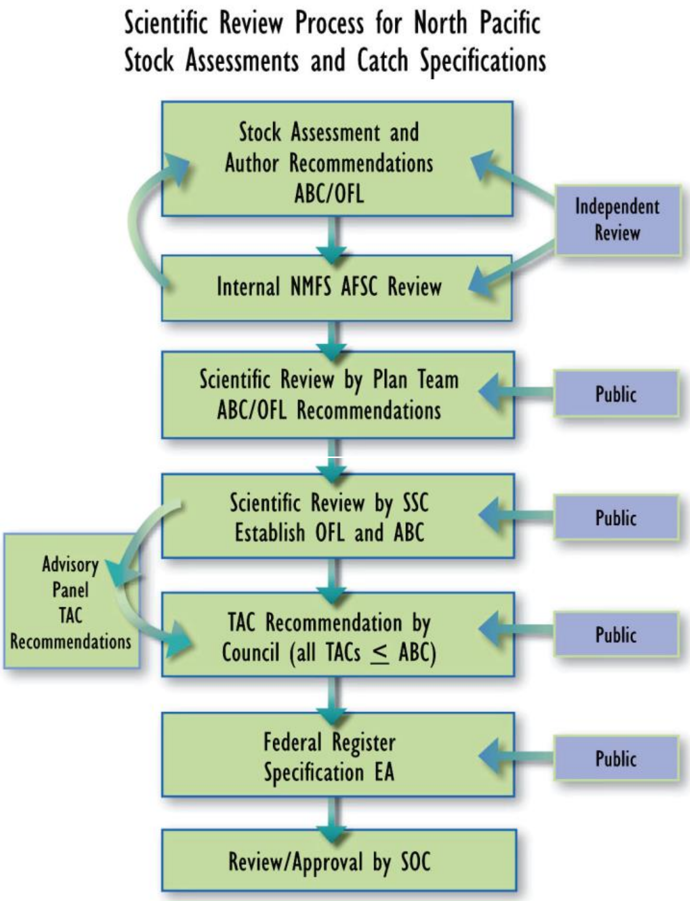
☑ Full Conformity **☐ Minor Non-conformity** **☐ Major Non-conformity**

☐ Critical Non-conformity

Clause:	**Evidence**
5.2	**Rating determination** *Both the BSAI and GOA flatfish stocks are subject to a rigorous annual or biennial analytical assessment process involving the testing of different model approaches and derivations, and extensive internal review processes. Interaction between the commercial fisheries targeting flatfish species and the wider ecosystem are considered in the annual Ecosystem Considerations report of the SAFE documents.* Both the BSAI and GOA flatfish stocks are subject of fisheries management plans (BSAI

	FMP https://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf and GOA FMP https://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf). The BSAI FMP was implemented in 1982 and the GOA FMP implemented in 1978. As a condition of these plans, these stocks must be assessed annually in the BSAI and biennially in the GOA. These evaluations form the basis for management actions. SAFE Reports are prepared and reviewed regularly for each FMP species or species group. The SAFE reports are comprised of three sections concerning: 1) Stock Assessment 2) Economic Status and 3) Ecosystem Considerations. The Stock assessment reports are prepared by multi-agency "Plan Teams" and largely based on input from stock assessment scientists from the NMFS-AFSC. Both the EBS and GOA flatfish stocks are subject to a rigorous analytical assessment process involving the testing of different model approaches and derivations, and extensive internal review processes. Assessment approaches and outcomes are reviewed twice annually prior to the submission of the 'best' assessment to the NPFMC each December. The 2012 presentations made to the NPFMC on the assessments of GOA groundfish species can be found here: http://www.afsc.noaa.gov/REFM/Docs/2012/GOAintro.pdf and for the BSAI groundfish here: http://www.afsc.noaa.gov/REFM/Docs/2012/2012_12_BSAI_SAFE_Overview_Council.pdf December 2011 SAFE reports for the assessments of GOA flatfish species in 2012 can be found here http://www.afsc.noaa.gov/refm/stocks/2011_assessments.htm and for the 2013 BSAI flatfish species (and GOA n/s rock sole) assessments from 2012 here http://www.afsc.noaa.gov/REFM/stocks/assessments.htm. Detailed assessments are produced annually for nine of these species while detailed assessments for GOA flathead sole, arrowtooth flounder and rex sole are produced every two years. Also, northern and southern Rock sole were assessed separately for the first time in 2012. However, updated SAFE report are produced every year for the GOA species, these report usually re-run the model with pre-established parameters from the previous year but adding the most recent and complete estimate of catch data. These stock assessments were briefly presented in clause 5.1.1. In addition, all assessed groundfish stocks are also subject to periodic external peer review through the CIE program. http://www.fakr.noaa.gov/protectedresources/stellers/esa/biop/final/cie/about.htm The objective of the CIE program is to ensure that assessment approaches are	

	appropriate and meet best international standards. Most recent CIE reviews of flatfish species SAFEs: BSAI yellowfin sole- 2012 GOA northern rock sole- 2012 GOA southern rock sole- 2012 GOA rex sole- 2011	



http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Species_Profiles2011.pdf

Interaction between the commercial fisheries targeting flatfish species and the wider ecosystem are considered in the annual *Ecosystem Considerations* section of the SAFE document http://www.afsc.noaa.gov/REFM/docs/2012/ecosystem.pdf. The reports are compiled by the REFM and reviewed by the Plan Teams. These are highly detailed and provide information on the interactions between commercial fisheries and the physical environment trends (area disturbance/impact by fisheries by gear type), oceanographic conditions such as trends in bottom and surface temperature, ice cover, status of oceanographic current and gyres, ecosystem trends such as phytoplankton and zooplankton production, status of key marine invertebrate species, benthic communities, marine mammals and seabirds as well as commercial and non-

commercial fish species. What is of significant use is the presentation of trends in the time series for key ecosystem indicators (Figure 5.2) and an analysis of trends. The reports also identify specific 'hot topics' such as the state of endangered or threatened species and also provide area specific summary 'report cards' which identify key findings and issues associated with each area. The report card for the EBS can be found here
http://access.afsc.noaa.gov/reem/ecoweb/eco2012reportcardEBS.pdf
and the report card for AI here
http://access.afsc.noaa.gov/reem/ecoweb/eco2012reportcardAI.pdf

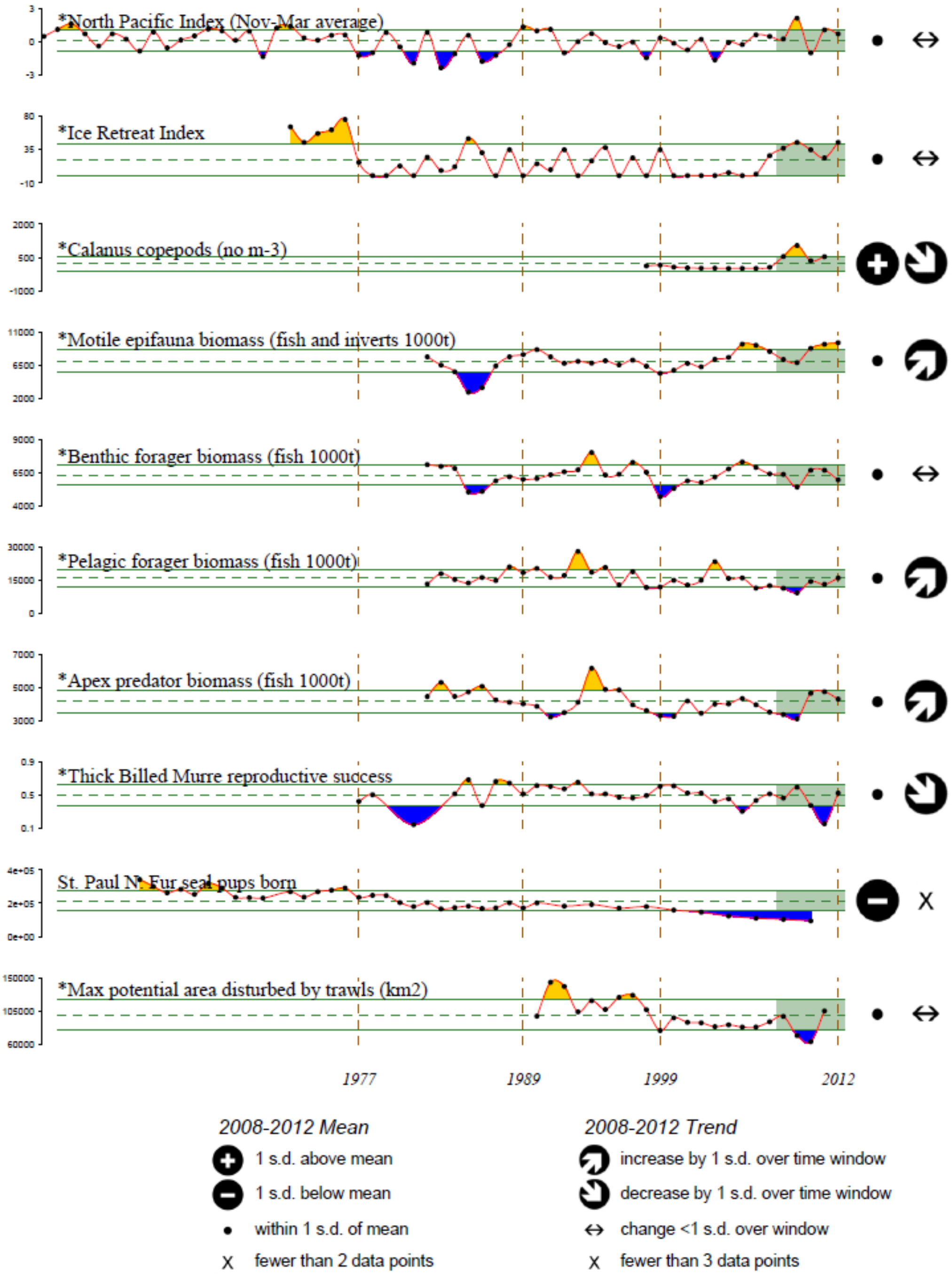


Figure 5.2. Example of trends in key Eastern Bering Sea ecosystem indicators from the Ecosystem Considerations report 2012. * indicates time series updated in 2012.

The Alaska Department of Environmental Conservation (DEC) implements statutes and regulations affecting air, land and water quality. DEC is the lead state agency for implementing the federal Clean Water Act and its authorities provide considerable opportunity to maintain high quality fish and wildlife habitat through pollution prevention. Alaskan waters are relatively free of industrial pollutants, which are aggressively monitored by the DEC. These include wastewater discharge, storm water discharge, seafood water discharge, placer mining discharge, log transfer discharge, and others. (http://www.dec.state.ak.us/).

The Ecosystem considerations report also provides informational indices (area disturbed by trawling) based on swept area estimates of commercial trawls, and is used to monitor trends in the scale (area) of trawling over time for EBS, AI and GOA and provide a proxy index of habitat disturbance.

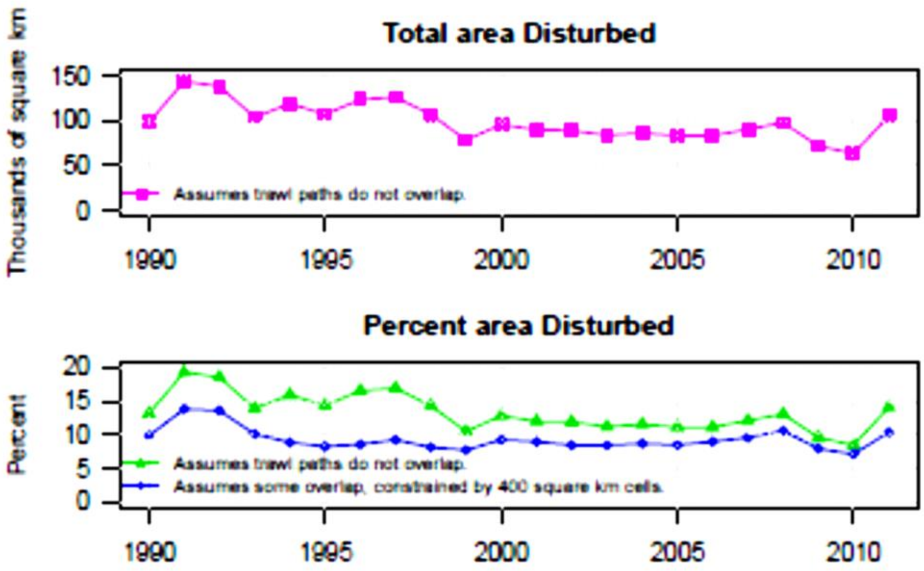


Figure 5.3. Total maximum potential trawl area disturbed, and the percent area disturbed. The green line, representing percent area disturbed, sums the area disturbed assuming no spatial overlap of trawl hauls in a year, thus providing an upper limit to the estimated of area disturbed. The blue line represents the percent of area disturbed with spatial overlap of trawl hauls within 400 km^2 cells, thereby, limiting the disturbance of trawls recorded in a cell to 400 km^2.

In addition to the use of habitat disturbance indices derived from commercial fishing activity (swept area), CPUE trends derived from RACE survey data are provided for various epifauna (sponges, soft corals etc.) species, although it is acknowledged that survey trawls have low (and undefined) catchability of such organisms, the index does provide a useful trend in abundance over time (Figures 5.4 and 5.5).

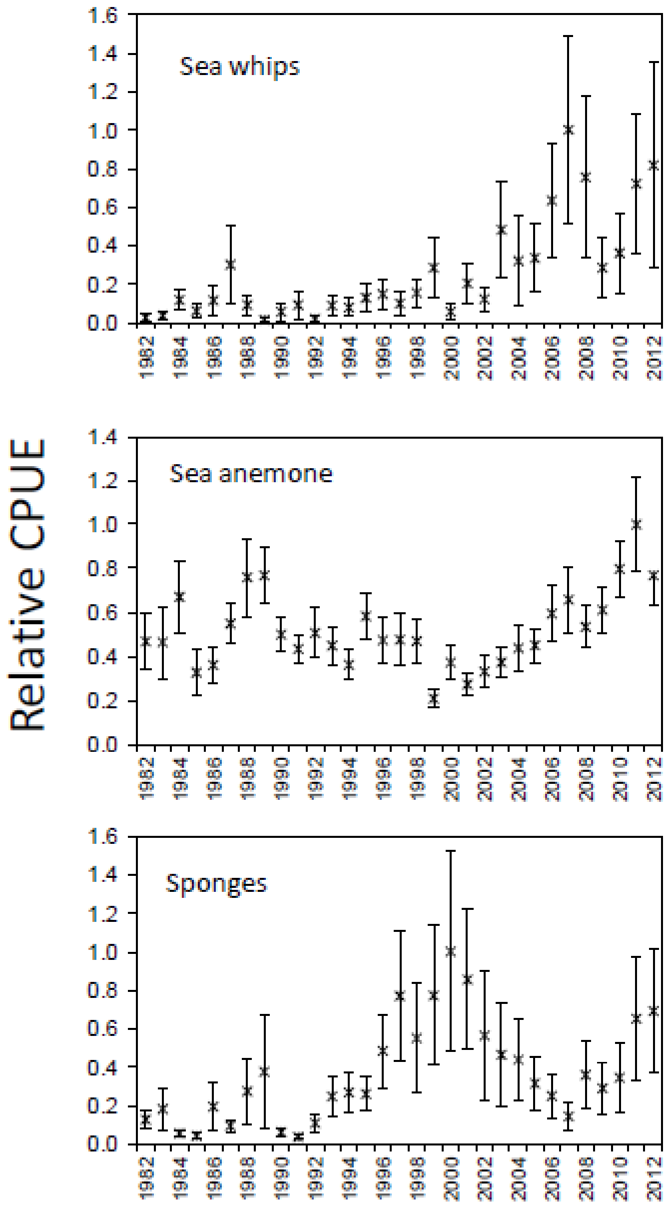
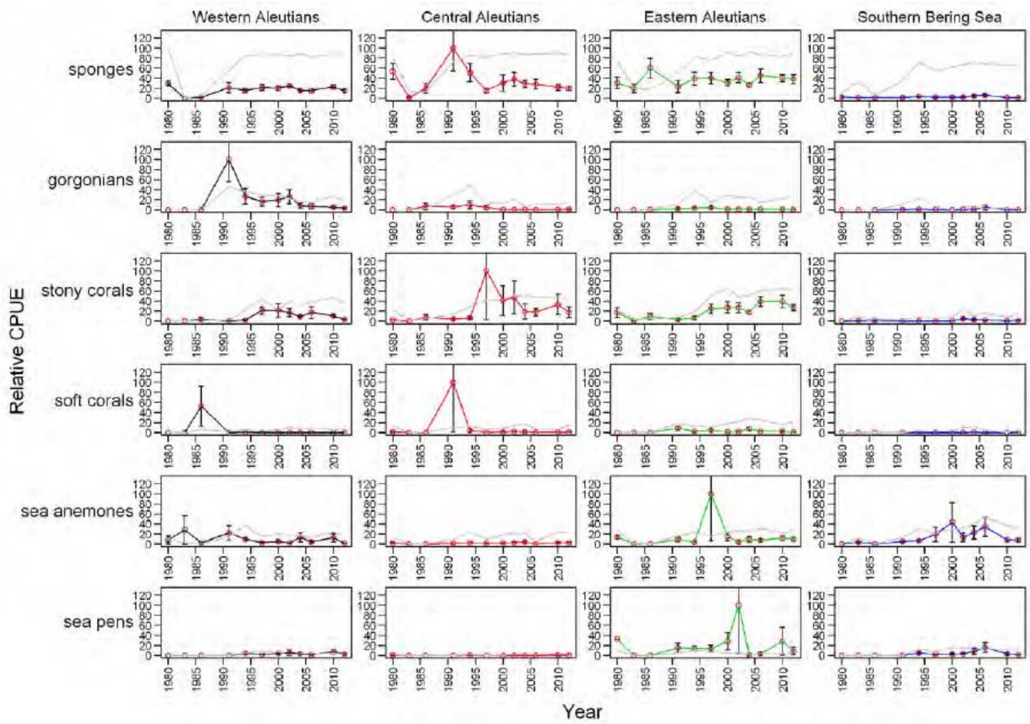


Figure 5.4. Relative CPUE trends of structural epifauna from the RACE bottom trawl survey of the EBS shelf, 1982-2012. Data points are shown with standard error bars.

	 **Figure 5.5.** Mean CPUE of HAPC species groups by area from RACE bottom trawl surveys in the Aleutian Islands from 1980 through 2012. Error bars represent standard errors. The gray lines represent the percentage of non-zero catches. The Western, Central, and Eastern Aleutians correspond to management areas 543, 542, and 541, respectively. The Southern Bering Sea corresponds to management areas 519 and 518. **Evidence** http://www.afsc.noaa.gov/REFM/docs/2012/ecosystem.pdf

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	**Evidence**
5.2.1	**Rating determination** *Given the depth and detail presented in the Ecosystem Considerations reports discussed above, it is clear that there is extensive research being undertaken to investigate the impacts of changes on the environment on all aspects of the marine ecosystem.*

	Given the depth and detail presented in the Ecosystem Considerations reports discussed above, it is clear that there is extensive research being undertaken to investigate the impacts of changes on the environment on all aspects of the marine ecosystem. The NOAA FATE program (Fisheries and The Environment) http://fate.nmfs.noaa.gov/ undertakes research into the impact of environmental forcing e.g. global warming on the productivity and dynamics of a wide range of marine species. One of the primary objectives of FATE is to identify and collate data associated with a suite of ecological indicators, such as those presented above and to integrate these into traditional stock assessments. REFM scientists in the Status of Stocks and Multispecies Assessments (SSMA) program use biological and oceanographic information coupled with numerical simulation techniques to study the interaction of fish populations, fisheries, and the environment. The Fishery Interaction Team of SSMA conducts field studies to examine potential commercial fishery impacts on prey including reduction in the abundance or availability of prey at local scales and disturbance of prey fields. http://www.afsc.noaa.gov/REFM/ The Resource Ecology and Ecosystem Modeling (REEM) Division focuses on multi-species interactions, food web modeling and the integration into single, multi-species and broader environmental modeling approaches. http://www.afsc.noaa.gov/refm/reem/default.php Annual results are published in the Ecosystem SAFE documents provided to the NPFMC. These reports provide a concise summary of the status of marine ecosystems in Alaska for stock assessment scientists, fishery managers, and the public. One section of the report covers Ecosystem Status and Management Indicators, and provides detailed information and updates on the status and trends of ecosystem components as well as either early signals of direct human effects on ecosystem components that might warrant management intervention or to provide evidence of the efficacy of previous management actions. In the first instance, the indicators are likely to be ones that summarize information about the characteristics of the human influences (particularly those related to fishing, such as catch composition, amount, and location) that are influencing a particular ecosystem component. A major component of the report is an ecosystem assessment that synthesizes historical climate and fishing effects on the EBS, the AI and the GOA ecosystems using information from the Ecosystem Status and Management Indicators section and stock assessment reports. Notable trends that capture unique occurrences, changes in trend direction, or patterns across indicators are highlighted. An ongoing goal is to produce an ecosystem assessment utilizing a blend of data analysis and modeling to clearly communicate the current status and possible future directions of ecosystems. http://www.afsc.noaa.gov/REFM/docs/2012/ecosystem.pdf	

<table>
<tr><td colspan="3">Clause:

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

FAO CCRF 12.7</td></tr>
<tr><td colspan="3">Evidence adequacy rating:

☑High ☐ Medium ☐ Low</td></tr>
<tr><td colspan="3">☑Full Conformity ☐ Minor Non-conformity ☐ Major Non-conformity

☐ Critical Non-conformity</td></tr>
<tr><td>Clause:</td><td>Evidence</td><td></td></tr>
<tr><td>5.3</td><td>Rating determination
Management organizations cooperate with relevant international organizations (e.g. US-Canada Governments) to encourage research in order to ensure optimum utilization of fishery resources.

The Canada/US Groundfish Committee was established in 1959 and is sanctioned as an advisory group by the State Departments of both nations. The Technical Sub-Committee (TSC) It is the only coast-wide forum for official exchange of information on the status of groundfish stocks and groundfish research among US federal and state agencies and the Canadian Department of Fisheries and Oceans.

NOAA and the Federal Agency for Fisheries of the Russian Federation signed a Joint Statement on Enhanced Fisheries Cooperation (April 29, 2013). The Joint Statement reaffirms the May 1988 Agreement Between the Government of the United States of America and the Government of the Union of Soviet Socialist Republics on Mutual Fisheries Relations while also identifying three major areas of future cooperation: 1) combating global Illegal Unreported and Unregulated (IUU) fishing; 2) collaborating on science and management of Arctic Ocean living marine resources ; and 3) advancing conservation efforts in the Ross Sea region of Antarctica. NOAA and the Russian Fisheries Agency have an excellent history of science cooperation. NOAA hopes that the joint statement will further strengthen the foundation of that cooperation.

The NOAA has an extensive number of international agreements with international organizations, individual governments and regional unions. These are managed through the NOAA office of International Affairs:
http://www.nmfs.noaa.gov/ia/index.htm.</td><td></td></tr>
</table>

	Many of these focus on promoting international collaboration between NMFS and national and regional laboratories outside the US. A full list of and the contents of the bi-lateral and international agreements can be found here: http://www.nmfs.noaa.gov/ia/intlagree/docs/2012/international_agreements.pdf Additionally, researchers involved with the Alaska Flatfish fisheries regularly attend the Western Groundfish Conference. This conference is held every two years with participants coming from government agencies, universities, industry and ENGOs from California to Alaska, including BC. The conference has been held every two years since 1981 (http://www.westerngc.org).	

Clause: **5.4 The fishery management organizations shall directly, or in conjunction with other States, develop collaborative technical and research programmes to improve understanding of the biology, environment and status of trans-boundary aquatic stocks.** ***FAO CCRF 12.17***		
Evidence adequacy rating: ☐**High**	☐ **Medium**	☐ **Low**
☐ **Full Conformity** ☐ **Critical Non-conformity**	☐ **Minor Non-conformity**	☐ **Major Non-conformity**

Clause:	**Evidence**	
5.4	The stocks here in question are not considered shared resources exploited by two or more State. Please refer to clauses **1.2 and 1.3**. The U.S. and Russia both consistently publish management data (TACs, catch data) and are both signers of the Agreement on Mutual Fisheries Relations (first signed in 1988) for conservation, management and optimal utilization of shared fisheries resources between both nations. The agreement is not specific to flatfish alone, but does call for cooperation, shared science, conservation and management of fisheries resources. It identifies combating global Illegal Unreported and Unregulated (IUU) fishing as the first of three major areas of future cooperation. http://www.nmfs.noaa.gov/ia/slider_stories/2013/04/us_russia.html http://www.nmfs.noaa.gov/ia/slider_stories/2013/04/agreement.pdf	

Clause:	
5.5	**Data generated by research shall be analyzed and the results of such analyses published in a way that confidentiality is respected where appropriate**.
5.5.1	**Results of analyses shall be distributed in a timely and readily understandable fashion in order that the best scientific evidence is made available as a contribution to fisheries conservation, management and development.**
5.5.2	**In the absence of adequate scientific information, appropriate research shall be initiated in a timely fashion.**
	FAO CCRF 12.3
Evidence adequacy rating:	
☑High ☐ **Medium** ☐ **Low**	
☑ Full Conformity ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**	

Clause:	**Evidence**
5.5	**Rating determination** *NMFS publishes the results of Alaskan flatfish complex fisheries data analysis (SAFE reports) in a way that confidentiality is respected where appropriate (NOAA administrative order 216-100, memorandum of agreement signed between the NOAA, ADFG and the Alaska Commercial Fishery Entry Commission).* The AFSC has a strong publication record in both peer reviewed scientific journals as well as reports to industry and the relevant management authorities e.g. NPFMC. Numerous articles are published in peer reviewed journals covering all aspects of marine and environmental science. http://www.afsc.noaa.gov/Publications/default.htm Individual divisions of NMFS also upload recent publications on their relevant web pages. With regards to the publication of data that could be considered commercially sensitive, AFSC policy is to aggregate data to the level of at least three producers e.g. vessels. NOAA administrative order 216-100 prescribes policies and procedures for protecting the confidentiality of data submitted to and collected by the NMFS. Confidential data are those identifiable with a person. Before release to the public, data must be aggregated to protect the individual identities. For fisheries data, this requires that there must be at least 3 entities contributing to any level of aggregated data. Only authorized users have access to confidential data, they must have a need to collect or

	use these data in the performance of an official duty, and they must sign a statement of nondisclosure affirming their understanding of NMFS obligations with respect to confidential data and the penalties for unauthorized use and disclosure. Confidential data must be maintained in secure facilities. Data collected by a contractor, such as an observer contractor, must be transferred timely to authorized Federal employees; no copies of these data may be retained by the contractor. NMFS may permit contractors to retain aggregated data. A data return clause shall be included in the agreement. All procedures applicable to Federal employees must be followed by contractor employees collecting data with Federal authority. Under agreements with the State, each State data collector collecting confidential data will sign a statement at least as protective as the one signed by Federal employees, which affirms that the signer understands the applicable procedures and regulations and the penalties for unauthorized disclosure. http://www.st.nmfs.noaa.gov/st1/recreational/documents/Intercept_Appendices/Appendix%20M%20031408%20NOAA%20administrative%20order%20216-100.pdf In addition, a memorandum of agreement was signed in September 1999 between the NOAA, ADFG and the Alaska Commercial Fishery Entry Commission (CFEC). The purpose of this agreement is to outline the understanding between the NOAA, U.S. Department of Commerce (DOC), ADFG and the CFEC, regarding reciprocal provision of direct access to, and subsequent storage and usage of, confidential data regarding marine fisheries in and off Alaska, such as fishery landings data and port sampling data. https://docs.google.com/viewer?a=v&q=cache:Hit556BFZOwJ:www.reginfo.gov/public/do/DownloadDocument%3FdocumentID%3D363353%26version%3D1+agreement+between+NOAA,+ADFG,+CFEC+on+confidential+fishery+data&hl=en&gl=ie&pid=bl&srcid=ADGEESi7De3rnfRg8PAgSaE3mqGRToAPmBPgyDt6_qReJD3Hm7S9b_pWTBVKQA7k7GyxEOGGBfcJaQHt0K_oisc9YVXl3oLPDt_5RKS0_j4x8FBfxlFwOSv3f7EMCXnSa3jfgGyXUVjr&sig=AHIEtbSUNn7ep_0PXSVirN4FYkumumXnRg	

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	Evidence
5.5.1	**Rating determination** *The yearly publication of the SAFE reports or updates, Ecosystem and Economic Considerations reports as well as numerous ad hoc technical papers for the NPFMC meetings and committees and NMFS Technical Publications adequately demonstrates*

	that the most up to date and best scientific advice is provided to those responsible for fisheries and marine resource management. The NPFMC web site also contains an extensive publication listing covering scientific papers of interest http://www.fakr.noaa.gov/npfmc/resources-publications/scientific-papers.html , reports of the assessment Plan Teams as well as the minutes of the NPFMC meetings and sub-committee meetings e.g. Advisory Panel and the Scientific and Statistics Committee. http://alaskafisheries.noaa.gov/npfmc/resources-publications/meeting-minutes.html SAFE reports are available at the Alaska Fishery Science Center website. Links are also provided on the Council website.
Evidence adequacy rating: ☑**High** ☐ **Medium** ☐ **Low**	
☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**	
Clause:	**Evidence**
5.5.2	Data collection is deemed effective for the Alaskan flatfish stocks given the extensive surveys, observer, catch data and other sources. Data deficiencies exist but are addressed in the research and informational requests in each SAFE report, CIE reviews, Council requests and NMFS programmatic reviews. The available data is adequate to conduct scientific analyses for accurate and conservative management. Research projects to enhance the current best scientific data available are conducted by entities such as the AFSC, ADFG, the NPRB, and local Universities. (see **clauses 5.1 and 5.1.1** for further information.)

Clause: **5.6 Studies shall be promoted which provide an understanding of the costs, benefits and effects of alternative management options designed to rationalize fishing, in particular, options relating to excess fishing capacity and excessive levels of fishing effort.** ***FAO CCRF 7.4.3***
Evidence adequacy rating: ☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity**	☐ **Minor Non-conformity**	☐ **Major Non-conformity**
☐ **Critical Non-conformity**		

Clause:	**Evidence**
5.6	**Rating Determination** *Studies are promoted which provide an understanding of the costs, benefits and effects of alternative management options designed to rationalize fishing, in particular, options relating to excess fishing capacity and excessive levels of fishing effort.* See clause 2.5 for details on the RFA/NEPA process and clause 3.2.1. for details relating to the avoidance excess fishing capacity/ excessive levels of fishing effort.

Clause:

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

FAO CCRF 7.6.7

Evidence adequacy rating:

☑**High**	☐ **Medium**	☐ **Low**

☑ **Full Conformity**	☐ **Minor Non-conformity**	☐ **Major Non-conformity**
☐ **Critical Non-conformity**		

Clause:	**Evidence**
5.7	**Rating Determination** *See **clause 2.5** for details on the RFA and NEPA process which, in the evaluation of alternative conservation and management measures, consider their cost-effectiveness and social impact.* See **clause 2.5** for details on the RFA and NEPA process. As an example, the recent changes to the observer program implemented in 2013 (see **clause 4.2**) have seen in depth socio-economic analysis for the fleets impacted by the restructuring of the program http://alaskafisheries.noaa.gov/sustainablefisheries/observers/.

C. The Precautionary Approach

6.	**The current state of the stock shall be defined in relation to reference points or relevant proxies or verifiable substitutes allowing for effective management objectives and targets. Remedial actions shall be available and taken where reference point or other suitable proxies are approached or exceeded.** ***FAO CCRF 7.5.2/7.5.3*** ***Eco 29.2/29.2bis/30-30.2***					
Confidence Ratings	**Low**	**0 out of 5**	**Medium**	**0 out of 5**	**High**	**5 out of 5**

Clause:

6.1 States shall determine for the stock both safe targets for management (Target Reference Points) and limits for exploitation (Limit Reference Points), and, at the same time, the action to be taken if they are exceeded.

6.1.1 Target reference point(s) shall be established.

6.1.2 Limit reference points shall be established. When a limit reference point is approached, measures shall be taken to ensure that it will not be exceeded.

6.1.3 Data and assessment procedures shall be installed measuring the position of the fishery in relation to the reference points. Accordingly, the level of fishing permitted shall be commensurate with the current state of the fishery resources.

FAO CCRF* 7.5.3, *7.6.1

FAO Eco 29.2-29.2bis,29.6,30-30.2

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

FAO CCRF 7.5.3

FAO Eco 29.6, 30.2

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

FAO CCRF 7.5.2

Evidence adequacy rating:		
☑**High**	☐ **Medium**	☐ **Low**
☑ **Full Conformity**	☐ **Minor Non-conformity**	☐ **Major Non-conformity**
☐ **Critical Non-conformity**		

Clause:	**Evidence**
6.1	*The BSAI and GOA groundfish management plans under which the flatfish in Alaska is managed define target ($B_{40\%}$) and limit ($B_{17.5\%}$) reference points for management of these stocks. Each SAFE report describes the current fishing mortality rate, stock biomass relative to target and limit reference points.* The BSAI and GOA groundfish management plans define target and limit reference points for the flatfish complex and other groundfish. Each SAFE report describes the current fishing mortality rate, as well as stock biomass relative to target and limit reference points. SAFE reports are completed yearly and published in January. Both Groundfish FMPs 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. The OFL is the upper limit fishing mortality and corresponds to MSY. ABC is usually set well below OFL and the TAC is usually below ABC although it can be set at the ABC level, but not above it. The resultant harvest control rule for determining appropriate ABC and OFL depends on the information base (presence/absence of B, Bmsy, F, Fmsy and Fspr) is illustrated below (Figure 6.1).

Tiers used to determine ABC and OFL for groundfish stocks.

(1) Information available: Reliable point estimates of B and B_{MSY} and reliable pdf of F_{MSY} .
- *1a)* *Stock status:* $B/B_{MSY} > 1$
  - $F_{OFL} = m_A$, the arithmetic mean of the pdf
  - $F_{ABC} \leq m_H$, the harmonic mean of the pdf
- *1b)* *Stock status:* $a < B/B_{MSY} \leq 1$
  - $F_{OFL} = m_A \times (B/B_{MSY} - a)/(1 - a)$
  - $F_{ABC} \leq m_H \times (B/B_{MSY} - a)/(1 - a)$
- *1c)* *Stock status:* $B/B_{MSY} \leq a$
  - $F_{OFL} = 0$
  - $F_{ABC} = 0$

(2) Information available: Reliable point estimates of B, B_{MSY}, F_{MSY}, $F_{30\%}$, and $F_{40\%}$.
- *2a)* *Stock status:* $B/B_{MSY} > 1$
  - $F_{OFL} = F_{MSY} \times (F_{30\%}/F_{40\%})$
  - $F_{ABC} \leq F_{MSY}$
- *2b)* *Stock status:* $a < B/B_{MSY} \leq 1$
  - $F_{OFL} = F_{MSY} \times (F_{30\%}/F_{40\%}) \times (B/B_{MSY} - a)/(1 - a)$
  - $F_{ABC} \leq F_{MSY} \times (B/B_{MSY} - a)/(1 - a)$
- *2c)* *Stock status:* $B/B_{MSY} \leq a$
  - $F_{OFL} = 0$
  - $F_{ABC} = 0$

(3) Information available: Reliable point estimates of B, $B_{40\%}$, $F_{30\%}$, and $F_{40\%}$.
- *3a)* *Stock status:* $B/B_{40\%} > 1$
  - $F_{OFL} = F_{30\%}$
  - $F_{ABC} \leq F_{40\%}$
- *3b)* *Stock status:* $a < B/B_{40\%} \leq 1$
  - $F_{OFL} = F_{30\%} \times (B/B_{40\%} - a)/(1 - a)$
  - $F_{ABC} \leq F_{40\%} \times (B/B_{40\%} - a)/(1 - a)$
- *3c)* *Stock status:* $B/B_{40\%} \leq a$
  - $F_{OFL} = 0$
  - $F_{ABC} = 0$

(4) Information available: Reliable point estimates of B, $F_{30\%}$, and $F_{40\%}$.
  - $F_{OFL} = F_{30\%}$
  - $F_{ABC} \leq F_{40\%}$

(5) Information available: Reliable point estimates of B and natural mortality rate M.
  - $F_{OFL} = M$
  - $F_{ABC} \leq 0.75 \times M$

(6) Information available: Reliable catch history from 1978 through 1995.

OFL= *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 6.1. Tier system used to determine ABC and OFL for groundfish stocks

The suitability of these proxies, target and limit reference points for exploitation (e.g. B35,

	B40) has been the subject of considerable research (Clark 1991, Restrepo 1999). 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 Bmsy or the biomass $B_{X\%}$ corresponding to the percentage of the equilibrium spawning biomass that would be obtained in the absence of fishing. This mechanism is built in the harvest control rule shown above. Clark, W.G., 1991. Groundfish exploitation rates based on life history parameters. Can. J. Fish. Aquat. Sci. 48, 734–750. (http://www.iphc.int/papers/f35.91.pdf) Restrepo, V. (ed.) 1999. Proceedings of the fifth national NMFS Stock Assessment Workshop: Providing scientific advice to implement the precautionary approach under the Magnuson-Stevens Fishery Conservation and Management Act. NOAA Tech. Memo. NMFS-F/SPO-40. http://www.st.nmfs.noaa.gov/StockAssessment/workshop_documents/nsaw5/introduc.pdf	

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	**Evidence**	
6.1.1	The biological reference points used in these assessments reflect the uncertainty in the stock assessment for each of these species. Each species is categorized as to the level of certainty in their analysis from 1 to 5 where 1 is the most certain and 5 the least certain. In 1999, the NPFMC prescribed that OFL should never exceed the amount that would be taken if the stock were fished at F_{MSY} (or a proxy for F_{MSY}), after Congress redefined the terms “overfishing” and “overfished” to mean a rate or level of fishing mortality that jeopardizes the capacity of a fishery to produce MSY on a continuing basis. The OFL could be set lower than catch at F_{MSY} at the discretion of the SSC. OFL can be then virtually defined as the upper limit reference point. Because Tiers 2–4 could be interpreted as treating MSY as a target rather than as a limit, the NPFMC revised those tiers by changing the default value for the rate of fishing mortality from $F_{30\%}$ (the rate that reduces equilibrium biomass to 30% of its unfished level under an assumption of constant recruitment) to the more conservative estimate of $F_{35\%}$. The buffer between OFL and ABC accounts for uncertainty in single-species stock assessments, ecosystem considerations, and operational constraints in managing the fishery. The SSC sets these management benchmarks based on scientific standards. Finally, the NPFMC determines the TAC based on social and economic considerations. In application, the NPFMC sets TAC ≤	

ABC < OFL. Under the new requirements, ACL = ABC.

In many cases environmental factors have been incorporated into spawning stock biomass per recruit (SPR) calculations to determine biological reference points. The reference points estimated in these assessments include, B_0, virgin biomass, B_{msy}, biomass at which maximum sustainable yield is attained, B_{abc}, the biomass associated with the acceptable biological catch and B_{ofl}, the biomass associated with the overfishing limit.

Fishing mortality reference points estimated include F_{abc}, the fishing mortality associated with the acceptable biological catch, F_{ofl}, the fishing mortality associated with the overfishing limit for the stock, $F_{40\%}$, the fishing mortality associated with reducing the biomass to a level that is 40% of the pristine level and $F_{35\%}$ the fishing mortality associated with reducing the biomass to a level that is 35% of the pristine level. This is the level of fishing mortality that maximizes the minimum yield of all spawner recruitment relationships considered for groundfish stocks in the North Atlantic and North Pacific. This fishing mortality has been shown to be cable to provide at t least 75% of maximum sustainable yield so long as the spawning biomass is maintained in the range of about 20-60% of the unfished level, regardless of the form of the spawner recruit relationship (Clark 1991).

For Tier 1 species the geometric mean of the model probability density function is used to estimate F_{abc} and F_{ofl}. For tier 2-4 species, the reference point of $F_{40\%}$ from SPR calculations is used as F_{abc} and that of $F_{35\%}$ is used as F_{ofl}. For tier 5 species, the reference point F_{abc}, is determined as 0.75*M, where M is the instantaneous rate of natural mortality.

BSAI federal fishery

BSAI federal fishery reference points, specification of OFL and Maximum Permissible ABC are currently estimated as follows:

Table 6.1. BSAI federal fishery reference points, specification of OFL and Maximum Permissible ABC from the 2012 SAFE reports.

Units	Tier	Year	B_{MSY} (t)	$B_{35\%}$ (t)	$B_{40\%}$ (t)	$B_{100\%}$ (t)	F_{OFL}	F_{ABC}	OFL (t)
Alaska plaice	3	2013		133,000	152,000	380,000	0.19	0.158	55,800
arrowtooth flounder	3	2013		215,667	246,476	616,191	0.21	0.17	131,985
flathead sole	3	2013		112,250	128,286	320,714	0.348	0.285	81,535
Greenland turbot	3b	2013		41,726	47,686	119,217	0.14	0.12	2,539
Kamchatka flounder	5	2013					0.13	0.098	16,300
northern rock sole	1	2013	260,000			694,500	0.164	0.146	241,000
yellowfin sole	1	2013	353, 000			966,900	0.112	0.105	220,000

A provisional analysis to assess the Kamchatka Flounder stock in the Bering Sea and Aleutian Islands using Tier 3 age and length structured modeling methodology has been performed and provided in the Appendix of the 2012 SAFE report for the species. A mortality of 0.13 derived from the assessment model has been used for the 2013 projections. Given the development of an age and size structured model, the species could be moved formally in tier 3 management in the 2013 or 2014 assessment cycle. This would provide biomass reference point in addition to the existing fishing mortality reference points for the species.

GOA federal fishery

GOA federal fishery reference points, specification of OFL and Maximum Permissible ABC are currently estimated as follows:

Table 6.2. GOA federal fishery reference points, specification of OFL and Maximum Permissible ABC from the 2011 and 2012 SAFE reports.

Units	Tier	Year	B_{MSY} (t)	$B_{35\%}$ (t)	$B_{40\%}$ (t)	$B_{100\%}$ (t)	F_{OFL}	F_{ABC}	OFL (t)
arrowtooth flounder	3	2013		421,953	482,231	1,205,580	0.207	0.174	247,196
flathead sole	3	2013		36,354	41,547	103,868	0.593	0.45	61,036
northern rock sole	3a	2013		16,600	19,000	47,500	0.180	0.152	11,400
rex sole	5	2013					0.17	0.128	12,492
southern rock sole	3a	2013		43,000	49,200	123,000	0.230	0.193	21,900

Although it is not possible to use a Tier 3 approach to making harvest recommendations for GOA rex sole because estimates of F35% and F40% are not considered reliable, the SSC has decided that it is possible to use a Tier 3 approach for determining overfished status because the estimate of $B35\%=0.35 \cdot B100\%$ (i.e., 35% of the unfished spawning stock biomass) is considered reliable (it does not depend on the fishery selectivity), as is the estimate of current (2012) spawning stock biomass. Because the estimated spawning stock biomass for 2012 (53,164 t) is greater than B35% (19,434 t), the stock is not considered overfished. Also, the catch for this species is generally well below the recommended ABC and TAC, indicating that the fishing pressure on the stock is actually much lower than the one recommended in the SAFE assessments.

Overall, the biomass and fishing mortality reference points used in this context are considered appropriate for stock conservation and management (Clark 1991, Restrepo et al. 1999).

The abundance of all the flatfish stocks in the BSAI and GOA appear to be stable or increasing and with conservative fishing mortalities and catches, many times more limited than allowed for from OFL, ABC and TAC recommendations. Overall the flatfish complex in Alaska appears

	to be not yet fully exploited. BSAI yellowfin sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIyfin.pdf BSAI Greenland turbot SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIturbot.pdf BSAI arrowtooth flounder SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIatf.pdf BSAI Alaska plaice SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIplaice.pdf BSAI Kamchatka flounder SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIkamchatka.pdf BSAI flathead sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIflathead.pdf BSAI northern rock sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIrocksole.pdf GOA flathead sole SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOAflathead.pdf GOA arrowtooth flounder SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOAatf.pdf GOA rex sole SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOArex.pdf GOA northern and southern rock sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/GOAnsrocksole.pdf NPFMC groundfish species profiles 2011: http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Species_Profiles2011.pdf http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf	
Evidence adequacy rating: ☑**High** ☐ **Medium** ☐ **Low**		
☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**		
Clause:	**Evidence**	
6.1.2	***Rating determination*** *Limit reference points ($B_{17.5\%}$) are established. The management approach also stipulates that if the stock shows a decline in biomass beyond limit reference point e.g. $B_{17.5\%}$ then the fishery maybe subjected to closure and formal rebuilding. None of the flatfish complex stocks are close to, at or below the limit reference point.*	

The GOA and BSAI Groundfish Fishery Management Plan specifies the application of a Maximum Fishing Mortality Threshold (MFMT) which is defined as the level of fishing mortality used to compute the smallest level of catch that would constitute overfishing, this would equate to fishing in excess of FMSY, where in the long term the stock would produce yields below maximum sustainable yield. The OFL is the resultant catch that would result from applying MFMT which is the level above which overfishing is occurring.

Under the management plan, part of or the entire target fishery can be closed when bycatch rates for non-target species would result in the TAC being exceeded, in other words the target fishery would be closed before the TAC is reached. In general terms the entire management approach is precautionary, fishing at F_{MSY} constitutes an upper acceptable bound. For the flatfish complex in Alaska (and other groundfish species), the TAC's are set well below catch levels that would have resulted from the application of Fmsy as a target for setting fishing opportunities as seen in other jurisdictions e.g. EU. The management approach also stipulates that if the stock shows a decline in biomass beyond $B_{35\%}$ then the maximum allowable catch declines at a faster rate (Figure 6.2).

In terms of biomass limit, the FMP define the Minimum Stock Size Threshold (MSST) which is the biomass below which the stock is considered to be overfished. Where possible MSST should be set at one half of the MSY stock size, or the minimum stock size at which rebuilding would be expected to occur within 10 years. None of the flatfish complex stocks are near, at or below limit reference point.

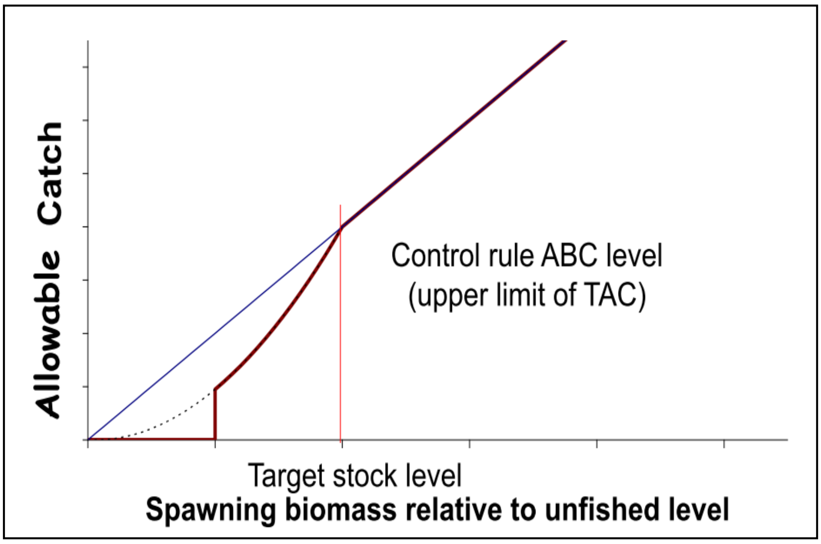


Figure 6.2. Schematic of the harvest control rules relative to the upper limit of the total allowable catch relative to spawning stock biomass. The vertical line represents the biomass target reference point. If the stock biomass falls below this level then the TAC (brown line) is adjusted downwards quicker than the rate of decline (blue line) to a point where a zero TAC is set.

Evidence

	http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	Evidence
6.1.3	The position of the fishery and stocks in relation their assigned reference points is measured through data and assessment and made published in the yearly SAFE. Virtually all the stocks in the BSAI and GOA appear to be stable or on the rise and with conservative fishing mortalities and catches, many times more limited than allowed for from OFL, ABC and TAC recommendations. Overall the flatfish complex in Alaska appears to be lightly exploited.

BSAI Alaska Plaice

BSAI Alaska plaice spawning stock biomass is considered stable and well above target reference points.

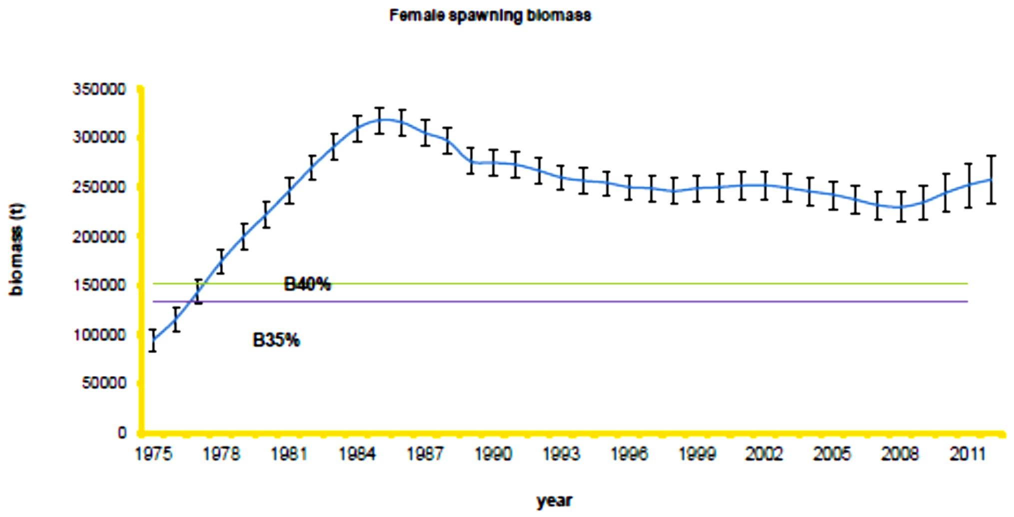


Figure 6.3. Model estimates of Alaska plaice female spawning biomass with estimates of B_{35} and B_{40} from Alaska plaice 2012 SAFE report.

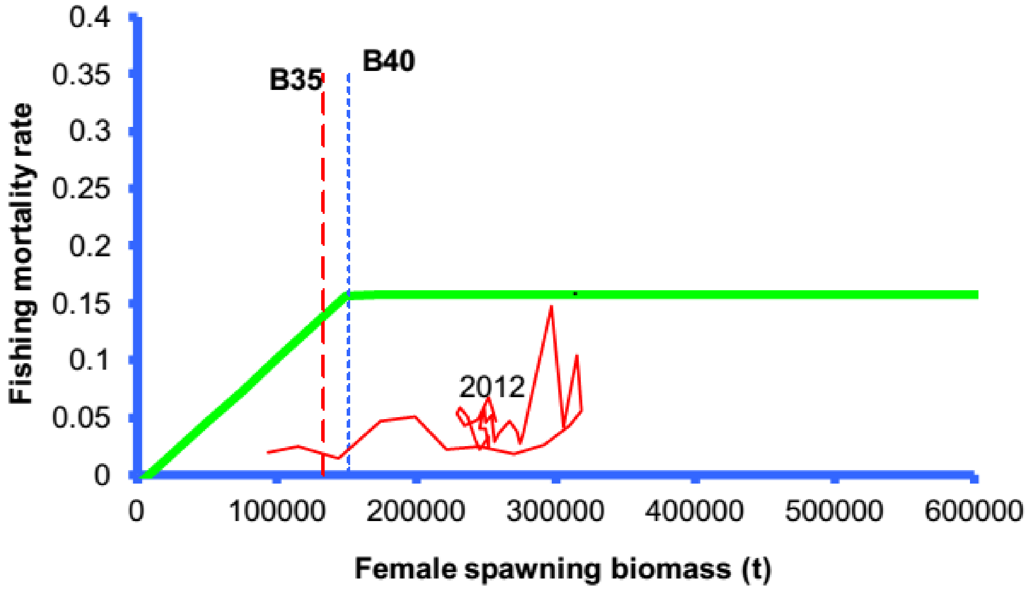


Figure 6.4. Phase plane figure of the estimated time series of Alaska plaice female spawning biomass and fishing mortality relative to the tier 3 control rule.

BSAI Arrowtooth flounder:

BSAI arrowtooth flounder spawning stock biomass is considered stable and well above target reference points.

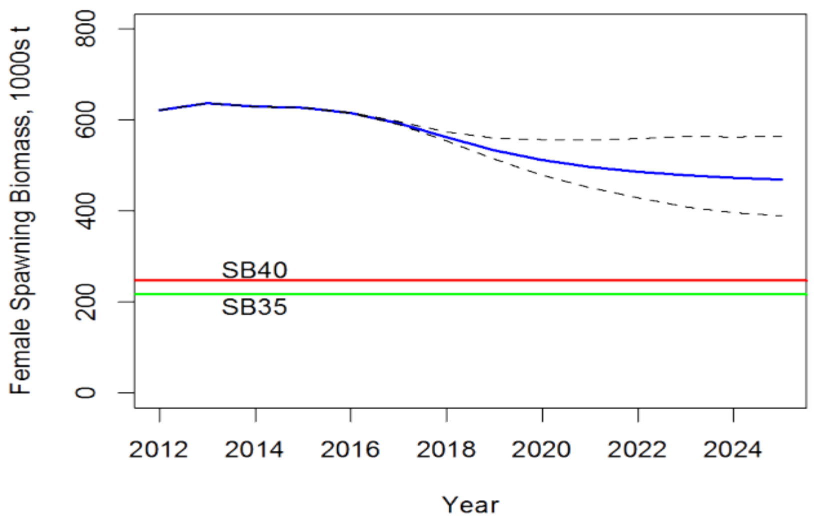


Figure 6.5. Projected female spawning biomass (1,000s t) of arrowtooth flounder if future harvest is at the same fishing mortality rate as the past five years.

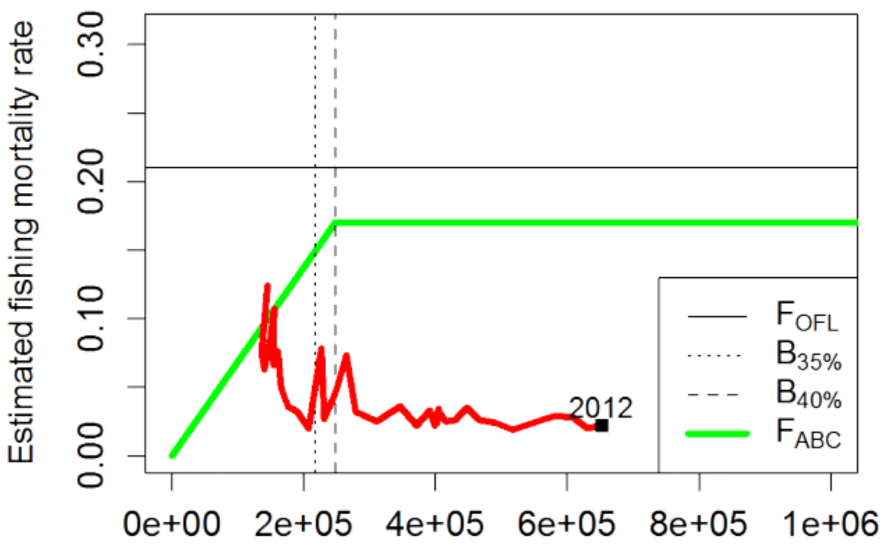


Figure 6.6. BSAI arrowtooth flounder phase plane diagram showing the time-series of stock assessment model estimates of female spawning biomass relative to the harvest control rule.

BSAI Flathead sole

In 2012, BSAI flathead sole B40% is estimated at 128,286 t. The year 2012 spawning stock biomass is estimated at 243,334 t. Thus the stock appears stable and well above its biomass target reference point.

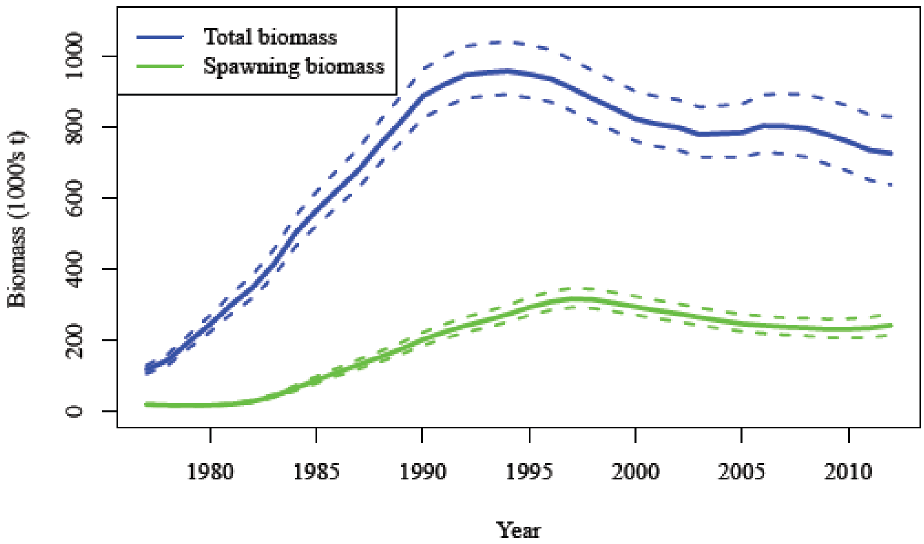


Figure 6.7. Estimates of total and female spawning biomass for BSAI flathead sole, with 95% confidence intervals from MCMC integration, for the preferred model. BSAI Flathead sole SAFE report 2012.

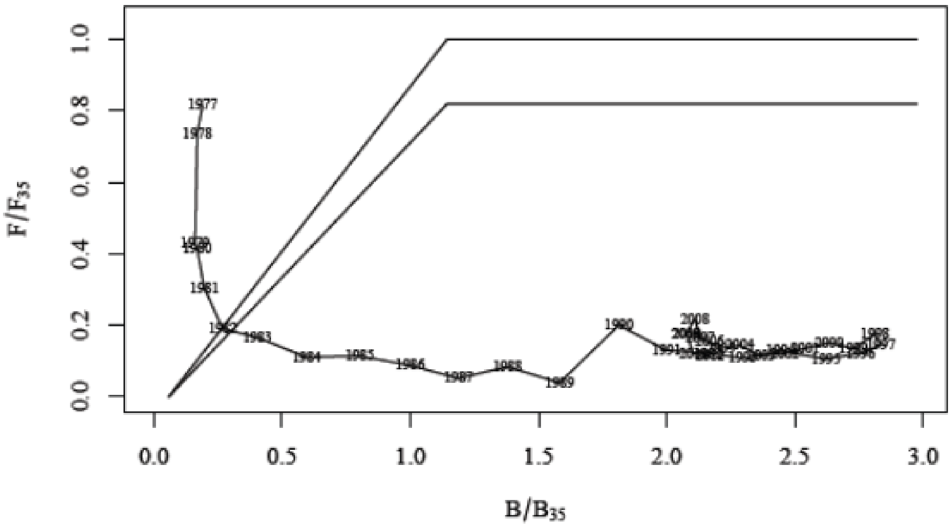


Figure 6.8. Control-rule graph: the ratio of estimated fully-selected fishing mortality (F) to F35% plotted against the ratio of model spawning stock biomass (B) to B35% from the preferred model. Control rules for ABC (lower line) and OFL (upper line) are also shown. Numbers indicate corresponding year.

Northern rock sole.

BSAI Northern Rock sole spawning stock biomass is considered on the rise and well above target reference points.

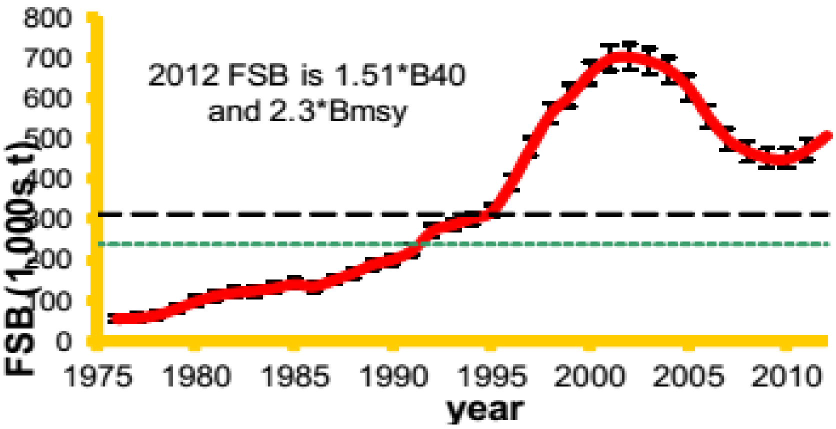


Figure 6.9. BSAI Northern rock sole female spawning biomass.

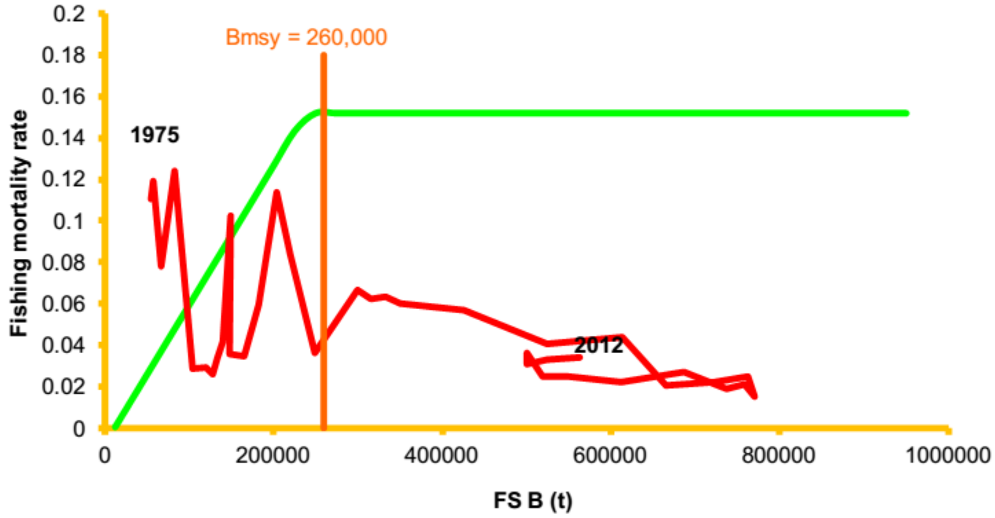


Figure 6.10. Phase plane diagram of female spawning biomass relative to the harvest control rule.

Yellowfin Sole

BSAI Alaska plaice spawning stock biomass is considered to be at about target reference point level.

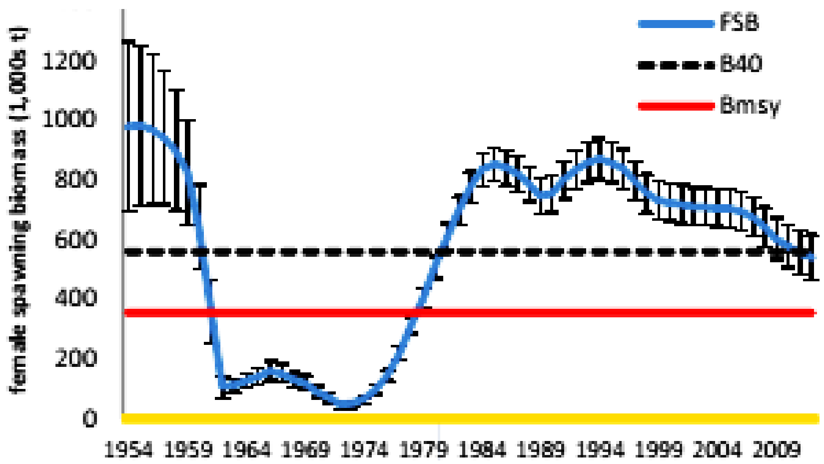


Figure 6.11. Model estimate of total biomass for BSAI yellowfin sole, 2012 SAFE report.

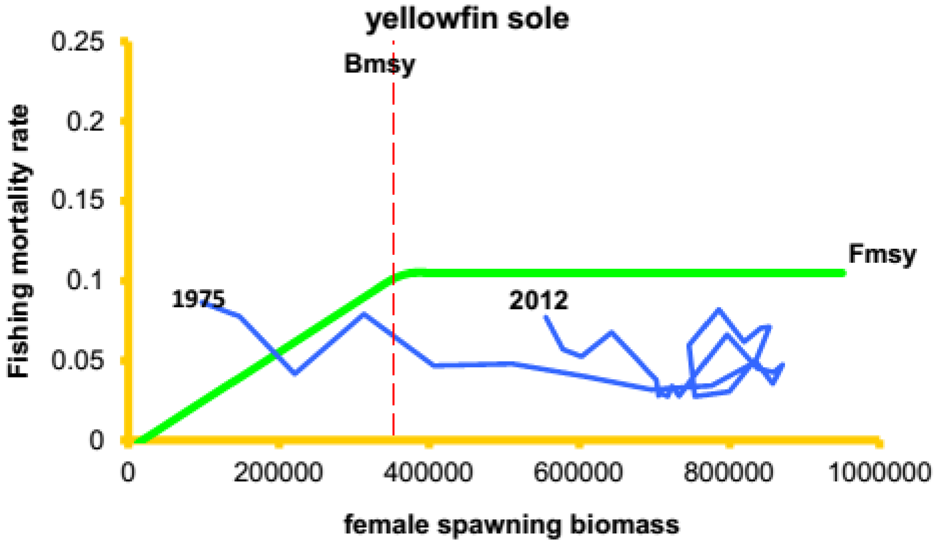


Figure 6.12. Yellowfin sole phase plane figure of the time-series of yellowfin sole female spawning biomass relative to the harvest control rule with 1975 and 2012 indicated.

BSAI Kamchatka flounder

Despite current management under tier 5, a provisional analysis to assess the Kamchatka Flounder stock in the Bering Sea and Aleutian Islands using Tier 3 age and length structured modeling methodology has been performed and provided in the Appendix of the 2012 SAFE report for the species. A mortality of 0.13 derived from the assessment model has been used for the 2013 projections. Given the development of an age and size structured model, the species could be moved formally in tier 3 management in the 2013 or 2014 assessment cycle. This would provide biomass reference point in addition to the existing fishing mortality reference points for the species.

Figure 6.13. 2012 assessment model estimate of female spawning biomass (t).

Acceptable Biological Catch and exploitation rate

Kamchatka flounder have a wide-spread distribution along the deeper waters of the Bering Sea/Aleutian Islands region and are believed to be at a fairly high level as discerned from the increases in survey estimates from the time-series of Bering Sea shelf, slope and Aleutian Islands surveys. The 2012 combined estimate of total biomass from the three areas is 108,800. Exploitation rates estimated for 2008-2010 steadily increased from 5% in 2008, 10% in 2009 to 16% in 2010 but has since declined to 9% in 2012. Given the limited amount of biological information available for Kamchatka flounder, they are qualified to be managed under Tier 5 of Amendment 56 to the BSAI groundfish management plan, and thus have harvest recommendations which are directly calculated from estimates of biomass and natural mortality. The Tier 5 formula for calculating ABC is: ABC = 0.75 x M x average biomass.

ABC calculated from this formula is sensitive to the fluctuations in annual biomass estimated from bottom trawl surveys (shelf survey CV is 10%, Aleutians CV = 30%). In order to lessen this effect, annual estimates of Kamchatka flounder abundance (using trawl survey estimates when they are available and filling in missing years from the average of the closest previous and future year which bracket the missing year) from the three surveys were summed and then ABC was calculated using running averages which ranged from 3 to the 7 most recent years (all with M = 0.13). ABC estimates from these five methods indicate that the effect of annual variability on the estimate of ABC and OFL can be dampened by including more years in the estimation calculation which was particularly evident in the years of biomass increase from the past five years. The seven year moving average for biomass is chosen for the ABC and OFL calculations for 2013 since it has the most resilience to the trawl survey variability and gives estimates which are close to the other moving averages.

The potential yield of Kamchatka flounder in 2013 and 2014, based on a combined biomass of 108,800 t from the combined trawl survey estimates is summarized as follows:

F_{ABC}	F_{OFL}	ABC	OFL
0.098	0.13	12,200	16,300

The Tier 5 estimates of Fabc and Fofl are 0.75 x M and M, respectively, and the ABC and OFL levels are the product of the fishing mortality rate and the 7 year running average of estimated biomass.

The increased harvest was the result of a recently developed market for Kamchatka flounder which has now become a fishery target. The 2010 estimated catch of Kamchatka flounder was 21,153 t, taken primarily in area 514 and to a lesser extent in area 518. The 2011 and 2012 catch are similar at 9,935 and 9,466 t, respectively (through October 20, 2012). The 2012 catch is 51% of the ABC and 38% of the OFL and was split evenly between the Aleutian Islands (55%) and the Bering Sea slope (45%).

2013 SAFE Report, latest data.

In the draft 2013 SAFE report Kamchatka flounder are managed as a Tier 3 stock using a statistical age-structured model as the primary assessment tool. Details of the model and last year's full assessment can be found at http://www.afsc.noaa.gov/REFM/docs/2012/BSAIkamchatka.pdf. For the 2013 update, the assessment model is not re-run (due to temporary federal government shutdown) but instead, the projection model is run with updated catch information only. This projection model run incorporates the most recent catch information and provides estimates of 2014 and 2015 ABC and OFL without re-estimating the stock assessment model parameters and biological reference points. This update does not incorporate the 2013 EBS shelf survey information.

Projected 2014 female spawning biomass is estimated at 50,400 t, above the B40% level of 46,100 t, and is projected to remain above B40% if fishing continues at that level. The stock was not being subjected to overfishing last year, is currently not overfished, nor is it approaching a condition of being overfished (http://www.afsc.noaa.gov/refm/stocks/plan_team/BSAIkamchatka.pdf).

BSAI Greenland turbot

There was a major revision of the Greenland turbot stock assessment model and data in the 2012 cycle. The changes in the weight at age and selectivities had the net effect of reducing the current biomass estimate while increasing the reference points for this species.

In addition to changes to the assessment model and data, there was a input error in 2009-2011 projection models that resulted in underestimates of the initial female spawning biomass (B100%), and therefore all biomass reference points. From the 2012 Authors' preferred reference model (Model 2) the estimate for B100% of 119,217 t is more than double last year's estimate of 53,900 t, but similar to the 2008 estimate of 109,328 t. **The 2012 status of the stock is B21%, much lower than last year's projected status for 2012 of B89% and the 2008 estimate of B52%.**

The change in status was mostly due to fixing the input error and improvements in the shapes of the selectivity curves chosen in 2012. Due to these changes the stock is now in Tier 3b and therefore the ABC and OFL recommendations were further reduced by the descending portion in the control rule. The 2013 recommended ABC is only 26% of the projected 2013 ABC from last year's model.

However, the projected 2013 estimated total biomass in this year's model is higher than projected from the 2011 Reference model. This is due to strong 2008 and an especially large 2009 year classes observed in both the survey and fisheries size composition data. These two year classes are expected to be larger than any other recruitment event since the 1970's and will begin to have an increasing influence on spawning stock biomass starting in 2014.

Model 2 estimated that the BSAI Greenland turbot fishery is not overfishing the stock, that the stock is not currently overfished, and that the stock is not approaching an overfished condition. It should be noted however, that Model 3 in this assessment estimates that the BSAI Greenland turbot stock is in an Overfished condition. The only difference between Model 3 and Model 2 is the inclusion of autocorrelation in the recruitment deviations. Model 3 is the best fitting model and the only reason this model was not selected by the stock assessment authors is due to the fact that inclusion of autocorrelation in SS3 has not yet been thoroughly vetted.

Ability to maintain catches within TAC bounds

Since 1996 apart from 2008, catches of Greenland turbot, including discards have been kept within TAC bounds. In practice, the TAC has rarely been caught in its entirety, living a good percentage every year in the water. This implies that the current status of the stock, as explained in the preceding paragraphs, ins not due to overfishing but due to changes within the model and assessment. For this reason, also according to the SAFE determination this stock has not been determined as overfished. Strong 2008 and an especially large 2009 year classes observed in both the survey and fisheries size composition data are expected to be larger than any other recruitment event since the 1970's and will begin to have an increasing influence on spawning stock biomass starting in 2014.

Table 6.3. Catch estimates of Greenland Turbot by gear type (t; including discards) and ABC and TAC values since implementation of the MFCMA.

Year	Trawl	Longline & Pot	Total	ABC	TAC
1977	29,722	439	30,161	40,000	
1978	39,560	2,629	42,189	40,000	
1979	38,401	3,008	41,409	90,000	
1980	48,689	3,863	52,552	76,000	
1981	53,298	4,023	57,321	59,800	
1982	52,090	31.8	52,122	60,000	
1983	47,529	28.8	47,558	65,000	
1984	23,107	12.6	23,120	47,500	
1985	14,690	40.6	14,731	44,200	
1986	9,864	0.4	9,864	35,000	33,000
1987	9,551	34	9,585	20,000	20,000
1988	6,827	281	7,108	14,100	11,200
1989	8,293	529	8,822	20,300	6,800
1990	12,119	577	12,696	7,000	7,000
1991	6,245	1,617	7,863	7,000	7,000
1992	749	3,003	3,752	7,000	7,000
1993	1,145	7,323	8,467	7,000	7,000
1994	6,426	3,845	10,272	7,000	7,000
1995	3,978	4,215	8,194	7,000	7,000
1996	1,653	4,902	6,555	7,000	7,000
1997	1,209	5,989	7,199	9,000	9,000
1998	1,830	7,319	9,149	15,000	15,000
1999	1,799	4,057	5,857	9,000	9,000
2000	1,946	5,027	6,973	9,300	9,300
2001	2,149	3,163	5,312	8,400	8,400
2002	1,033	2,605	3,638	8,000	8,000
2003	908	2,605	3,513	4,000	4,000
2004	675	1,544	2,220	3,500	3,500
2005	729	1,831	2,559	3,500	3,500
2006	360	1,605	1,965	2,740	2,740
2007	429	1,400	1,829	2,440	2,440
2008	1,935	806	2,741	2,540	2,540
2009	3,080	1,417	4,196	7,380	7,380
2010	1,978	2,160	4,138	6,120	6,120
2011	1,618	2,019	3,636	6,140	5,060
2012*	2,591	1,314	3,905	9,660	8,660

*Catch estimated as of October 2012

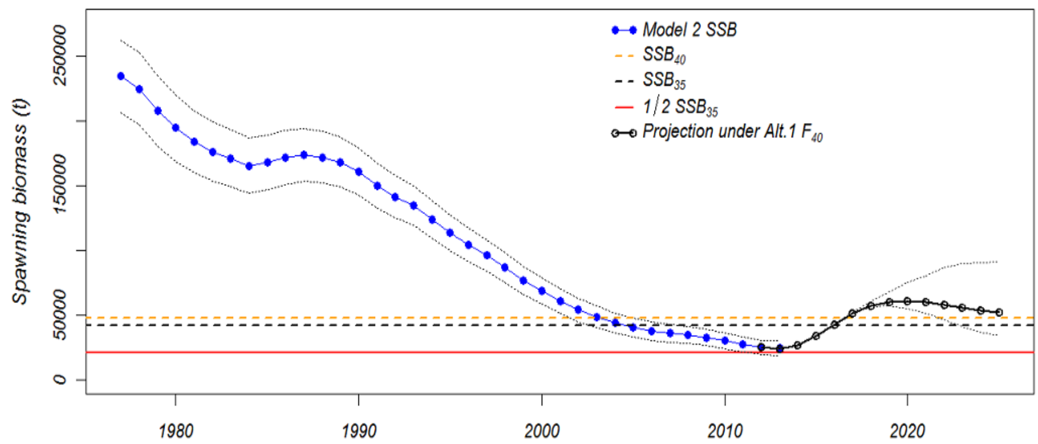


Figure 6.14. Female spawning biomass in tons for BSAI Greenland Turbot for this year's reference model (Model 2) with reference levels and projection out to 2025 from Alternative 1 F40 fishing levels. Model error bars are 95% confidence intervals based on the inverted Hessian, projection error bars are 95% credible intervals based on 1,000 simulations.

The mean ABC between 1997 and 2002 was 9,783 t, the mean catch however was lower and averaged about 6,355 t per year over this time period. From 2003 to 2008 the ABC levels remained relatively low with a high of 4,000 t in 2003 and a low of 2,440 t in 2007. The catch dropped even lower to an average of just 2,417 t per year in this time period. In 2008 with Amendment 80 an arrowtooth/ Kamchatka fishery emerged that more than doubled the catch of Greenland turbot in 2008 and continued to double the catch of Greenland turbot through 2012. The average catch for 2008 through 2011 was 3,678 t. The ABCs during this time period, due to a clerical error in the projection model, went from 2,500 t in 2008 to 7,380 in 2009. From 2009 to 2012 the ABC averaged 7,325 t with a high at 9,660 t in 2012. Although the decline in spawning biomass began to slow in 2005 through 2007, the decline in spawning biomass again steepened post-2008. This decline may be correlated with increased fishing pressure during this time period. One thing that should be noted is that throughout this decline the fishing exploitation rate has been relatively low. Between 1986 and 2007 the mean total exploitation was estimated at 0.05 with a maximum total exploitation rate of 0.07. The increased fishing exploitation rate in 2009 and 2010, that may have steepened the most recent decline, was only 0.08. The catch levels in 2008 through 2012 however exceeded the OFL control rule levels projected from Model 2. The large 2008 and 2009 year classes have not yet made it into the spawning population and therefore the spawning population is seen to continue to decline through 2013. Projections for 2014 and onward predict a steep increase in spawning biomass with these incoming year classes.

The historical F/Fmsy versus female spawning biomass relative to Bmsy for BSAI Greenland turbot, 1960-2011 produced in the 2012 SAFE report, indicates that 2009, 2010, 2011 and 2012 harvest have been over the OFL harvest control rule (see below). This current and retrospective model behavior is a product of significant revisions to stock biomass and reference points from the 2012 assessment and not the result of actual overfishing above permitted levels (e.g. catch above OFL levels).

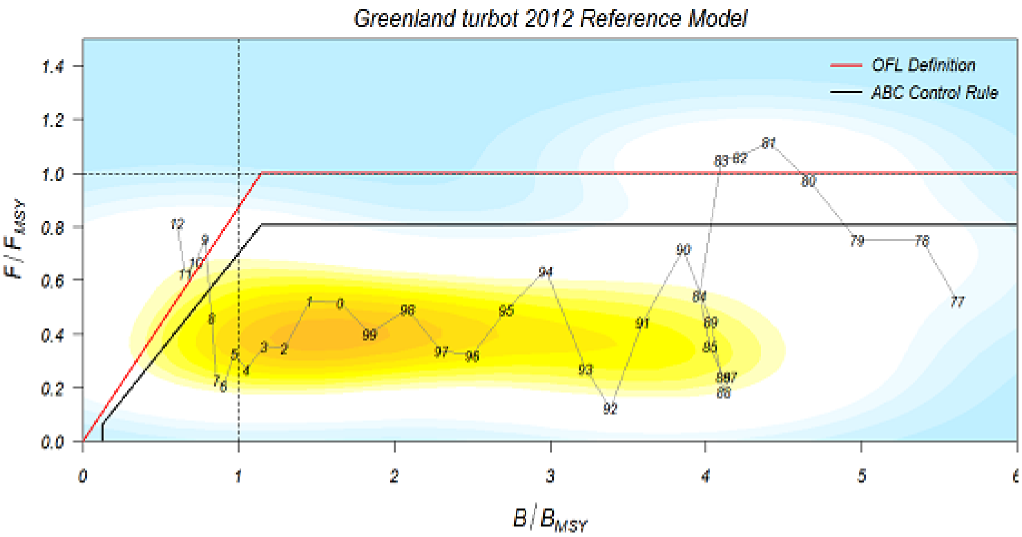


Figure 6.15. Ratio of historical F/Fmsy versus female spawning biomass relative to Bmsy for BSAI Greenland turbot, 1960-2012. Note that the proxies for Fmsy and Bmsy are F35% and B35%, respectively. As presented in the 2012 SAFE report.

The same figure presented here below, but as found in the 2011 SAFE, does show in fact the harvest in recent years was considered well within the ABC and OFL harvest control rules.

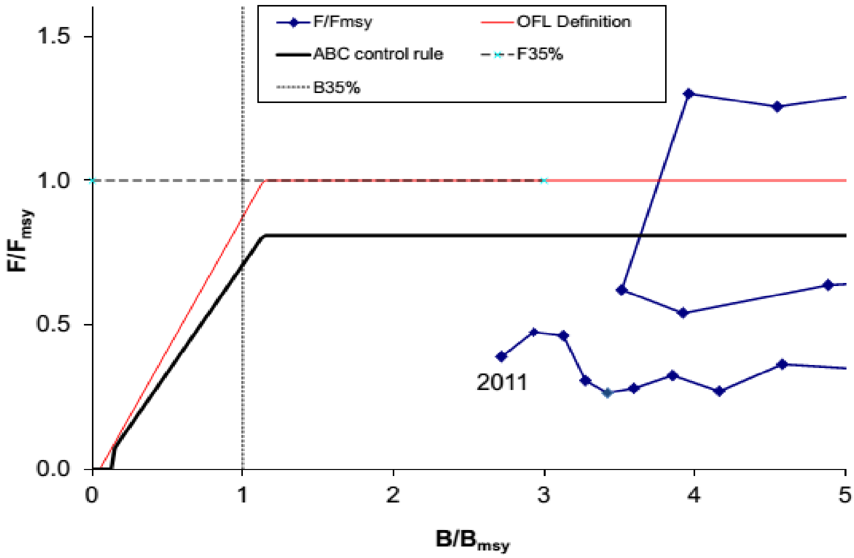


Figure 6.16. Ratio of historical F/Fmsy versus female spawning biomass relative to Bmsy for BSAI Greenland turbot, 1960-2011. Note that the proxies for Fmsy and Bmsy are F35% and B35%, respectively.

GOA Arrowtooth Flounder

Spawning biomass for arrowtooth flounder in the Gulf of Alaska is estimated for 2013 as 1,274,290 tonnes. This is much higher than the B40% reference point calculated at 482,231 t and B35% calculated at 421,953 t.

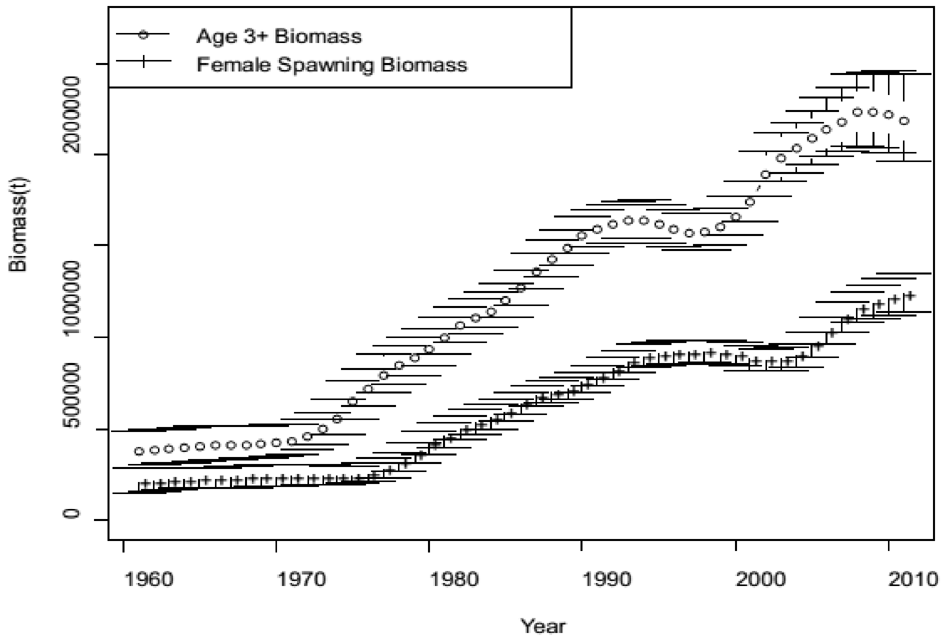


Figure 6.17. Age 3+ biomass and female spawning biomass from 1961 to 2011 with approximate lognormal 95% confidence intervals.

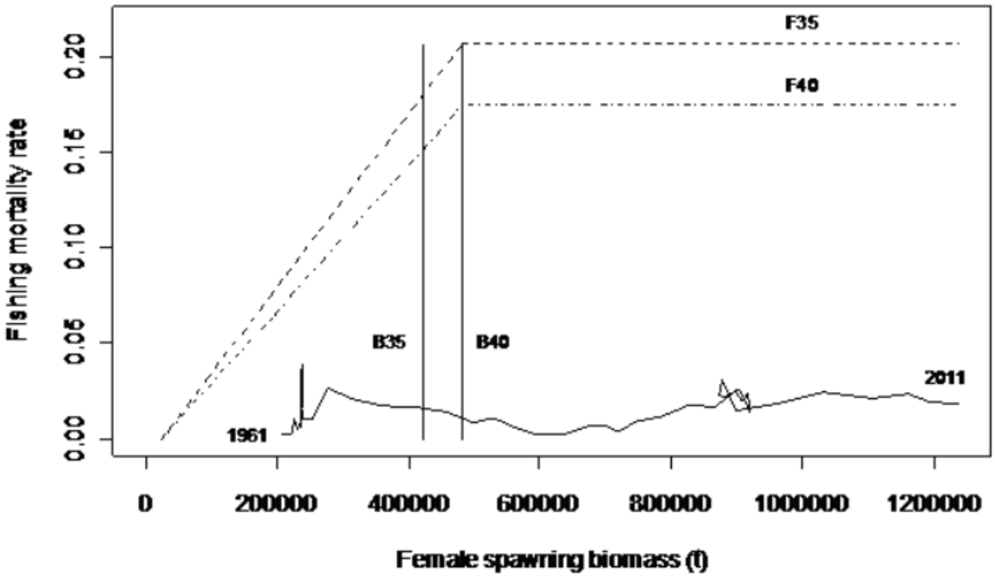


Figure 6.18. Fishing mortality rate and female spawning biomass from 1961 to 2011 compared to the F35% and F40% control rules. Vertical lines are B35% and B40%.

Flathead Sole

The B40 spawning biomass for flathead sole in the GOA is estimated at 41,547 t while the projected spawning biomass is at 106,377 t, therefore stable and well above target reference point.

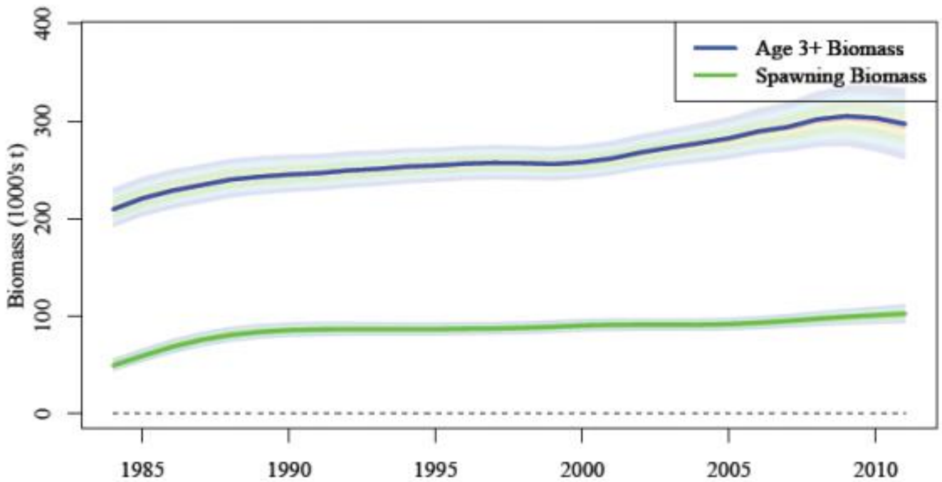


Figure 6.19. Time series plots of estimated total (age 3+) biomass and spawning biomass. 95% credibility intervals based on marginal posterior distributions from MCMC integration for parameters related to. The solid lines indicate time series of maximum likelihood estimates.

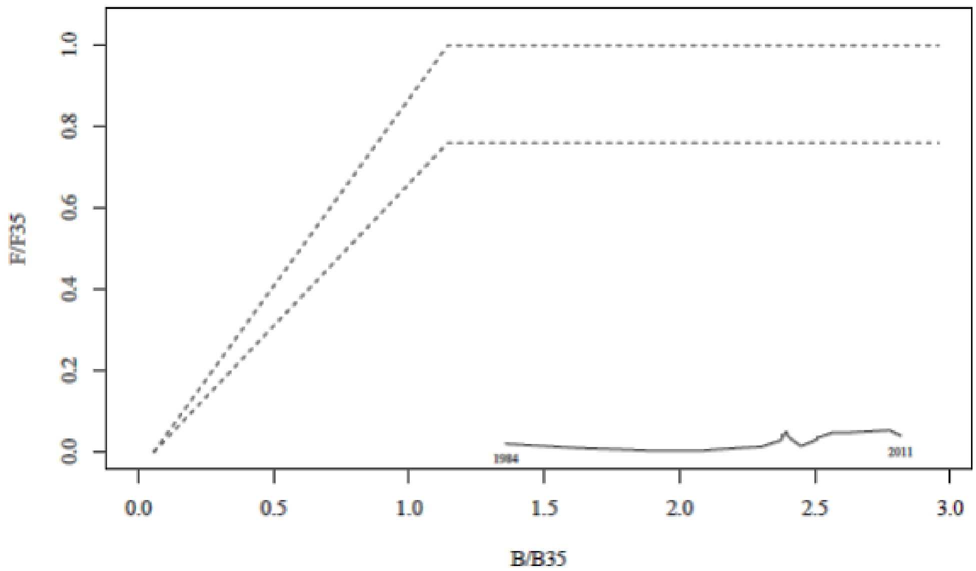


Figure 6.20. Control rule plot of estimated fishing mortality versus estimated female spawning biomass for GOA flathead sole. FOFL = upper dashed line, Fmax ABC = lower dashed line.

GOA Northern and Southern Rock Sole

The spawning biomass of both Northern and Southern rock sole in the Gulf of Alaska is considered to be above their target reference points of B40. SB_{40} for Northern rock sole in 2013 is estimated at 20,100 t while the spawning biomass is estimated at 42,700 t. SB_{40} for Southern rock sole in 2013 is estimated at 45,100 t while the spawning biomass is estimated at 82,800 t. Therefore both stocks are considered well above their reference points (table available in the 2012 SAFE report for the two species).

	Northern	Southern
SB_{2013}	42,700	82,800
$SB_{40\%}$	20,100	45,100
$SB_{35\%}$	17,600	39,500
F_{ABC}	0.152	0.193
ABC	9,700	18,600
F_{OFL}	0.180	0.230
OFL	11,400	21,900

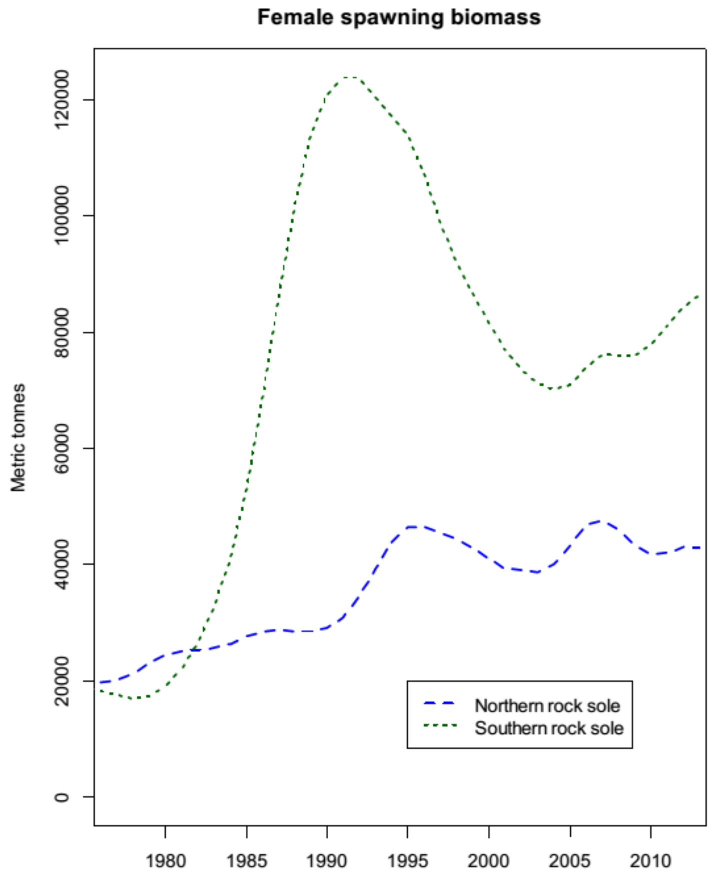


Figure 21. Estimated female spawning biomass of northern and southern rock sole for Model 3, 2012 SAFE.

Catches for both species have been consistently low in past years. For example, the ABC calculated in the 2011 SAFE for Northern rock sole was 10.800 t, and 22,700 t for southern rock sole, while the estimated 2012 catch for both species was 1,763 t. Overall the fishing mortality for these two species is considered to be fairly low and more conservative than allowed by F_{ABC} recommendations.

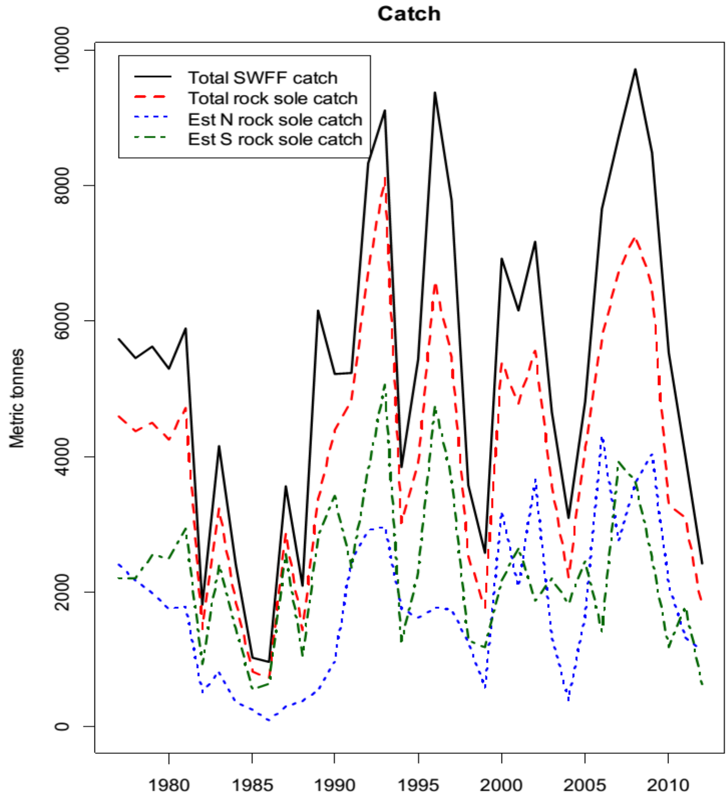


Figure 6.22. Total shallow-water flatfish catch, calculated total U/N/S rock sole catch, and estimated northern (N) and southern (N) rock sole catch for Model 3, 2012 SAFE.

GOA Rex Sole

Updated Catch and Projections

Because no new survey data was available in 2012 (2 year survey cycle consisting of one year on and one year off as for the other GOA species), the single species projection model was run using parameter values from the base case 2011 assessment model, together with updated catch information for 2011 and 2012, to predict adult biomass for rex sole in 2013 and 2014 and to make ABC recommendations for those years.

New information available to update the projection model consists of the total catch for 2011 (2,876 t) and the current catch for 2012 (2,048 t as of Sept. 22, 2012). The recommended ABC and OFL from last year's assessment were based on Tier 5 calculations applied to the assessment model estimates of adult biomass, because estimates for F35% and F40% were not considered reliable. The same Tier 5 approach based on adult biomass estimated using the projection model was used in the 2012 SAFE report. The projection model was run to generate estimates of total (age 3+) biomass for 2013-2014. The estimated final catch for 2012 (2,315 t) was also used as the estimate for the final 2013 catch. The resulting estimates of total biomass (2013-2014) were converted to adult biomass using a conversion factor determined from the 2011 assessment model, because numbers-at-age for 2013 and 2014 were not available from the projection model. ABC and OFL for 2013 and 2014 were then calculated based on Tier 5 specifications for FOFL (=M) and max FABC (=0.75M) using estimates of adult biomass at the start of each year, M=0.17, and the Baranov catch equation. The recommended ABC's for 2013 and 2014 are 9,560 t and 9,460 t, respectively, while the OFL's are 12,492 t for 2013 and 12,362 t for 2014. Not surprisingly, the new OFL and recommended ABC values for 2013 are nearly identical to those adopted for 2013 using the 2012 full assessment model (12,326 t and 9,432 t, respectively).

Although it is not possible to use a Tier 3 approach to making harvest recommendations for rex sole because estimates of F35% and F40% are not considered reliable, the SSC has decided that it is possible to use a Tier 3 approach for determining overfished status because the estimate of B35%=0.35 · B100% (i.e., 35% of the unfished spawning stock biomass) is considered reliable (it does not depend on the fishery selectivity), as is the estimate of current (2012) spawning stock biomass. Because the estimated spawning stock biomass for 2013 (52,807 t) is greater than B35% (19,434 t), the stock is not considered overfished. Because the 2012 catch was less than the 2012 ABC (i.e., 2,425 t < 9,612 t), overfishing is not occurring (http://www.afsc.noaa.gov/refm/stocks/plan_team/GOArex.pdf).

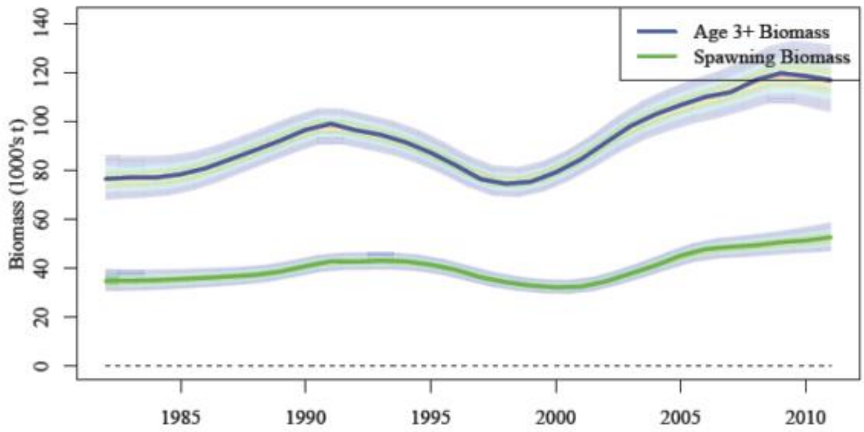


Figure 6.23. Time series plots of estimated total (age 3+) biomass and spawning. 99% credibility intervals based on marginal posterior distributions from MCMC integration for parameters related to the fishery. The solid lines indicate time series of maximum likelihood estimates.

It can be seen in Table 6.4, below, that the catch for this species is generally below the recommended ABC and TAC. This also indicates that the fishing pressure on the stock is actually much lower than the one recommended in the SAFE assessments.

Table 6.4. Rex sole catch, OFL and ABC 2011-2014.

Species	Year	Biomass[1]	OFL[2,3]	ABC[2,3]	TAC[2,3]	Catch[4]
Rex sole	2011	86,974	12,499	9,565	9,565	2,876
	2012	87,162	12,561	9,612	9,612	2,048
	2013	86,684	12,492	9,560		
	2014	85,778	12,362	9,460		

	[1] Adult biomass from the assessment and projection models. [2] http://www.fakr.noaa.gov/sustainablefisheries/specs11_12/goa_table1.pdf [3] http://www.fakr.noaa.gov/sustainablefisheries/specs12_13/goa_table1.pdf [4] As of Sept. 22, 2012. **References** 2012 and 2011 Flatfish SAFE reports, available at: 2011 SAFEs: http://www.afsc.noaa.gov/refm/stocks/2011_assessments.htm 2012 SAFEs: http://www.afsc.noaa.gov/refm/stocks/assessments.htm	
Evidence adequacy rating: ☑**High** ☐ **Medium** ☐ **Low**		
☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**		
Clause:	**Evidence**	
6.1.4	*Management actions are agreed to in the eventuality that data sources and analyses indicate that these reference points have been exceeded.* **See section 6.1.1 and 6.1.2 above**. Management responses to avoid exceeding MSY reference points are incorporated into the harvest control rules and through setting of conservative harvest rates, ABC and OFL limits, and the in-season management is used to close fisheries that have reached quotas or exceeded reference points. Overall the flatfish complex appears to be lightly fished and most stocks appear to be stable and on the rise, generally above their target reference points (however, see BSAI Greenland turbot).	
Evidence adequacy rating: ☑**High** ☐ **Medium** ☐ **Low**		
☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**		
Clause:	**Evidence**	
6.1.5	**Rating determination** *The Tier system for stock assessment and management is structured around differing level of uncertainty about fish stock ecology and fishing history and the decision rules are based on*	

biological reference points. The level of discarding is closely monitored and measures are taken to reduce discarding. NEPA 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.

The management system for the Alaska flatfish complex in the BSAI and the GOA fisheries takes all of these factors into account uncertainties relating to the size and productivity of the stocks, reference points, stock condition in relation to such reference points, levels and distribution of fishing mortality and the impact of fishing activities, including discards, on non-target and associated or dependant species as well as environmental and socio-economic conditions.

The Tier system for stock assessment and management reflects the uncertainty about fish stock ecology and fishing history (see section 6.1). The decision rules are based on biological reference points, both limit and target reference points (see section 6.1). The maximum permitted rate of fishing is adjusted in accordance with stock condition. Given the conservative procedures for setting harvest, especially the hierarchy of TAC ≤ ABC < OFL & ACL = ABC for Groundfish, the inclusion of associated fishing mortality, (see section 6.1.1), the high level of observer coverage, near-real time harvest monitoring, Prohibited Species Catch and the setting of initial TACs lower than the advised TAC to reduce the chance of overshooting TAC, all highlight a system that is highly risk averse. In addition to these, these fisheries are lightly exploited in that the catches tend to be constantly and significantly below TAC recommendations due to bycatch limits for other species. These fact contributes positively in lessening pressure on species that may be associated or dependant to the flatfish complex here under assessment.

The level of discarding is monitored with at-sea observers and measures (retention requirements) are taken to reduce discarding. Regulations including the Improved retention/ Improved utilization program, groundfish retention standards, Amendment 80, and Regulatory amendment 78 FR 12627 (please see **section 8.4** for greater detail) take account of target species discards. Moreover, discards are accounted for in the SAFE reports as part of the overall fish stock assessment. The NEPA requires preparation of EISs for major Federal actions significantly affecting the quality of the human environment. NEPA is a comprehensive process to provide checks and balances against changes to the environment that may impact ecosystems and the natural processes.

Gear modifications have been implemented in the BSAI and are in the process of being implemented in the GOA (scheduled for a 2014 start). Modifications have been made to trawl gear to lift the trawl 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 reduce the unobserved mortality of crab caused by interaction with the trawl sweeps. The new North Pacific Observer Program went into effect January of 2013 and made important changes to how observers are deployed, how observer coverage is funded, and the vessels and processors that must have some or all of their operations observed. These changes will increase the statistical reliability of data collected by the program, address cost

	inequality among fishery participants and expand observer coverage to previously unobserved fisheries. **Evidence** http://www.afsc.noaa.gov/refm/stocks/assessments.htm http://www.afsc.noaa.gov/REFM/Docs/2012/ecosystem.pdf http://alaskafisheries.noaa.gov/npfmc/pdfdocuments/conservation_issues/trawlmods112.pdf http://alaskafisheries.noaa.gov/sustainablefisheries/observers/	

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***						
Confidence Ratings	**Low**	**0 out of 6**	**Medium**	**0 out of 6**	**High**	**3 out of 6**

Clause: **7.1 The precautionary approach shall be applied widely to conservation, management and exploitation of living aquatic resources in order to protect them and preserve the aquatic environment.** ***FAO Eco 29.6*** **7.1.1 The absence of adequate scientific information shall not be used as a reason for postponing or failing to take conservation and management measures.** ***FAO CCRF 7.5.1*** ***Eco 29.6/32***	
Evidence adequacy rating: ☑**High** ☐ **Medium** ☐ **Low**	
☑**Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**	
Clause:	**Evidence**
7.1	**Rating determination** *The precautionary approach is applied widely to conservation, management and exploitation of living aquatic resources in order to protect them and preserve the aquatic environment.* The FAO Guidelines for the Precautionary Approach (PA) for fisheries management (FAO 1995) advocate a comprehensive management process that includes data collection, monitoring, research, enforcement, and review. More specifically, prior identification of desirable (target) and undesirable (limit) outcomes must be carried out and measures are required that will avoid undesirable outcomes with high probability

and correct them promptly should they occur. The Guidelines suggest that this be achieved through decision rules that specify in advance what action should be taken when specified deviations from operational targets are observed (i.e. harvest control rules). Furthermore, the Guidelines suggest that a management plan should not be accepted until it has been shown to perform effectively in terms of its ability to avoid undesirable outcomes (for example through simulation trials). Lastly, the absence of adequate scientific information should not be used as a reason for postponing or failing to take measures to conserve target species, associated or dependent species as well as non-target species and their environment.

FAO. 1995. Precautionary approach to fisheries. Part 1: Guidelines on the precautionary approach to capture fisheries and species introductions. FAO Fisheries Technical Paper 350/1 [online]. Available from http://www.fao.org/DOCREP/003/W3592E/W3592E00.HTM

The flatfish fisheries in Alaska contain the elements listed above and are therefore considered to conform to the FAO PA Guidelines.

Federally-managed fisheries

The FMPs have pre-defined harvest control rules that include limit and target reference points and are used to determine annual catch limits to control exploitation within sustainable bounds and to promote optimal utilization around MSY. The harvest control rules include a variable harvest rate that is reduced if a stock falls below a target level of B_{MSY}, or its proxy of $B_{40\%}$, in order to promote stock rebuilding. The harvest rate is controlled to be below a limit reference point of F_{OFL}. F_{OFL} is maintained at a constant level of F_{MSY}, or its proxy $F_{35\%}$ when the stock size is above the target. It is reduced if the stock size falls below the target, and is set to 0 if stock size falls below a critical level. The critical level may be adjusted upward if other considerations suggest a more conservative approach is warranted. This single species approach is applied to all groundfish stocks in Alaska.

The Optimum yield (OY) cap is used to achieve the harvest level for a species that is consistent with the greatest overall benefits, including economic, social, and biological considerations. It differs from maximum sustainable yield (MSY) in that MSY considers only the biology of the species. MSY constitutes a “ceiling” for OY. Optimum yield may be lower than MSY, depending on relevant economic, social, or ecological factors while in the case of an overfished fishery, OY provides for the rebuilding of the stock to B_{MSY}. The FMP for each management area sets out an Optimum Yield (OY) for the groundfish complex as a whole, which includes flatfish along with the majority of targeted groundfish species. The OY in the GOA is currently 116,000 to 800,000 mt, and in the BSAI is 1,400,000 to 2,000,000 mt.

http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf

	2012 and 2011 Flatfish SAFE reports, available at: 2011 SAFEs: http://www.afsc.noaa.gov/refm/stocks/2011_assessments.htm 2012 SAFEs: http://www.afsc.noaa.gov/refm/stocks/assessments.htm The annual process of determining OFL and ABC specifications begins with the assignment of each stock to one of six "tiers" based on the availability of information about that stock. Stocks in Tier 1 have the most information, and those in Tier 6, the least. The application of a control rule for each tier prescribes the resulting OFL and maximum ABC for each stock (Figure 7.1), with higher tiers proscribing more conservative catches. This is discussed further in section 7.1.1. By this method, the less scientific information that is available for a stock, the more conservatively catch limits are set. BSAI yellowfin sole and northern rock sole are Tier 1 stocks; BSAI flathead sole, arrowtooth flounder, Alaska plaice and Greenland turbot are Tier 3 stocks; BSAI Kamchatka flounder is a Tier 5 stock. GOA arrowtooth flounder, flathead sole, northern and southern rock sole are all Tier 3 stocks; GOA rex sole is a Tier 5 stock. The current Tier 5 stocks are being moved toward higher management levels, for example: a Tier 3 trial assessment was done for Kamchatka flounder in 2012 and the GOA rex sole assessment is improving both the model and data inputs. The tier system used here allows for the determination of TACs below the OFL to prevent overfishing or address other biological concerns that may affect the reproductive potential of a stock but that are not reflected in the OFL itself. TACs can also be established at levels that maximize harvests, and associated economic and social benefits, when biological and ecological conditions warrant doing so.	

Catch Limit Control Rules for North Pacific Groundfish.

Tier 1: Reliable point estimates of B and B_{MSY} and pdf of F_{MSY}.

1a) Stock status: $B/B_{MSY} > 1$
$F_{OFL} = mA$, the arithmetic mean of the pdf
$F_{ABC} \leq mH$, the harmonic mean of the pdf

1b) Stock status: $\alpha < B/B_{MSY} \leq 1$
$F_{OFL} = mA \times (B/B_{MSY} - \alpha)/(1 - \alpha)$
$F_{ABC} \leq mH \times (B/B_{MSY} - \alpha)/(1 - \alpha)$

1c) Stock status: $B/B_{MSY} \leq \alpha$
$F_{OFL} = 0$; $F_{ABC} = 0$

Tier 2: Reliable point estimates of B, B_{MSY}, F_{MSY}, $F_{35\%}$, and $F_{40\%}$.

2a) Stock status: $B/B_{MSY} > 1$
$F_{OFL} = F_{MSY}$
$F_{ABC} \leq F_{MSY} \times (F_{40\%}/F_{35\%})$

2b) Stock status: $\alpha < B/B_{MSY} \leq 1$
$F_{OFL} = F_{MSY} \times (B/B_{MSY} - \alpha)/(1 - \alpha)$
$F_{ABC} \leq F_{MSY} \times (F_{40\%}/F_{35\%}) \times (B/B_{MSY} - \alpha)/(1 - \alpha)$

2c) Stock status: $B/B_{MSY} \leq \alpha$
$F_{OFL} = 0$; $F_{ABC} = 0$

Tier 3: Reliable point estimates of B, $B_{40\%}$, $F_{35\%}$, and $F_{40\%}$.

3a) Stock status: $B/B_{40\%} > 1$
$F_{OFL} = F_{35\%}$; $F_{ABC} \leq F_{40\%}$

3b) Stock status: $\alpha < B/B_{40\%} \leq 1$
$F_{OFL} = F_{35\%} \times (B/B_{40\%} - \alpha)/(1 - \alpha)$
$F_{ABC} \leq F_{40\%} \times (B/B_{40\%} - \alpha)/(1 - \alpha)$

3c) Stock status: $B/B_{40\%} \leq \alpha$
$F_{OFL} = 0$; $F_{ABC} = 0$

Tier 4: Reliable point estimates of B, $F_{35\%}$, and $F_{40\%}$.
$F_{OFL} = F_{35\%}$; $F_{ABC} \leq F_{40\%}$

Tier 5: Reliable point estimates of B and natural mortality rate M.
$F_{OFL} = M$; $F_{ABC} \leq 0.75 \times M$

Tier 6: Reliable catch history from 1978 through 1995.
OFL = the average catch, unless an alternative value is established by the SSC.
$ABC \leq 0.75 \times$ OFL

Figure 7.1. Tier system used to determine ABC and OFL for groundfish stocks

For each species in the flatfish complex yields associated with the Overfishing Limit (OFL) and the Acceptable Biological Catch (ABC) are estimated. The (OFL) is the amount of catch determined from the estimate of biomass for a given year and the maximum rate of fishing mortality that does not result in overfishing. Thus, catch equal to OFL results in equal probability that overfishing is or is not occurring. The ABC is defined in such a way as to take into account uncertainty regarding the OFL estimation and other uncertainties in the stock assessments. The Plan teams have the option to propose alternatives to the ABC if conditions warrant, such as additional uncertainties, recruitment variability, and declining stock trends. The ABC is always lower than the OFL. The SSC then reviews the SAFE report and Plan Team recommendation, and makes its own recommendation to the NPFMC. This recommendation includes ACL.

The tier category also provides a dynamic assessment process linked to a species

	immediate condition and changing when the condition changes. BSAI yellowfin sole and BSAI northern rock sole are Tier 1 species and yield was estimated directly from the probability density function from the latest model population estimates at the given level of certainty. BSAI flathead sole, BSAI arrowtooth flounder, BSAI Alaska plaice, BSAI Greenland turbot, GOA flathead sole, GOA arrowtooth flounder, GOA northern rock sole and GOA southern rock sole are Tier 3 species and yield was estimated using the appropriate F reference points estimated from spawning stock biomass per recruit (SPR) information applied to the most current biomass estimate with the level of confidence determined from model posterior densities. BSAI Kamchatka flounder and GOA rex sole are Tier 5 species and ABC yield for these species was estimated using F equivalent to 0.75 of their instantaneous rate of natural mortality and the most current survey biomass estimate and OFL yield from F=M as that species/stock biomass will increase when F is lower than M. The uncertainty in the biomass estimates provides the range for OFL and ABC. The 2006 reauthorization of the MSA included the requirement that the NPFMC's SSC specify ACLs with accompanying accountability measures when setting annual harvest quotas. The guidelines stipulate that ACL may not exceed ABC and that if ACL=ABC=OFL, then the proposal will prevent overfishing with accountability measures. Because NPFMC's groundfish FMPs are multiyear plans, their plans provide that if ACL is exceeded in one year, then accountability measures are triggered for the next year to assure compliance (50 CFR 600.310 (f)(5)). The NPFMC then reviews the SAFE report, Plan Team recommendation, and SSC recommendation; then makes its own recommendation to the Secretary, with the constraint that the NPFMC's recommended ABC cannot exceed the SSC's recommended ABC or ACL. http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf The next stage of the management process is to determine the annual total allowable catch (TAC) for each stock. The TAC must be lower than or equal to the ABC. The TAC may be lower than the ABC on the basis of bycatch considerations, management uncertainty, socioeconomic considerations, or if required to have the sum of all TACs for directed species in the ecosystem (BSAI and GOA separately) to fall within the range of the OY. In this way, the management system addresses multi-species, ecosystem, and social needs of the fishery. (Dicosimo et al. 2010 http://icesjms.oxfordjournals.org/content/67/9/1861.full). In application, the NPFMC sets TAC ≤ ABC < OFL. Actual groundfish harvests have averaged approximately 90% of the cumulative TAC and 65% of the cumulative ABC (Figure 7.2), because of the complex array of accountability measures governing these fisheries.	

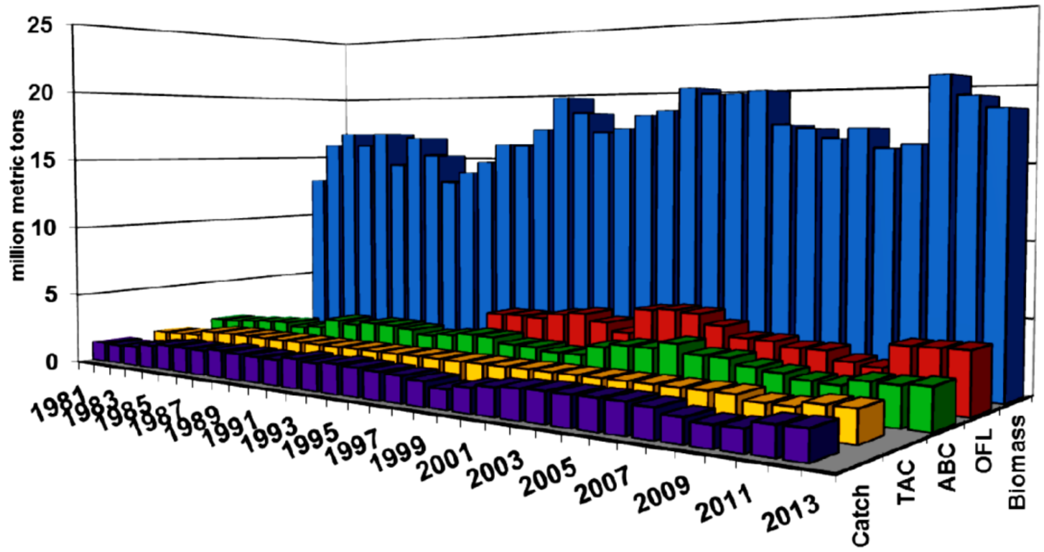


Figure 7.2. Cumulative estimates of biomass, OFL, ABC, TAC, and annual catch (all in million tons) across all groundfish species in the BSAI, 1981-2013. http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIintro.pdf

Besides the MSA, US fisheries management must be consistent with the requirements of other regulations including the Marine Mammal Protection Act, the Endangered Species Act, and the Migratory Bird Treaty Act. NMFS uses Steller sea lion protection measures to ensure the groundfish fisheries off Alaska are not likely to jeopardize the continued existence of the western population of Steller sea lions or adversely modify their critical habitat.

Management of the federal Alaskan flatfish complex fisheries is highly compliant with all these principals. Regular SAFE reports use best available science and multiple fishery models to make management recommendations for the following years. An on-going process of review and revision ensures that management actions are effective and achieve desired outcomes with high probability.

State waters fisheries

State waters fishery harvests are based on federal quotas. The NPFMC's TAC limits are set for the federal and parallel flatfish complex fisheries and resources apportioned among federal management areas to distribute fishing effort. Harvest from federal and parallel seasons are subtracted from the same TAC. Because the NPFMC's TAC setting process is a multi-year procedure, any overages by the state fisheries can adjust the following year's ABC to assure compliance with the requirement to remain below the ACL.

Evidence

NPFMC groundfish species profiles 2011:

	http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/Species_Profiles2011.pdf http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf http://www.adfg.alaska.gov/static/regulations/fishregulations/pdfs/commercial/Groundfish-2012-2013.pdf	

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	**Evidence**	
7.1.1	**Rating determination** *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.* Reference points are based on the MSY concept. In tier 1, reliable point estimates for B, and B_{MSY} are used. In tier 3, there is limited knowledge of the stock recruitment relationship and proxies are used for the MSY reference points. In tier 5, reliable point estimates of B and natural mortality (M) are used to compute a conservative F_{OFL}. The suitability of these proxies has been the subject of considerable research (Clark 1991, Restrepo 1999). OFL and ABC decision rules are progressively more conservative for tier 4, 5, and 6 stocks. There are several steps between assessing the status of stocks relative to national standards and what the annual catch would be at that standard (OFL), and the establishment of the annual TAC. The following relationship is in place: TAC ≤ ABC < OFL The rules for determining the OFL and ABC are such that the OFL is always greater than the ABC. This is explicitly designed to account for uncertainties (see above). While there are prescribed rules for determining the ABC, there are provisions in the management plans for assessment authors, Plan teams, and the SSC to recommend a more conservative ABC if there are uncertainties in the data, recruitment variability, or a declining trend in population size. In other words, in the face of uncertainty it is explicitly stated that the correct course of action is to become more conservative. And,	

	finally, the NPFMC is permitted to recommend a more conservative ABC when warranted. The NPFMC's ABC can only be equal to or lower than the SSC's. Then, additional ecosystem and socioeconomic considerations are taken into account before the TAC is established. However, the TAC can only be equal to or less than the ABC. 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. Clark, W.G., 1991. Groundfish exploitation rates based on life history parameters. Can. J. Fish. Aquat. Sci. 48, 734–750. (http://www.iphc.int/papers/f35.91.pdf) Restrepo, V. (ed.) 1999. Proceedings of the fifth national NMFS Stock Assessment Workshop: Providing scientific advice to implement the precautionary approach under the Magnuson-Stevens Fishery Conservation and Management Act. NOAA Tech. Memo. NMFS-F/SPO-40. http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf 2012 and 2011 Flatfish SAFE reports, available at: 2011 SAFEs: http://www.afsc.noaa.gov/refm/stocks/2011_assessments.htm 2012 SAFEs: http://www.afsc.noaa.gov/refm/stocks/assessments.htm	

Clause:

7.2 For new and exploratory fisheries, procedures shall be in place for promptly applying precautionary management measures, including catch or effort limits.

7.2.1 Provisions shall be made for the gradual development of new or exploratory fisheries while information is being collected on the impact of these fisheries, allowing an assessment of the impact of such fisheries on the long-term sustainability of the stocks.

7.2.2 Information collection and precautionary management provisions shall be established and initiated early on to allow impact assessment.

FAO CCRF 7.5.4

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

FAO CCRF 7.5.5

Evidence adequacy rating: ☐**High** ☐ **Medium** ☐ **Low**		
☐ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**		
Clause:	**Evidence**	
7.2	**Not applicable. Alaskan flatfish complex fisheries are well-established fisheries.** A new or exploratory fishery would normally be assigned to tier 6. In which case the OFL would be set to the average catch for of a given period and the maximum ABC would be set to 75% of this value. None of the flatfish complex fisheries in Alaska are considered new or exploratory.	
Evidence adequacy rating: ☐**High** ☐ **Medium** ☐ **Low**		
☐ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**		
Clause:	**Evidence**	
7.2.1	**Not applicable. Alaskan flatfish complex fisheries are well-established fisheries. See clause 7.2**	
Evidence adequacy rating: ☐**High** ☐ **Medium** ☐ **Low**		
☐ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**		
Clause:	**Evidence**	
7.2.2	**Not applicable. Alaskan flatfish complex fisheries are well-established fisheries. See clause 7.2**	

Evidence adequacy rating:

☑High **☐ Medium** **☐ Low**

☑ Full Conformity **☐ Minor Non-conformity** **☐ Major Non-conformity**

☐ Critical Non-conformity

Clause:	Evidence	
7.2.3	**Rating determination** *The PA and harvest control rules are used as a management method to prevent overfishing or as a contingency plan to respond to overfishing, adverse environmental changes or other phenomena negatively affecting the fishery resource.* The precautionary approach (7.1) and harvest control rules as described in 7.1.1 are used as a management method to prevent overfishing or as a contingency plan to respond to overfishing and the in-season management is used to close fisheries that have exceeded reference points. The NMFS and ADFG undertake ecosystem level research regarding the effects of climate change on the flatfish fisheries of the BSAI and GOA, predator and prey relationships and related fisheries in the BSAI and GOA area. For example, the impacts of climate change on fish and fisheries is expected to increase the demand for more accurate stock projections and harvest strategies that are robust to shifting production regimes. Each SAFE report contains an ecosystem section addressing that species predator/ prey interactions, fishery effects and habitat requirements. There is also an annual ecosystem assessment and report card produced for each management area along with the SAFE documents. **Evidence** http://www.afsc.noaa.gov/REFM/Docs/2012/ecosystem.pdf http://www.afsc.noaa.gov/REFM/Stocks/assessments.htm http://www.afsc.noaa.gov/refm/stocks/2011_assessments.htm	

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***						
Confidence Ratings	**Low**	**0 out of 10**	**Medium**	**0 out of 10**	**High**	**10 out of 10**

Clause:

8.1 **Conservation and management measures shall be designed to ensure the long-term sustainability of fishery resources at levels which promote the objective of optimum utilization, and be based on verifiable and objective scientific and/or traditional sources.In the evaluation of alternative conservation and management measures, their cost-effectiveness and social impact shall be considered.**

FAO CCRF 7.1.1 Others 7.4.1/7.6.7

Eco 29.2/29.4

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

FAO CCRF 8.4.2

Evidence adequacy rating:

☑High **☐ Medium** **☐ Low**

☑ Full Conformity **☐ Minor Non-conformity** **☐ Major Non-conformity**

☐ Critical Non-conformity

Clause:	**Evidence**
8.1	**Rating determination** *The Alaska flatfish complex commercial fisheries are managed according to the BSAI and GOA FMPs that attempt to ensure the 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 for Alaska flatfish fisheries are outlined in the BSAI and GOA Groundfish FMPs. 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 ability and precision in catch control, 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 clear management objectives (46 for BSAI and 45 for GOA) falling under the following general 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;*
- *Improve Data Quality, Monitoring and Enforcement.*

Determining Harvest Levels

The management system uses several reference/target reference points that are summarized here and discussed in detail 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 (closures). ACL cannot exceed the ABC, and may be divided into sector- ACLs (gear type, Amendment 80 fleet, etc.). • *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, area, and catch restrictions, (iv) measures that allow flexible management authority, (v) designation of monitoring and reporting requirements for the fisheries, and (vi) description of the schedule and procedures for review of the FMP or FMP component. http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf For every change/amendment or new development affecting fisheries management and therefore modifying the FMPs (http://www.fakr.noaa.gov/sustainablefisheries/amds/default.htm), 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 federal agencies to consider the impact of federal 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. http://www.eeoc.gov/eeoc/plan/regflexibilityact.cfm In addition, the White House, through Executive Order (E.O.) 12866, requires Executive Branch agencies to perform benefit-cost analyses for all rules it deems to be "significant" and to submit these analyses to the Office of Management and Budget for review. http://www.epa.gov/ttnecas1/econdata/Rmanual2/2.2.html 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 Economic and social analysis is part of the NEPA (essentially an environmental and socio-economic impact assessment) requirements, of which the NPFMC and NMFS consistently adhere and comply with. One recent change affecting flatfish complex fisheries in Alaska is the restructuring and implementation (Jan. 2013) of the groundfish observer program. http://alaskafisheries.noaa.gov/analyses/observer/amd86_amd76_earirirfa0311.pdf The State of Alaska allows some parallel fisheries in State waters and manages minimal takes for flatfish in certain areas via permit or as bycatch in other state fisheries. The state is a cooperating agency in the NEPA process for federal actions. Any proposed changes to the existing management regime by government, industry, or the public must go through a rigorous regulatory review process. http://www.adfg.alaska.gov/index.cfm?adfg=fisheriesboard.main	
Evidence adequacy rating: **☑High** **☐ Medium** **☐ Low**		
☑ Full Conformity **☐ Minor Non-conformity** **☐ Major Non-conformity** **☐ Critical Non-conformity**		
Clause:	**Evidence**	
8.1.1	The BSAI and GOA FMPs authorize only non-pelagic trawls and longlines (for Greenland Turbot) for flatfish fishing, hence no dynamiting, poisoning and other	

	comparable destructive fishing practices are allowed. In addition to this, regulations require trawl sweep modification in the BSAI (and similar rule in the GOA to be implemented in 2014) to decrease seafloor interaction.	

Clause:

8.2 States shall seek to identify domestic parties having a legitimate interest in the use and management of the fishery.

8.2.1 Arrangements shall be made to consult these parties and gain their collaboration.

FAO CCRF 7.1.2 Others 7.1.6

Evidence adequacy rating:

☑High **☐ Medium** **☐ Low**

☑ Full Conformity **☐ Minor Non-conformity** **☐ Major Non-conformity**

☐ Critical Non-conformity

Clause:	Evidence	
8.2	**Rating determination** *The NPFMC and its public meeting processes allow for the various stakeholders and fishery users to be involved in the decision making process relevant to flatfish complex fisheries in Alaska.* The NPFMC and its public meeting processes allow for the various stakeholders and fishery users to be involved in the decision making process relevant to flatfish complex fisheries in Alaska. This allows the NPFMC to identify, consult and gain collaboration with the parties interested in harvest and management of the fisheries resources. Please refer to the information supplied under fundamental clause 2 for more details. http://www.fakr.noaa.gov/npfmc/public-meetings/council-meeting.html Additionally the fishery management cycle is an open process with potential for local stakeholder involvement. The NPFMC has signed a Memorandum of Understanding (MOU) with 10 Federal agencies and 4 State agencies, to create the Alaska Marine Ecosystem Forum (AMEF). The AMEF seeks to improve coordination and cooperative understanding between the agencies on issues of shared responsibilities related to the marine ecosystems off Alaska's coast. The purpose of the forum is to: • Promote dialogue and information exchange. • Improve agency coordination by sharing priorities and data.	

	• Allow agencies to understand the ecosystem impact of other activities. • Provide opportunities for problem solving and joint work. One of the NPFMC's policy priorities is to improve outreach and communications with rural communities and Alaska Native entities and develop a method for systematic documentation of Alaska Native and community participation in the development of fishery management actions. Upon review of several suggestions to expand both ongoing communication and outreach specific to particular projects affecting rural stakeholders, the NPFMC initiated a small workgroup in 2008 to further review potential approaches and provide recommendations. Upon review of the workgroup report in February 2009, the NPFMC approved the workgroup's primary recommendation to initiate a standing committee (the Rural Community Outreach Committee) to provide input to the NPFMC on ways to improve outreach to communities and Alaska Native entities. The committee was initiated in June 2009. The committee has been instrumental in recommending and implementing changes to improve overall outreach and two-way communication with rural stakeholders, as well as assisting in the development of project-specific, long-term outreach plans for NPFMC actions regarding Bering Sea Chinook and chum salmon bycatch reduction measures. http://www.fakr.noaa.gov/npfmc/rural-outreach/rural-community-outreach-committee.html	
Evidence adequacy rating: ☑**High** ☐ **Medium** ☐ **Low**		
☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**		
Clause:	**Evidence**	
8.2.1	**Rating Determination** *Arrangements are made to consult these parties and gain their collaboration.* The NPFMC and its public meeting processes allow for the various stakeholders and fishery users to be informed of potential management actions, encourage them to comment on proposed actions, and may consider those comments in the decision making process relevant to flatfish complex fisheries in Alaska. This allows the NPFMC to identify, inform and gain collaboration with the parties interested in harvest and management of the fisheries resources. **Please refer to the information supplied under Fundamental clause 2 for more details.** http://www.fakr.noaa.gov/npfmc/public-meetings/council-meeting.html	

Clause:
8.3 Fleet capacity operating in the fishery shall be measured and states shall maintain, in accordance with recognized international standards and practices, statistical data, updated at regular intervals, on all fishing operations and a record of all authorizations to fish allowed by them. ***FAO 8.1.2, 8.1.3*** **8.3.1 Mechanisms shall be established where excess capacity exists to reduce capacity to levels commensurate with sustainable use of the resource. Such mechanisms shall include monitoring the capacity of fishing fleets.** ***FAO CCRF 7.1.8, 7.6.3***
Evidence adequacy rating: ☑**High** ☐ **Medium** ☐ **Low**
☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**

Clause:	Evidence
8.3	**Rating determination** *Fleet capacity operating in the Alaska flatfish complex fisheries is measured. Alaska maintains, in accordance with recognized international standards and practices, statistical data, updated at regular intervals, on all fishing operations and a record of all authorizations to fish allowed by them (NMFS RAM Division).* The NMFS Alaska Region RAM division requires that all vessels fishing or processing groundfish possess a federal fishing permit, a federal vessel license or/and a federal processing permit. The permit describes all pertinent information about the vessel and its' vessel fishing category, gear type and target fisheries. As a condition of these permits vessels must also comply with all regulations described in the GOA and BSAI FMPs. This includes reporting and landings requirements (*e*landings and logbooks), carrying onboard observers or having shoreside observers at shore plants. This information is regularly up-dated and meets or exceeds the federal and international standards and practices required. The NPFMC produces an annual Fleet Profile document to provide the public with readily available and accessible information about the fishing fleets prosecuting federally managed fisheries off Alaska. Vessels are grouped into fleets based on their target species, gear type, licenses, or eligibility for catch share programs. They categorized vessels into 16 commercial fleets and one charter fleet (although there may be substantial overlap). They examine catch data, vessel registration data, and observer data from vessels participating in the 2010 fisheries for groundfish, crab,

	halibut, and scallops for the 2012 report. In 2010, there were 1,646 unique vessels fishing commercially in the federal fisheries off Alaska. Another 1,090 vessels were used as charter vessels in the recreational halibut fishery that occurs in both federal and state waters. Thus, the total number of vessels participating in federal managed fisheries off Alaska was 2,736. Many of these vessels also participate in federal fisheries and state managed fisheries. http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/resources/FleetProfiles412.pdf http://www.fakr.noaa.gov/ram/ffpfpp.htm

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	**Evidence**
8.3.1	The flatfish complex fisheries in Alaska are not overharvesting the resource and fleet capacity is carefully measured. Mechanisms are in place via the permitting process, observer program and catch reporting programs to quantify fishing capacity and ensure that excess capacity is avoided. Accordingly, the resources in the GOA and BSAI are generally above their target reference points, except for Greenland turbot. Overall, the flatfish complex in Alaska appears to be lightly exploited. The fleets are measured and controlled in terms of permitting and quota share limitations by federal agencies. The fleets are monitored by the NMFS RAM division in terms of permitting. **Please see evidence in clauses 8.3, 6.1.3 and 7.1.**

Clause:

8.4 States and relevant groups from the fishing industry shall encourage the development and implementation of technologies and operational methods that reduce waste and discards of the target species. These measures shall be applied appropriately.

***FAO CCRF* 8.4.5**

8.4.1 Technical measures shall be taken into account, where appropriate, in relation to:

- **fish size**
- **mesh size or gear**
- **discards**
- **closed seasons**
- **closed areas**

- **areas reserved for particular (e.g. artisanal) fisheries**
- **protection of juveniles or spawners**

8.4.2 Suitable arrangements shall be in place to measure performance and to promote, to the extent practicable, the development and use of selective, environmentally safe and cost-effective gear, methods and techniques. Less consistent methods, practices and gears shall be phased out accordingly.

FAO CCRF 7.6.9, 7.6.4, 8.5.2

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

FAO CCRF 8.2.4

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	Evidence
8.4	***Rating determination*** *The AFSC and relevant groups from the fishing industry have developed and implemented operational methods that reduce waste and discards of the target species (Groundfish Retention Standard and Improved retention/Improved utilization programs).* **<u>BSAI</u>** **Improved retention/Improved utilization program (IR/IU)** The MSA authorizes the NPFMC and the Secretary of Commerce (SC) to reduce discards for conservation and management purposes. Prior to Congress passing the Sustainable Fisheries Act (SFA) in 1996, the NPFMC and SC adopted significant bycatch and discards reduction management actions. One of these actions was Amendment 49 to the BSAI Groundfish FMP (IR/IU), which was approved in September 1997 and implement in January 1998. Amendment 49 required all vessels fishing for groundfish in the BSAI management area to retain 100% of rock sole and yellowfin sole beginning January 1, 2003. In 2001, the NPFMC determined that the head and gut trawl catcher processor sector would not be able to fully meet IR/IU flatfish retention requirements under Amendment 49. In 2002, the NPFMC approved Amendment 75 to BSAI Groundfish

FMP, delaying implementation of the IR/IU flatfish regulations for the BSAI until June 1, 2004. However, Amendment 75 was only partially approved by the Secretary, the delay of IR/IU flatfish implementation in the BSAI was approved, but the ending date (June 1, 2004) for the delay was not approved. The practical effect of partially approving Amendment 75 was that it delayed indefinitely the flatfish IR/IU program.

During the final action on Amendment 75, the NPFMC considered the creation of retention standard (GRS) as an alternative.

http://www.alaskafisheries.noaa.gov/analyses/groundfish/amend79EARIRIRFA0505.pdf

Groundfish Retention Standard (GRS)

The purpose of the GRS is to create a retention standard for groundfish in the BSAI that would minimize discards of head and gut trawl catcher processors that are not listed AFA catcher/processor at 50 CFR 679.4(1)(2)(1). To meet the NPFMC's stated goals of minimize waste and improve utilization of fish resources to the extent practicable, the NPFMC initiated Amendment 79 in October 2002 that would establish a minimum groundfish retention standard. Several alternatives were developed and the preferred alternative was a GRS phased over four year period starting at 65% and increasing to 85%. The GRS was approved by the NPFMC in conjunction with Amendment 79 in June 2003, published as a final rule on April 2007 (71 FR 17362), and became effective in 2008. Under the preferred alternative, only HT-CP vessels ≥ 125' (38.1 m) LOA required to comply with the GRS. The schedule for increasing GRS is listed below in Table 8.1.

Table 8.1. Schedule for increasing the GRS.

GRS Schedule	Annual GRS
2008	65%
2009	75%
2010	80%
2011 and each year after	85%

The NPFMC selected the annual GRS schedule after reviewing historic retention rates for the BSAI fisheries for 1995 to 2002. Historic retention rates were estimated by dividing retained catch weight by the estimated weight of total groundfish catch derived from NMFS blend data. Blend data were derived from a combination of Weekly Production Reports and NMFS observer data. Observers on C/P vessels reported groundfish species composition, total catch, and estimate of retention and discards on a weekly basis for each separate reporting area. Total catch was typically estimated using cod-end or bin volumetrics, scales, or conversion from production data. Species composition of the catch was obtained by sampling the catch. The total catch is apportioned by species based on that sampling. Following NPFMC final action on the GRS program, NMFS adjusted the methodologies used to determine catch estimates from the NMFS Blend Database (1995 through 2002) to the Catch Accounting Database (2003 through present).

http://www.alaskafisheries.noaa.gov/analyses/groundfish/amend79EARIRIRFA0505.pd

	f http://alaskafisheries.noaa.gov/analyses/groundfish/rireairfa_grs1212.pdf Amendment 80 Amendment 80 was adopted by the NPFMC in June 2006, implemented under a final rule in 2007 and fully effective starting with the 2008 fishing year. This action allocates several BSAI non-pollock trawl groundfish species among trawl fishery sectors, and facilitate the formation of harvesting cooperatives in the non-AFA trawl catcher/processor sector. The NPFMC adopted Amendment 80 to meet the broad goals of: (1) improving retention and utilization of fishery resources by the non-AFA trawl catcher/processor fleet by extending the GRS to non-AFA trawl catcher/processor vessels of all lengths; (2) allocating fishery resources among BSAI trawl harvesters in consideration of historic and present harvest patterns and future harvest needs; (3) authorizing the allocation of groundfish species to harvesting cooperatives and establishing a limited access privilege program (LAPP) for the non-AFA trawl catcher/processors to reduce potential GRS compliance costs, encourage fishing practices with lower discard rates, and improve the opportunity for increasing the value of harvested species; and (4) limiting the ability of non-AFA trawl catcher/processors to expand their harvesting capacity into other fisheries not managed under a LAPP. The flatfish species in the BSAI directly affected by this Amendment include flathead sole, rock sole and yellowfin sole. http://alaskafisheries.noaa.gov/sustainablefisheries/amds/80/ Regulatory amendment 78 FR 12627 The NMFS published a regulatory amendment, effective March 2013, to modify the GRS program in the BSAI management area. This final rule removes certain regulatory requirements that mandate minimum levels of groundfish retention by the owners and operators of trawl C/P vessels not listed in the AFA, commonly referred to as either non-AFA trawl C/Ps or Amendment 80 vessels, and Amendment 80 cooperatives participating in the BSAI groundfish fisheries. The GRS program was implemented to increase the retention and utilization of groundfish; however, NMFS has discovered that the regulatory methodology used to calculate compliance with the GRS requires individual Amendment 80 vessels and Amendment 80 cooperatives to retain groundfish at rates well above the minimum retention rates recommended by the NPFMC or implemented by NMFS. As a result, the GRS imposes significantly higher than predicted compliance costs on vessel owners and operators due to the increased level of retention needed to meet the minimum retention rates. Additionally, NMFS discovered that enforcement of the GRS has proven far more complex, challenging, and potentially costly than anticipated by NMFS. This action is necessary to relieve Amendment 80 vessels and Amendment 80 cooperatives from undue compliance costs stemming from the minimum retention rates while continuing to promote the GRS program goals of increased groundfish retention and utilization. This action maintains current monitoring requirements for the Amendment 80 fleet and establishes a new requirement for	

Amendment 80 cooperatives to annually report groundfish retention performance as part of the report submitted to NMFS. This action is intended to promote the goals and objectives of the MSA, the fishery management plan, and other applicable law. http://alaskafisheries.noaa.gov/frules/78fr12627.pdf

Retention rates for the Amendment 80 sector

Table 8.2 shows retention rates by target for Amendment 80 sector from 2003 through 2009. Unlike retention rates calculated using round weight equivalent of reported production used to determine the GRS compliance, these retention rates rely on Catch Accounting data from NMFS. Using these retention rates, it is apparent in the table that the sector has made a large improvement in their retention rates during the 2003 through 2009 period. The aggregate retention rate for 2003 was 71 percent, with most of the retention rates for the different target fisheries ranging from 60 percent to 70 percent, while just six years later, in 2009, the aggregate retention rate for the sector was 90 percent with most retention rates for the different target fisheries above 85 percent (GRS scheduled for 2009 is 75%). In fact, only two target fisheries had retention rates below 80 percent, Alaska plaice at 70 percent, and other species at 72 percent.

Table 8.2. Retention rates by target for the Amendment 80 sector, 2003 through 2009.

Target	2003	2004	2005	2006	2007	2008	2009
Alaska Plaice				58%	72%	90%	70%
Arrowtooth Flounder	74%	54%	68%	52%	71%	88%	93%
Atka Mackerel	74%	79%	89%	89%	89%	94%	94%
Flathead Sole	69%	65%	71%	75%	65%	86%	90%
Greenland Turbot - BSAI	72%	41%	85%		81%	98%	96%
Other Flatfish - BSAI	49%	39%	49%	50%	48%	60%	80%
Other Species	60%	18%	86%	27%	75%		72%
Pacific Cod	63%	55%	66%	66%	70%	95%	89%
Pollock - bottom	33%	16%	43%	53%	55%	88%	90%
Pollock - midwater	4%		87%		33%	100%	90%
Rock Sole - BSAI	65%	61%	73%	79%	80%	89%	87%
Rockfish	94%	90%	95%	95%	93%	98%	92%
Sablefish - BSAI		59%	84%		54%	93%	95%
Yellowfin Sole - BSAI	73%	74%	80%	78%	75%	87%	88%
Aggregate Retention Rate	**71%**	**68%**	**78%**	**79%**	**78%**	**89%**	**90%**

Source: NMFS Catch Accounting

http://alaskafisheries.noaa.gov/analyses/groundfish/rireairfa_grs1212.pdf

GOA

Improved retention/Improved utilization program (IR/IU)

The MSA authorizes the NPFMC and the Secretary of Commerce (SC) to reduce discards for conservation and management purposes. Prior to Congress passing the Sustainable Fisheries Act (SFA) in 1996, the NPFMC and SC adopted significant bycatch and discards reduction management actions. One of these actions was Amendment 49 to the GOA Groundfish FMP (IR/IU), which was approved in January 1998. Amendment 49 required all vessels fishing for groundfish in the GOA management area to retain all shallow water flatfish beginning January 1, 2003. No discarding of whole fish is allowed, either prior to or subsequent to that species being brought on board the vessel, except as

permitted in the regulations. At-sea discarding of any processed product from shallow water flatfish is also prohibited, unless required by other regulations.
All shallow water flatfish caught in the GOA must be either 1) processed at sea subject to minimum product recovery rates and/or requirements established by regulations implementing the FMP, 2) delivered in their entirety to onshore processing plants for which similar processing requirements are implemented by State regulations.
Amendment 72 to the Fishery Management Plan for Groundfish of the Gulf of Alaska was approved in August, 2008. Amendment 72 amends the FMP to state that the Council will annually review information on the discard of shallow-water flatfish in Gulf of Alaska groundfish fisheries. After review of this annual information, the Council may recommend revisions to retention and utilization requirements if the discard rate for shallow-water flatfish falls above or below a specified threshold.
http://alaskafisheries.noaa.gov/sustainablefisheries/amds/default.htm
http://alaskafisheries.noaa.gov/frules/73fr50888.pdf
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf

Retention rates of shallow water flatfish
Full retention of shallow-water flatfish is required by IR/IU rule. Estimates of retained and discarded catch (t) in the various trawl target fisheries, since 1991, by management assemblage, were calculated from discard rates observed from at sea sampling and industry reported retained catch (Table 8.3). Retention of shallow water flatfish was between 71% and 88% from 1994 to 2000. Retention for shallow-water flatfish has been between 87% and 98% from 2001 to 2011.

Table 8.3. Percent (by weight) of catch for shallow water flatfish that is retained for the GOA flatfish fisheries, 1994 through 2011.

Year	shallow-water flatfish
1994	73%
1995	71%
1996	86%
1997	81%
1998	83%
1999	77%
2000	88%
2001	91%
2002	91%
2003	90%
2004	87%
2005	93%
2006	92%
2007	94%
2008	93%
2009	98%
2010	95%
2011	95%

http://www.afsc.noaa.gov/REFM/docs/2011/GOAshallowflat.pdf

Rex sole

The GOA rex sole fishery maintains a retention rate around 95%.

Table 8.4. Time series of recent reference points (ABC, OFL), TACs, total catch and retention rates for rex sole.

Year	ABC (t)	TAC (t)	OFL (t)	Total Catch (t)	% Retained
1995	11,210	9,690	13,091	4,021	90%
1996	11,210	9,690	13,091	5,874	95%
1997	9,150	9,150	11,920	3,294	92%
1998	9,150	9,150	11,920	2,669	97%
1999	9,150	9,150	11,920	3,060	96%
2000	9,440	9,440	12,300	3,591	97%
2001	9,440	9,440	12,300	2,940	95%
2002	9,470	9,470	12,320	2,941	95%
2003	9,470	9,470	12,320	3,485	95%
2004	12,650	12,650	16,480	1,464	93%
2005	12,650	12,650	16,480	2,176	91%
2006	9,200	9,200	12,000	3,294	95%
2007	9,100	9,100	11,900	2,852	98%
2008	9,132	9,132	11,933	2,703	97%
2009	8,996	8,996	11,756	4,753	99%
2010	9,729	9,729	12,714	3,636	98%
2011	9,565	9,565	12,499	2,594	97%

http://www.afsc.noaa.gov/REFM/docs/2011/GOArex.pdf

Flathead sole

The gross retention rate for flathead sole over all fisheries has been 87% or larger since 2005, and higher than 95% since 2009 (Table 8.5).

Table 8.5. Time series of recent reference points (ABC, OFL, TAC), total catch and retention rates for GOA flathead sole. The 2011 catch is through Sept. 24, 2011.

Year	Author ABC (t)	ABC (t)	TAC (t)	OFL (t)	Total Catch (t)	% Retained
1995	--	28,790	9,740	31,557	2,181	
1996	--	52,270	9,740	31,557	3,107	
1997	--	26,110	9,040	34,010	2,446	
1998	--	26,110	9,040	34,010	1,742	
1999	--	26,010	9,040	34,010	900	
2000	--	26,270	9,060	34,210	1,547	
2001	--	26,270	9,060	34,210	1,911	
2002	22,684	22,690	9,280	29,530	2,145	
2003	41,402	41,390	11,150	51,560	2,425	88
2004	51,721	51,270	10,880	64,750	2,390	80
2005	36,247	45,100	10,390	56,500	2,530	87
2006	37,820	37,820	9,077	47,003	3,134	89
2007	39,110	39,110	9,148	48,658	3,163	89
2008	44,735	44,735	11,054	55,787	3,419	90
2009	46,464	46,464	11,181	57,911	3,658	96
2010	47,422	47,422	10,411	59,295	3,842	95
2011	49,133	49,133	10,587	61,412	2,339	97

http://www.afsc.noaa.gov/REFM/docs/2011/GOAflathead.pdf

Current Retention Rates for 2013

Table 8.6. Catch data for Alaskan flatfish species through September 21, 2013. Data are from weekly production and Observer Reports (includes CDQ).

	Retained catch (mt)	Discarded catch (mt)
BSAI Alaska plaice	14462	7132
BSAI arrowtooth flounder	16236	2800
BSAI flathead sole	14550	1424
BSAI Greenland turbot	1010	336
BSAI Kamchatka flounder	6874	718
BSAI northern rock sole	54160	3118
BSAI yellowfin sole	113538	4604
GOA arrowtooth flounder	10708	4440
GOA flathead sole	2004	322
GOA rex sole	3287	55
GOA shallow water flatfish	4516	218

http://alaskafisheries.noaa.gov/2013/car230_disc_ret.csv

The BSAI Alaskan plaice fishery was closed in May of 2013 due to the initial TAC having been reached. Vessels fishing flatfish in the BSAI were prohibited from retaining Alaska plaice and forced to move their operations away from areas with high Alaska plaice catches. Lower retention rates for arrowtooth flounder in the GOA are due to the large biomass of arrowtooth available and its high occurrence as bycatch in other target fisheries.

http://www.gpo.gov/fdsys/pkg/FR-2013-05-20/html/2013-11950.htm

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	Evidence
8.4.1	**Rating determination** *Technical measures are taken into account, as appropriate, in relation to fish size, mesh size or gear, discards, closed seasons, closed areas, areas reserved for particular (e.g. artisanal) fisheries, and protection of juveniles or spawners.* **These are for the BSAI:** Fish size No fish size limits are implemented for flatfish species because there is a general separation between young and adult flatfish. Also, fishermen tend to target bigger adults as they fetch higher prices in the market.

Mesh size or gear

Trawl sweep modifications have been implemented in the BSAI. Longline gear is regulated as for seabird avoidance measures.

Discards

Discard mitigation measures have been implemented through the GRS program which requires 85% retention of flatfish in federal waters. This is verified by the high degree of observer coverage. The GRS was approved by the NPFMC in conjunction with Amendment 79 in June 2003, published as a final rule on April 2007 (71 FR 17362), and became effective in 2008. The GRS requires that non-FA trawl C/P vessels to retain a minimum of 85% of flatfish complex species. Retention rate is higher then the stated minimum. See also Table 8.6. for 2013 discards rates under clause 8.4.1.

Permits

All vessels participating in the BSAI groundfish fisheries, other than fixed gear sablefish, require a federal groundfish license, except for: vessels fishing in State of Alaska waters; vessels less than 32' LOA; and jig gear vessels less than 60' LOA that meet specific effort restrictions. Licenses are endorsed with area, gear, and vessel type and length designations. Fishing permits may be authorized, for limited experimental purposes, for the target or incidental harvest of groundfish that would otherwise be prohibited. Gear types for flatfish authorized by the FMP are non–pelagic trawls, and hook-and-line (for Greenland turbot) as defined in regulations.

Time and Area Restrictions (Figures 8.2 and 8.3)

Management measures in place in the BSAI groundfish fisheries constrain fishing both temporally and spatially.

In consultation with the NPFMC, the Secretary can establish fishing seasons by regulations that implement the FMP, to accomplish the goals and objectives of the FMP, the MSA, and other applicable law.

All trawl: Fishing with trawl vessels is not permitted year-round in the Crab and Halibut Protection Zone and the Pribilof Island Habitat Conservation Area. The Nearshore Bristol Bay Trawl Closure area is also closed year-round except for a subarea that remains open between April 1 and June 15 each year. The Chum Salmon Savings Area is closed to trawling from August 1 through August 31.

Nonpelagic trawl: The Red King Crab Savings Area is closed to nonpelagic trawling year round, except for a subarea that may be opened at the discretion of the NPFMC and NMFS when a guideline harvest level for Bristol Bay red king crab has been established. The Aleutian Islands Habitat Conservation Area, Bering Sea Habitat Conservation Area, St. Matthew Island Habitat Conservation Area, St. Lawrence Island Habitat Conservation Area, Nunivak Island, Etolin Strait, and Kuskokwim Bay Habitat Conservation Area, and the Northern Bering Sea Research Area are closed to nonpelagic trawling year-round. Owners and operators of fishing vessels using nonpelagic trawl gear in the Modified Gear Trawl Zone, regardless of target species, must use modified nonpelagic trawl gear as required for the Bering Sea flatfish fishery.

Bottom contact gear: The use of bottom contact gear is prohibited in the Aleutian Islands Coral and Alaska Seamount Habitat Protection Areas year-round. The use of mobile bottom contact gear is prohibited year-round in Bowers Ridge Habitat Conservation Zone.

Gear test area exemption: Specific gear test areas for use when the fishing grounds are closed to that gear type are established in regulations that implement the FMP.

Marine mammal measures: Regulations implementing the FMP include conservation measures that temporally and spatially limit fishing effort around areas important to marine mammals. NMFS uses Stellar sea lion protection measures (SSLPM) to ensure the groundfish fisheries off Alaska are not likely to jeopardize the continued existence of the western population of Steller sea lions or adversely modify their critical habitat. The management measures disperse fishing over time and area to protect against potential competition for important Steller sea lion prey species near rookeries and important haulouts.

Steller sea lion critical habitat (Figure 8.1) includes a 20 nautical mile buffer around all major haulouts and rookeries, as well as associated terrestrial, air and aquatic zones, and three large offshore foraging areas (see http://alaskafisheries.noaa.gov/protectedresources/stellers/habitat.htm).

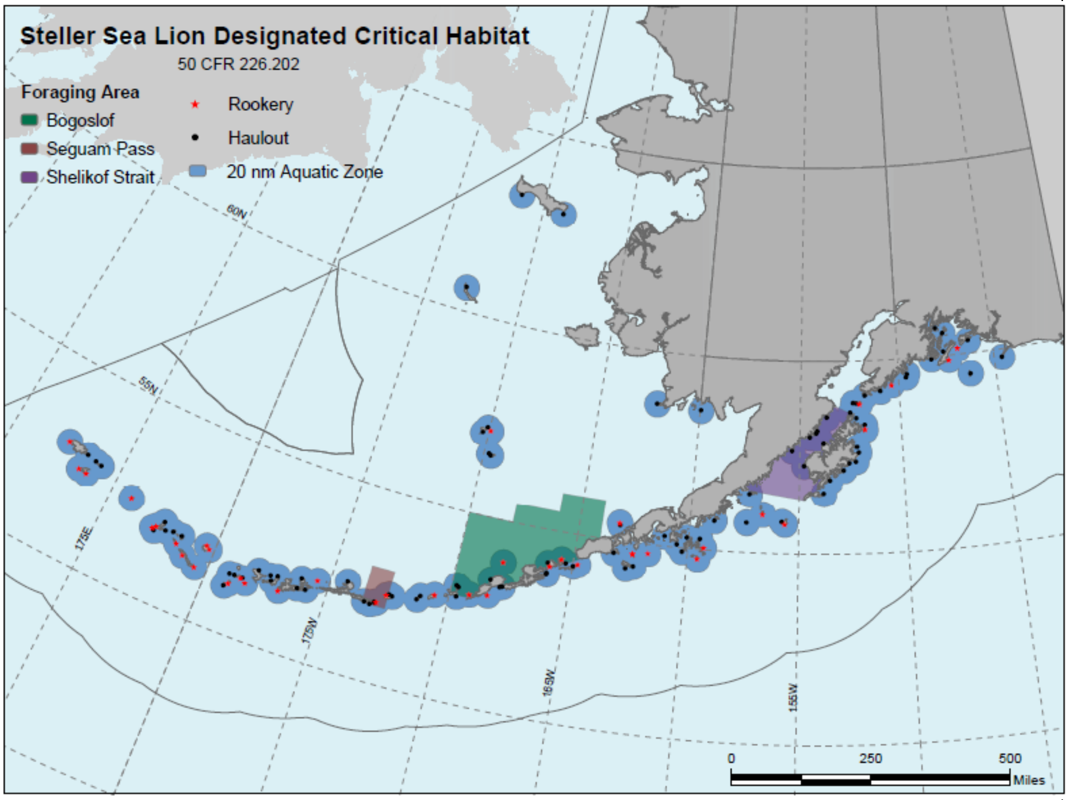
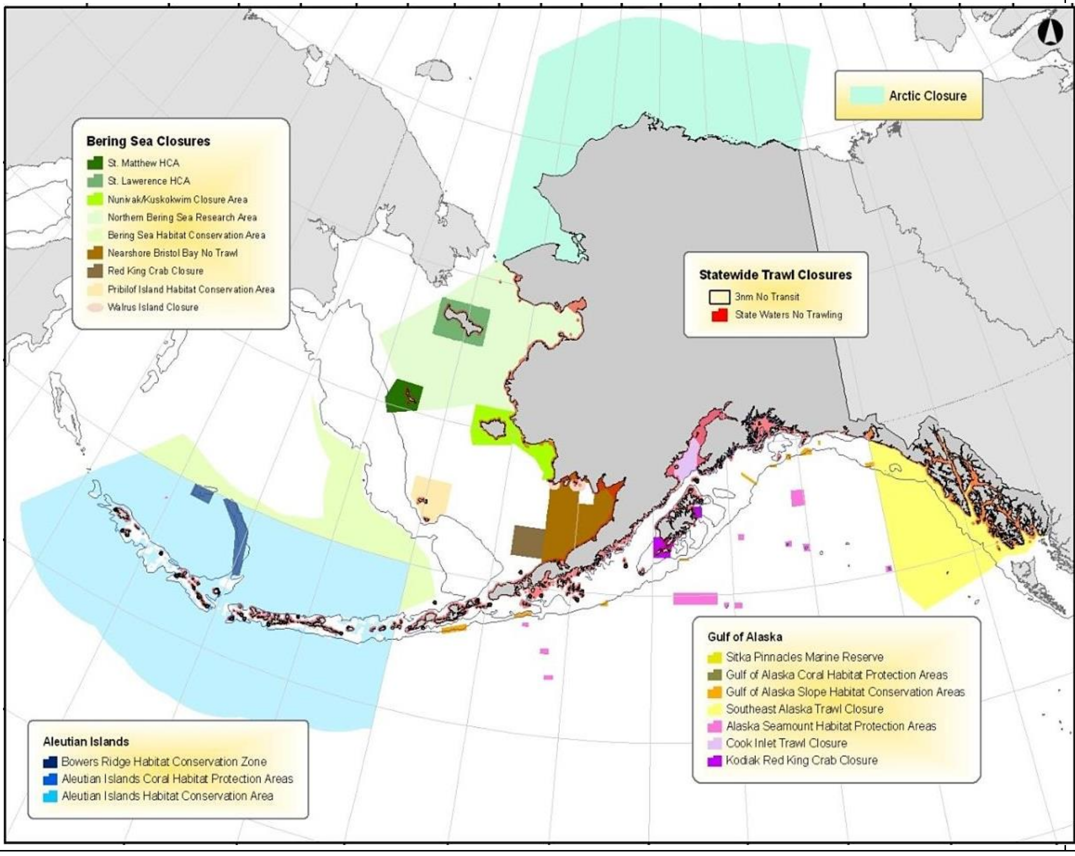
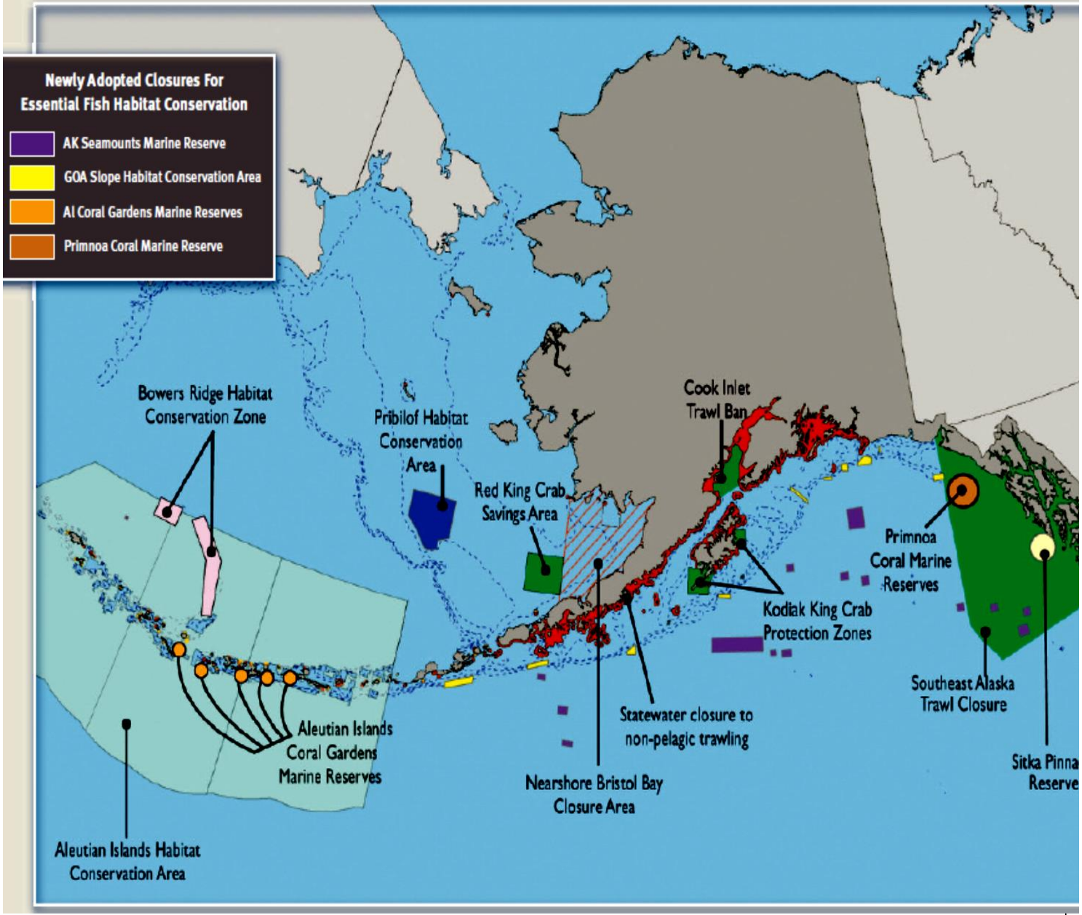


Figure 8.1. Steller Sea Lion Protection Areas from NOAA Alaska Region





Figures 8.2 and 8.3. Year round closures in Alaskan waters (8.2) and EFH, closures and HAPC Conservation Areas in the EBS, the GOA and the AI (8.3).
http://alaskafisheries.noaa.gov/npfmc/conservation-issues/habitat-protections.html
https://alaskaseafood.org/sustainability/pdf/Marine%20Protected%20Areas%20Brochure.pdf

For the GOA these are:

Fish size

No fish size limits are implemented for flatfish species because there is a general separation between young and adult cod. Also, fishermen tend to fish fairly selectively by targeting larger adult fish, which fetch higher prices in the market.

Mesh size or gear

Trawl sweeps modifications have been implemented in the BSAI. The NMFS proposes regulations that would implement Amendment 89 to the FMP for Groundfish of the GOA and that would revise current regulations governing the configuration of modified nonpelagic trawl gear. This proposed rule would require that nonpelagic trawl gear used in the directed flatfish fisheries in the Central Regulatory Area of the GOA be modified to raise portions of the gear off the sea floor (in depth discussion in clause 8.4.2). The stakeholder comments period ended on July 17, 2013 and the regulation should be formally announced and implemented in the upcoming months.

Discards

Discard mitigation measures have been implemented through the IR/IU program which requires 100% retention of shallow water flatfish in federal waters. This regulation is also active in state waters. This is verified by the high degree of observer coverage. The GOA rex sole and flathead sole fisheries both have high retention rates (well above 85%). See also Table 8.6. for 2013 discards rates under clause 8.4.1.

Permit

All vessels participating in the GOA groundfish fisheries, other than fixed gear sablefish and demersal shelf rockfish in Southeast Outside district, require a Federal groundfish license, except for: vessels fishing in State of Alaska waters and vessels less than 26' LOA. Licenses are endorsed with area, gear, and vessel type and length designations. Fishing permits may be authorized, for limited experimental purposes, for the target or incidental harvest of groundfish that would otherwise be prohibited.

Time and Area Restrictions (Figures 8.2 and 8.3)

Management measures in place in the GOA groundfish fisheries constrain fishing both temporally and spatially.

In consultation with the NPFMC, the Secretary can establish fishing seasons by regulations that implement the FMP, to accomplish the goals and objectives of the FMP, the MSA, and other applicable law.

All vessels: Fishing or anchoring within the Sitka Pinnacles Marine Reserve is prohibited at all times.

All trawl: Use of trawl gear is prohibited at all times in the Southeast Outside district.

Non-pelagic trawl: The use of non-pelagic trawl is prohibited in Cook Inlet. Three types of closure areas are designated around Kodiak Island. Type I areas prohibit non-pelagic trawling year-round; Type II prohibit non-pelagic trawl from February 15 to June 15; adjacent areas designated as Type III may be reclassified by the Regional Administrator as Type I or Type II following a recruitment event. The GOA Slope Habitat Conservation Area is closed to non-pelagic trawling year-round.
The NMFS proposes regulations that would implement Amendment 89 to the FMP for Groundfish of the GOA. The proposed rule would establish a protected area in Marmot Bay, northeast of Kodiak Island, and close that area to fishing with trawl gear except for directed fishing for Pollock with pelagic trawl gear. The proposed closure would reduce bycatch of Tanner crab in GOA groundfish fisheries. The stakeholder comments period ended on July 17, 2013.

Bottom contact gear: The use of bottom contact gear is prohibited in the Gulf of Alaska Coral and Alaska Seamount Habitat Protection Areas year-round.

	Anchoring: Anchoring by fishing vessels in the Gulf of Alaska Coral and Alaska Seamount Habitat Protection Areas is prohibited. *Gear test area exemption:* Specific gear test areas for use when the fishing grounds are closed to that gear type, are established in regulations that implement the FMP. Marine mammal measures: Management measures to protect SSL disperse fishing over time and area to protect against potential competition for important Steller sea lion prey species near rookeries and important haulouts (see Figure 8.1). **Evidence** http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf http://www.fakr.noaa.gov/npfmc/conservation-issues/habitat-protections.html http://www.fakr.noaa.gov/npfmc/conservation-issues/ssl.html http://www.fakr.noaa.gov/sustainablefisheries/sslpm/ http://alaskafisheries.noaa.gov/prules/78fr36150.pdf	
Evidence adequacy rating: ☑**High** ☐ **Medium** ☐ **Low**		
☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**		
Clause:	**Evidence**	
8.4.2	**Rating determination** *The development and use of selective, environmentally safe and cost effective gear (trawl sweep modifications, seabird avoidance for longline), methods and techniques is common practice in Alaska including flatfish complex fisheries. The gear, as well all the other plethora of management and operational control measures currently allowed for the fishery in question, are in line with the management goals, conservation and optimum utilization of this resource.* **Bottom trawl gear** The issues of primary concern with respect to the effects of fishing on benthic habitat using nonpelagic bottom trawl gear are the potential for damage or removal of fragile biota within each area that is used by fish as habitat and the potential reduction of habitat complexity, benthic biodiversity, and habitat suitability. Based on the information available to date, the predominant direct effects caused by nonpelagic trawling include smoothing of sediments, moving and turning of rocks and boulders,	

resuspension and mixing of sediments, removal of seagrasses, damage to corals, and damage or removal of epibenthic organisms. Trawls affect the seafloor through contact of the doors and sweeps, footropes and footrope gear, and the net sweeping along the seafloor. In the BSAI ninety percent of the area impacted by flatfish trawling is due to contact between the seafloor and the sweeps.
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/conservation_issues/trawlmods112.pdf

The RACE Division has actively collaborated with the Bering Sea flatfish fishing industry (Amendment 80 fleet) to develop fishing gear changes that reduce effects of flatfish trawling on the seafloor habitats of the EBS shelf. These conservation engineering efforts originally focused on modification to flatfish trawl gear to reduce impacts to benthic habitat. However, the techniques also showed promise to reduce the bycatch of crabs, and mortality rates of crabs that slip under the gear without being caught (unobserved mortality).

During a 2002-05 analysis (NMFS 2005) of the effects of fishing on the EFH of Alaska groundfish and subsequent considerations of mitigation actions, fishing industry representatives offered that gear modifications be considered as another management option for reducing trawl effects as an alternative to further area closures. As a result, in 2005, the NPFMC included support for research to develop and test proposed modifications in its EFH actions for the protection of BS EFH. The timeline for the development of trawl gear modifications is showed in Table 8.7.

Table 8.7. Timeline for the development of trawl gear modifications (Light green: BS and light red: GOA).

2005	FEB	NMFS and NPFMC considering actions to protect EFH
	FEB	Final action on EFH left action on Bering Sea open for consideration of actions—including gear modifications
	MAY	First meeting with captains and trawl manufacturers - Develop concepts and plan research
	SEPT	Research to develop twin trawl tests of sweep effectiveness for fish capture (F/V Cape Horn)
2006	MAR	Meeting with captains and trawl manufacturers - discuss results and research plan
	SEPT	Twin trawl experiment on effects of different sweep elevations on fish capture (F/V Cape Horn)
	MAY	Experiment to measure effects on benthos—video / sonar sled (F/V Pacific Explorer)
	NOV	Meeting with captains and trawl manufacturers - discuss results and research plan
	DEC	Presented Initial results to Management NPFMC (NPFMC)
	DEC	Workshop - initial discussions of potential regulations and enforcement
2007	MAR	Meeting with captains and trawl manufacturers - discuss results and research plan
	APR	Workshop - Further discussions of potential regulations and enforcement

		JUN JUN/JUL OCT	Pilot research on crab mortality - Develop crab mortality methods and pilot test recapture nets (F/V Pacific Explorer) Experiment to measure effects on benthos over day, week, month, year—video / sonar sled (F/V Pacific Explorer—R/V Oscar Dyson) Meeting with captains and trawl manufacturers - discuss results and research plan	
	2008	JAN MAR MAY JUN AUG SEPT	Presentation of results at annual captains meeting Tests of sweep clearance achieved with alternative bobbin spacing and height (F/V Unimak) Tests of sweep clearance achieved with alternative bobbin spacing and height (F/V Arica) Presented results of sweep clearance tests to NPFMC Crab mortality research—Modifications reduce mortality of Tanner and snow crabs (F/V Pacific Explorer) Workshop at net shed with captains, gear manufacturers, scientists, enforcement and NPFMC regional staff on regs and enforcement	
	2009	JAN JAN FEB JUN AUG OCT OCT NOV	Presentation of results at annual captains' meeting Onboard meeting with enforcement, NPFMC and regional staff to clarify regulations and enforcement issues NPFMC presentation on crab mortality research Twin trawl tests of fish capture with thinner cables (F/V Cape Horn) Crab mortality research - Modifications reduce mortality of king crab (F/V Pacific Explorer) Presentation to NPFMC - research update NPFMC recommends regulations Two workshops explaining draft regulations and discussing enforcement	
	2010	 ALL YEAR OCT OCT	Regulations drafted, discussed, reviewed and finalized Fleet and gear manufacturers pretest specific devices, handling and attachment alternatives – comment on draft regulations OCT Final Rule published (Amendment 94) NPFMC initiated a trailing amendment to require trawl sweep modifications on non-pelagic trawl vessels fishing in Central GOA	
	2011	JAN Spring/Summer	Trawl sweep modifications requirement goes into effect in the BS Four Kodiak-based trawl vessels took aboard AFSC and Alaska Groundfish DataBank staff to measure seafloor clearances achieved with the proposed sweep modifications	
	2012	FEB APR	Initial regulatory impact review for the proposed Amendment to the FMP for the GOA Management Plan to require trawl sweep modification in the flatfish fishery in the Central GOA The NPFMC completed the Amendment 89 action recommending elevating devices on non-pelagic trawl sweep for vessels targeting flatfish in the Central GOA. The NPFMC also recommended extending the section of the sweep exempted from elevating devices from 180 to 185 feet.	
	2013	MAY 2013 July 2013	Regulatory impact review for the proposed Amendment 89 to the FMP for the GOA Management Plan to require trawl sweep modification in the flatfish fishery in the Central GOA The stakeholder comments period on the proposed rule that would	

		implement Amendment 89 to the FMP for Groundfish of the GOA ended on July 17, 2013.

Consultation processes and impact assessments have resulted in amendment 94 to the FMP in BSAI. This amendment requires participants using nonpelagic trawl gear in the directed fishery for flatfish in the Bering Sea subarea to modify the trawl gear to raise portions of the gear off the ocean bottom, and this requirement went into effect on January 2011. The gear modification consists in elevating devices to be placed on the trawl sweeps to lift the sweep off the seafloor (Figure 8.4).

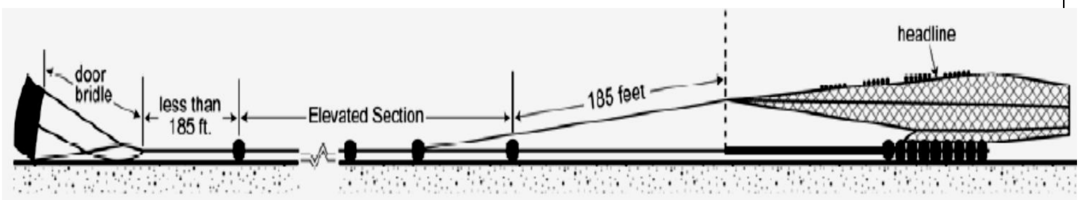


Figure 8.4. Location of elevating devices in the elevated section of modified nonpelagic trawl gear.

Research (Table 8.7) has demonstrated that using modified trawl sweeps reduce effects on sessile seafloor animals, reduce mortality of Tanner, snow and king crabs without negatively affecting target catch rates.

These results led the NPFMC to recommend requiring modified trawl sweeps for the Central GOA flatfish fishery in order to reduce negative interactions with Tanner crab. In October 2010, the NPFMC initiated a trailing amendment to require trawl sweep modifications on non-pelagic trawl vessels fishing in the Central GOA. Unlike the modification required to the BS trawl sweeps, however, which is required only in the directed flatfish fisheries, the proposed trawl sweep modification for the Central GOA would apply to all non-pelagic trawl fisheries (e.g., flatfish, Pacific cod, pollock, and rockfish). The action was initiated in conjunction with final action on the GOA Tanner crab bycatch measures. The gear modification shall be similar to the BSAI, i.e. elevating bobbins to be placed on the trawl sweeps to lift the sweep off the seafloor.

However, in the Central GOA flatfish fishery, trawl catcher vessels tend to be smaller than the BS trawl catcher vessels. In addition, sediments and bathymetry of the Central GOA flatfish fishery grounds may be different from the BS flatfish fishery grounds. Recognizing these differences, research and field testing (Table 8.7) was conducted to ensure that the BS tests and regulation requirements are applicable in the Central GOA flatfish fishery.

In 2012, an amendment to the Fishery Management Plan for the GOA Management Plan has been proposed to require trawl sweep modification in the flatfish fishery in the Central GOA.

	An Environmental Assessment, regulatory Impact Review, and Initial Regulatory Flexibility Analysis – Secretarial Review for the proposed Amendment 89 to the FMP for Groundfish of the GOA was issued in May 2013. The stakeholder comments period on the proposed rule that would implement Amendment 89 to the FMP for Groundfish of the GOA ended on July 17, 2013. These modification requirements are scheduled to go into effect in the 2014 fishing season. The trawl sweep modification has proven to be effective in the BSAI flatfish fisheries at reducing mortality of crab. It is also likely to provide protection to Tanner crab in the Central GOA flatfish fisheries. It is not possible to quantify a benefit to crab stocks in the Central GOA from modified trawl sweeps without further testing to understand how sediment conditions in the Central GOA flatfish fisheries compare to the areas in which BSAI experiments occurred. However, the general similarity of GOA trawl gear to that used in the BSAI indicates that while the benefits may be smaller, they would still be substantial. **Longline** The NPFMC's fleet rationalization programs for halibut and sablefish and the growth and technical advancements of the offshore Freezer Longline (FLL) fleet lead to gear advancements to reduce bycatch. There are several regulations in place towards seabird avoidance for vessels fishing with hook-and-line gear. Since 1997, NMFS has implemented and revised seabird avoidance measures to mitigate interactions between the federal hook and-line fisheries and seabird. The measures used in longline fisheries in Alaska include the use of streamer lines; sink baited hooks, circle hooks, line shooters, lining tubes, night settings etc. A full page including the history of these developments and the regulations currently in place is available at the following web address: http://alaskafisheries.noaa.gov/protectedresources/seabirds/guide.htm **Evidence** http://www.fakr.noaa.gov/frules/75fr61642.pdf http://www.fakr.noaa.gov/regs/679b27.pdf http://www.fakr.noaa.gov/npfmc/PDFdocuments/bycatch/GOATrawlSweeps211.pdf http://www.fakr.noaa.gov/npfmc/PDFdocuments/conservation_issues/trawlmods112.pdf http://www.nmfs.noaa.gov/stories/2012/07/07_26_12trawl_gear_innovation.html ftp://ftp.afsc.noaa.gov/posters/pRose03_development-implementation.pdf http://www.fakr.noaa.gov/frules/75fr61642.pdf http://www.fakr.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOASummary.pdf http://www.fakr.noaa.gov/npfmc/conservation-issues/gear-mods.html http://alaskafisheries.noaa.gov/sustainablefisheries/amds/amd89/amd89trawlearirirfa.pdf	

<table>
<tr><td colspan="3">Evidence adequacy rating:

☑High ☐ Medium ☐ Low</td></tr>
<tr><td colspan="3">☑ Full Conformity ☐ Minor Non-conformity ☐ Major Non-conformity

☐ Critical Non-conformity</td></tr>
<tr><td>Clause:</td><td>Evidence</td><td></td></tr>
<tr><td>8.4.3</td><td>Rating determination
Fixed gear in Alaska must be marked as for regulations.

Regulations pertaining to vessel and gear markings are set forth in this section and as prescribed in the annual management measures published in the Federal Register pursuant to § 300.62 of chapter III of this title.
(1) All hook-and-line, longline, and pot-and line marker buoys carried on board or used by any vessel regulated under this part shall be marked with the following:
(i) The vessel’s name; and
(ii) The vessel’s Federal fisheries permit number; or
(iii) The vessel’s ADFG vessel registration number.
(2) Markings shall be in characters at least 4 inches (10.16 cm) in height and 0.5 inch (1.27 cm) in width in a contrasting color visible above the water line and shall be maintained so the markings are clearly visible.
http://www.fakr.noaa.gov/regs/679b24.pdf

Mobile gear such as trawl gear does not carry identifying markings and thus derelict and discarded gear cannot be traced to specific vessels. However, the loss of such gear is very seldom and when it occurs, it is promptly retrieved, given its economic value.</td><td></td></tr>
</table>

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***						
Confidence Ratings	**Low**	**0 out of 11**	**Medium**	**0 out of 11**	**High**	**7 out of 11**

Clause:

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

FAO CCRF 7.6.10

Eco 30

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	Evidence
9.1	**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). The flatfish stocks in Alaska are not depleted or threatened with deletion. Presently and as projected, 2014 stock biomass levels are well above target reference points in both management areas. 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.* A stock or stock complex is determined to be overfished if it falls below the minimum stock size threshold (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 maximum fishing mortality threshold (MFMT), also referred as the "OFL control rule". MFMT is

	the level fishing mortality (F), on an annual basis, used to compute the smallest annual level of catch that would constitute overfishing. 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 MSA. 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 MSA 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 overfishing 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 the event that a stock or stock complex is determined to be approaching a condition of being overfished, an in-season action, an FMP amendment, a regulatory amendment or a combination of these actions will be implemented to prevent overfishing from occurring. In other words, fishing will be decreased or stopped accordingly. Careful stock surveys and accompanying stock analysis carried out annually by staff from the NMFS ensure populations remain at sustainable levels. See evidence under Fundamental Clauses **4, 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. Appendix F Adverse Effects on Essential Fish Habitat of the BSAI and GOA Groundfish FMP includes a discussion of fishing and non-fishing activities that may adversely affect EFH (last update, June 2013). <u>Effects of fishing activities on EFH</u> The fishing effects analysis is performed to evaluate whether the fisheries, as they are currently conducted off Alaska, will affect habitat that is essential to the welfare of the managed fish population in a way that is more than minimal and not temporary. During the last review it has been shown that fishing effects on the habitat of flatfish species in the BSAI and GOA do 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 flatfish species, the long-term effect indices are low, particularly those of the habitat features most likely to be important to flatfish species (infaunal and epifaunal prey). The nearshore areas, where spawning occurs and where early juveniles	

	reside, are mostly unaffected by past and current fishery activities, although there has been an increase in nearshore trawling in some area during 2002-2007 relative to 1998-2002 period. The fishery appears to have had minimal effects on the distribution of late juveniles and adult flatfish species. 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. Effects of non-fishing activities on EFH This section of BSAI and GOA FMPs synthesizes a comprehensive review of the "Impact to EFH from non-fishing activities in Alaska", a report produced by the NMFS in November 2011. Non fishing activities discussed in the document are subject to a variety of regulations and restrictions designed to limit environmental impacts under federal, state, and local laws. Also, NEPA requires federal agencies to prepare Environmental Assessments or Environmental Impact Statements prior to making decisions. NEPA documents on oil and gas exploration are very common, and in many cases involve interaction with fisheries management organizations due to potential or proposed spatial overlap between living and non-living resources. **Evidence** 2012 flatfish SAFE reports, available at: http://www.afsc.noaa.gov/refm/stocks/assessments.htm http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf http://alaskafisheries.noaa.gov/habitat/efh/review.htm http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmpAppendix613.pdf http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmpAppendix613.pdf http://alaskafisheries.noaa.gov/habitat/efh/nonfishing/impactstoefh112011.pdf	

Clause:

9.2 When deciding on use, conservation and management of the resource, due recognition shall be given, where relevant, in accordance with national laws and regulations, to the traditional practices, needs and interests of indigenous people and local fishing communities which are highly dependent on these resources for their livelihood.

FAO CCRF 7.6.6

Evidence adequacy rating:		
☑High	☐ Medium	☐ Low
☑ Full Conformity	☐ Minor Non-conformity	☐ Major Non-conformity
☐ Critical Non-conformity		

Clause:	Evidence	
9.2	**Rating determination** *When deciding on use, conservation and management of the resource, due recognition is given, where relevant, in accordance with national laws and regulations (MSA), to the traditional practices, needs and interests of indigenous people and local fishing communities (through the NPFMC) which are highly dependent on these resources for their livelihood.* National Standard 8 of the MSA states that 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. http://www.nmfs.noaa.gov/sfa/magact/mag3.html#s301 The fishery management process for the Alaska groundfish fisheries is an open process with potential for local stakeholder involvement. In 1992 the Council created the Western Alaska Community Development Quota (CDQ) Program, to provide western Alaska communities an opportunity to participate in the BSAI fisheries. The CDQ Program allocates approximately 10.7% of all BSAI quotas for groundfish, prohibited species, halibut, and crab to over 65 eligible communities. The purpose of the CDQ Program is to (i) to provide eligible western Alaska villages with the opportunity to participate and invest in fisheries in the BSAI Management Area; (ii) to support economic development in western Alaska; (iii) to alleviate poverty and provide economic and social benefits for residents of western Alaska; and (iv) to achieve sustainable and diversified local economies in western Alaska. The CDQ program has allowed CDQ groups to acquire equity ownership interests in the groundfish fishery that provide additional revenues to fund local in-region economic development projects, and education and training programs. According to the State of Alaska, the Community Development Quota entities	

	operating in federal waters on behalf of coastal communities have maintained or improved their performance from 2006 to 2010. Each of the six groups maintained or improved performance in all four categories — socioeconomic conditions, financial performance, workforce development and community development plan. The Aleutian Pribilof Island Community Development Association was not evaluated for the socioeconomic conditions category. http://alaskafisheries.noaa.gov/cdq/dreview.htm One of the NPFMC's policy priorities is to improve outreach and communications with rural communities and Alaska Native entities and develop a method for systematic documentation of Alaska Native and community participation in the development of fishery management actions. Upon review of several suggestions to expand both ongoing communication and outreach specific to particular projects affecting rural stakeholders, the NPFMC initiated a small workgroup in 2008 to further review potential approaches and provides recommendations. Upon review of the workgroup report in February 2009, the NPFMC approved the workgroup's primary recommendation to initiate a standing committee (the Rural Community Outreach Committee) to provide input to the NPFMC on ways to improve outreach to communities and Alaska Native entities. The committee was initiated in June 2009. The NPFMC identified three primary tasks for the committee: 1) to advise the NPFMC on how to provide opportunities for better understanding and participation from Alaska Native and rural communities; 2) to provide feedback on community impacts sections of specific analyses, if requested; and 3) to provide recommendations regarding which proposed NPFMC actions need a specific outreach plan and prioritize multiple actions when necessary. The committee has been instrumental in recommending and implementing changes to improve overall outreach and two-way communication with rural stakeholders, as well as assisting in the development of project-specific, long-term outreach plans for NPFMC actions regarding Bering Sea Chinook and chum salmon bycatch reduction measures. **Evidence** http://www.fakr.noaa.gov/npfmc/catch-shares-allocation/CDQ.html http://www.fakr.noaa.gov/npfmc/rural-outreach/rural-community-outreach-committee.html	

Clause:

9.3 States and relevant groups from the fishing industry shall encourage the development and implementation of technologies and operational methods that reduce discards of the target and non-target species catch. The use of fishing gear and practices that lead to the discarding of catch shall be discouraged and the use of fishing gear and practices that increase survival rates of escaping fish shall be promoted.

FAO CCRF 8.4.5

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑**Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	**Evidence**
9.3	**Rating determination** *Several measures are in place to reduce discards of the target and non-target species catch. The use of fishing gear and practices that lead to the discarding of catch is discouraged and the use of fishing gear and practices that increase survival rates of escaping fish is promoted (halibut excluder device, trawl sweep modifications).* Several measures are in place to reduce discards of the target and non-target species catch. Discards are addressed by the IR/IU (in the GOA) and GRS (in the BSAI) programs active for flatfish complex, coupled with observer coverage and enforcement activities. Limited access and fleet rationalization has a tremendous impact on reducing bycatch. By reducing fleet size, less gear is on the grounds and most of the effort is on profitable grounds (vessels not displaced to low CPUE area by crowding). Time and area closures also reduce target and non-target bycatch. PSC caps help fishers focus on finding areas of low bycatch so they can continue their target fisheries and avoid foreclosure. **IR/IU program** The 50 C.F.R. § 679.27 IR/IU programme has been approved in 1997. Amendment 49 required all vessels fishing for groundfish in the GOA management area to retain all shallow water flatfish beginning January 1, 2003. No discarding of whole fish is allowed, either prior to or subsequent to that species being brought on board the vessel, except as permitted in the regulations. At-sea discarding of any processed product from shallow water flatfish is also prohibited, unless required by other regulations. All shallow water flatfish (includes northern and southern rock sole) caught in the GOA must be either 1) processed at sea subject to minimum product recovery rates and/or requirements established by regulations implementing the FMP, 2) delivered in their

entirety to onshore processing plants for which similar processing requirements are implemented by State regulations.

GRS program

The purpose of the GRS is to create a retention standard for groundfish in the BSAI that would minimize discards of head and gut trawl catcher processors that are not listed AFA catcher/processor at 50 CFR 679.4(1)(2)(1). The GRS was approved by the NPFMC in conjunction with Amendment 79 in June 2003, published as a final rule on April 2007 (71 FR 17362), and became effective in 2008. The GRS requires that non-FA trawl C/P vessels retain a minimum of 85% of flatfish complex species.

Current Retention Rates for 2013

Catch data for Alaskan flatfish species through September 21, 2013. Data are from weekly production and Observer Reports (includes CDQ).

	Retained catch (mt)	Discarded catch (mt)
BSAI Alaska plaice	14462	7132
BSAI arrowtooth flounder	16236	2800
BSAI flathead sole	14550	1424
BSAI Greenland turbot	1010	336
BSAI Kamchatka flounder	6874	718
BSAI northern rock sole	54160	3118
BSAI yellowfin sole	113538	4604
GOA arrowtooth flounder	10708	4440
GOA flathead sole	2004	322
GOA rex sole	3287	55
GOA shallow water flatfish	4516	218

http://alaskafisheries.noaa.gov/2013/car230_disc_ret.csv

The BSAI Alaskan plaice fishery was closed in May of 2013 due to the initial TAC having been reached. Vessels fishing flatfish in the BSAI were prohibited from retaining Alaska plaice and forced to move their operations away from areas with high Alaska plaice catches. Lower retention rates for arrowtooth flounder in the GOA are due to the large biomass of arrowtooth available and its high occurrence as bycatch in other target fisheries.

Prohibited species catches (PSC)

Pacific halibut, Pacific herring, Pacific salmon and steelhead, king crab, and Tanner crab are prohibited species and must be avoided while fishing for groundfish and must be returned to the sea with a minimum of injury, except when their retention is required or authorized by other applicable law. Groundfish species and species under this FMP for which TAC has been achieved shall be treated in the same manner as prohibited species. When a target fishery attains a PSC limit apportionment or seasonal allocation, the bycatch zone or management area to which the PSC limit applies will be closed to

that target fishery for the remainder of the year or season.
The NPFMC is currently accepting public comment on Amendment 95 to the American Fisheries Act which will minimize the amount of Pacific halibut caught as PSC in the GOA. Regulatory reductions in limits are scheduled to begin as early as 2014, if the proposed amendment is passed.
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/halibut/GOAPSC512_exsum.pdf
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/bycatch/GOAPSCmotion612.pdf

Halibut PSC and excluder device

Though the commercial value per pound of halibut is greater than that of most target species in trawl fisheries off Alaska, halibut retention is prohibited for trawlers and individual groundfish target trawl fisheries are subject to closure if they attain either their seasonal or annual limit of allowed halibut bycatch mortality. Although all groundfish fisheries catch considerable amounts of halibut as bycatch, only longline fishermen holding quota share in the IFQ program are allowed to retain halibut in the federally managed fisheries off Alaska.

To avoid catching halibut, trawl fishermen voluntarily developed a rigid grate system and escape panel which are installed ahead of the trawl "codend". The bycatch reduction device was then formally tested by an industry trade association in conjunction with a NMFS fishing gear researcher under an experimental Fishing Permit in 1998. Results from the experiment showed the device excluded 94% of the halibut while only releasing 38% of the target flatfish. Linear simulations of the fishery were developed to estimate the potential benefit of the grate. Results indicated that fleet-wide use of the grate would result in a 171% increase in the duration of the fishery, a 61% increase in target flatfish catch, and a 71% reduction in overall halibut bycatch. Other simulations demonstrated a high incentive for individual noncompliance. Factors affecting incentives for voluntary or regulatory use of bycatch reduction devices were explored in detail within the context of the highly regulated flatfish fisheries under federal management off Alaska. Halibut excluder usage occurs in many Bering Sea bottom trawl fisheries and has been trialled in the Gulf of Alaska, currently used by some vessels.
http://www.mcafoundation.org/doc/Final_halibut_excluder_for_GOA_EFP_(06-03-2009)_report%20GAUVIN.pdf

Bycatch controls for Crabs

BSAI

Limits on the bycatch of prohibited crab species have been established in some Bering Sea fisheries, to reduce the impacts on these species traditionally harvested by other gear types. When bycatch limits are reached, fisheries responsible for the bycatch are closed for the rest of the season, or are prohibited from fishing in areas with historically high bycatch rates. Area closures have also been implemented throughout the BSAI and GOA to protect crab. In addition to these tools, gear restrictions and other regulations have been implemented to reduce crab bycatch (See clause 8.4.2 for further discussion). For example:

	• In 2011, a trawl sweep modification requirement was implemented for vessels participating in the Bering Sea flatfish fishery, to raise the trawl sweep off the seafloor. Research has demonstrated that this gear modification reduces crab bycatch and unobserved mortality of red king crab, Tanner crab, and snow crab. GOA Bycatch of crabs is relatively low in GOA fisheries compared to the BSAI. However, area closures have been adopted by the NPFMC to protect both red king crab and Tanner crab in the GOA. PSC limits for crab species in GOA groundfish fisheries have not been established to date. In addition to these tools, gear restrictions and other regulations have been implemented to reduce crab bycatch (See clause 8.4.2. for further discussion). For example: • In 2012, Amendment 89 to the FMP for the GOA Management Plan has been proposed to require trawl sweep modification in the flatfish fishery in the Central GOA. The stakeholder comments period on the proposed rule that would implement Amendment 89 to the FMP for Groundfish of the GOA ended on July 17, 2013. **Evidence** http://alaskafisheries.noaa.gov/analyses/groundfish/rireairfa_grs1212.pdf http://alaskafisheries.noaa.gov/sustainablefisheries/amds/default.htm http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf http://www.touchngo.com/lglcntr/akstats/aac/title05/chapter028/section070.htm http://www.st.nmfs.noaa.gov/st5/abstracts/The_Effectiveness_of_a_Halibut_Excluder_Device_and_Consideration_of_Tradeoffs_in_its_Application.html http://aquaticcommons.org/9781/1/mfr6225.pdf http://alaskafisheries.noaa.gov/sustainablefisheries/amds/amd89/amd89trawlearirirfa.pdf http://www.fakr.noaa.gov/regs/679b24.pdf	

Clause: **9.4 Technologies, materials and operational methods shall be applied to minimize the loss of fishing gear and the ghost fishing effects of lost or abandoned fishing gear.** ***FAO CCRF 8.4.6, 8.4.1***		
Evidence adequacy rating:		
☑**High**	☐ **Medium**	☐ **Low**

☑ **Full Conformity**	☐ **Minor Non-conformity**	☐ **Major Non-conformity**
☐ **Critical Non-conformity**		

Clause:	**Evidence**
9.4	**Rating determination** *Technology, materials and operational methods (LLP) are applied to minimize the deployment/loss of fishing gear. Measures have been implemented to minimize the ghost fishing effects of lost or abandoned fishing gear.* With the implementation of the LLP program for groundfish fisheries, bycatch and waste were reduced because the race for fish was eliminated, allowing for more selective fishing practices and significant reductions in actual gear deployment/loss. Gillnets for groundfish have been prohibited to prevent ghost fishing and bycatch of non-target species. The loss of trawl gear is very seldom and when it occurs, it is promptly retrieved, given its economic value. **Evidence** http://alaskafisheries.noaa.gov/ram/llp.htm http://alaskafisheries.noaa.gov/npfmc/bycatch-controls/CrabBycatch.html

Clause:

9.5 **There shall be a requirement that fishing gear, methods and practices where practicable, are sufficiently selective as to minimize waste, discards, and catch of non-target species - both fish and non-fish species and impacts on associated or dependent species.**

FAO CCRF 7.6.9, 7.2.2

Evidence adequacy rating:

☑**High**	☐ **Medium**	☐ **Low**

☑ **Full Conformity**	☐ **Minor Non-conformity**	☐ **Major Non-conformity**
☐ **Critical Non-conformity**		

Clause:	**Evidence**
9.5	**Rating determination** *Reduction measures in terms of gear modifications for trawls and longline gears are*

implemented and are efficient in minimizing bycatch of non-target species, both fish and non-fish species.

Discards and bycatch are regularly observed and reported in the SAFE reports. Recent bycatch and discard levels are given in **clause 13.1.2**. Reduction measures in terms of gear modifications for trawls and long-lines are implemented for bycatch of crab, salmon, halibut and seabirds. IR/IU and GRS programs have been improved for discard avoidance. See also Table 8.6 for further details on 2013 discard rates.

PSC limits are in force resulting in fishery closures when catches exceed limits. Additionally bycatch species are assessed to determine PSC limits. Additional regulations include conservation measures that temporally and spatially limit fishing effort around areas important to marine mammals. NMFS uses Steller sea lion protection measures (SSLPM) disperse fishing over time and area to protect against potential competition for important Steller sea lion prey species near rookeries and important haulouts.

For further information, please refer to Clauses 8.4.1, 8.4.2, and 9.3.

Evidence

http://alaskafisheries.noaa.gov/analyses/groundfish/rireairfa_grs1212.pdf
http://alaskafisheries.noaa.gov/sustainablefisheries/amds/default.htm
http://www.alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAI.pdf
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf
http://www.fakr.noaa.gov/regs/679b24.pdf
http://alaskafisheries.noaa.gov/protectedresources/stellers/habitat.htm

Clause:

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

FAO CCRF 8.5.1

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	**Evidence**

9.6	There is no evidence of circumvention of regulations relating to fishing selectivity and related impacts. Information from the USCG reports the flatfish complex fisheries have minimal violation rates. **Please see clause 11.1 for further information.**	

Clause:

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

FAO CCRF 8.5.4

Evidence adequacy rating:

☐**High** ☐ **Medium** ☐ **Low**

☐ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	**Evidence**	
9.7	Flatfish complex fisheries in Alaska are not considered transboundary or shared resources. Gear modifications result from an intense collaboration and consultation process between the fishing industry, groundfish fisheries management and research institutions. Research findings are peer-reviewed and published as evidence of collaboration between relevant institutions.	

Clause:

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

FAO CCRF 8.5.3, 12.10

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity**	☐ **Minor Non-conformity**	☐ **Major Non-conformity**
☐ **Critical Non-conformity**		

Clause:	**Evidence**	
9.8	**Rating determination** *Relevant institutions involved in the fishery collaborate in developing standard methodologies for research into fishing gear selectivity, fishing methods and strategies, and on the behaviour of target and non-target species in relation to such fishing gear as an aid for management decisions and with a view to minimizing non-utilized catches.* Gear modifications resulted from an intense collaboration and consultation process between the fishing industry, groundfish fisheries management and research institutions. Research findings are peer-reviewed and published as evidence of collaboration between relevant institutions. **For further information and evidence, please refer to clauses 8.4.1, 8.4.2, and 9.3 and 9.7.**	

Clause:

9.9 **Policies shall be developed for increasing stock populations and enhancing fishing opportunities through the use of artificial structures, placed with due regard to the safety of navigation.**

FAO CCRF 8.11.1

9.9.1 **States shall ensure that, when selecting the materials to be used in the creation of artificial reefs as well as when selecting the geographical location of such artificial reefs, the provisions of relevant international conventions concerning the environment and safety of navigation are observed**.

FAO CCRF 8.11.2

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

FAO CCRF 8.11.3

Evidence adequacy rating:		
☐**High**	☐ **Medium**	☐ **Low**
☐ **Full Conformity**	☐ **Minor Non-conformity**	☐ **Major Non-conformity**
☐ **Critical Non-conformity**		

Clause:	Evidence	
9.9	**Not Applicable.** The flatfish complex resources in Alaska are productive and not in an overfished condition. The habitat throughout Alaska is pristine and conducive to productive flatfish complex resources without the addition of artificial reefs and aggregation devices.	

Evidence adequacy rating:		
☐**High**	☐ **Medium**	☐ **Low**
☐ **Full Conformity**	☐ **Minor Non-conformity**	☐ **Major Non-conformity**
☐ **Critical Non-conformity**		

Clause:	Evidence	
9.9.1	**Not Applicable.** The flatfish complex resources in Alaska are productive and not in an overfished condition. The habitat throughout Alaska is pristine and conducive to productive flatfish complex resources without the addition of artificial reefs and aggregation devices.	

Evidence adequacy rating:		
☑**High**	☐ **Medium**	☐ **Low**
☑ **Full Conformity**	☐ **Minor Non-conformity**	☐ **Major Non-conformity**
☐ **Critical Non-conformity**		

Clause:	Evidence	
9.9.2	**Rating Determination** *Should it be needed, there is an established management system for artificial reefs.*	

	Construction and deployment of reefs and enhancement devices requires previous consultation and evaluation, and approval by one or more of the following agencies: NOAA's National Marine Fisheries Center - Fisheries Restoration Center Alaska Department of Fish and Game – Restoration and Enhancement Alaska Department of Environmental Conservation - Alaska Clean Water Actions US Environmental Protection Agency – River Corridor and Wetland Restoration Coastal America – Regional Conservation Projects US Fish and Wildlife Service – Partners for Fish and Wildlife Program and Alaska Coastal Program Any project with potential for considerable impact on the natural environment will also be required to go through an environmental and socio-economic NEPA analysis. This is well explained under Fundamental clause 2 of this report. Also, the NPFMC and BOF manage fisheries in Alaska and within their public process they offer fishermen the opportunity to get involved and participate in the various decision making processes relevant to fisheries management.	

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*						
Confidence Ratings	**Low**	**0 out of 3**	**Medium**	**0 out of 3**	**High**	**3 out of 3**

Clause:

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

FAO CCRF 8.1.7, 8.4.1

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	**Evidence**
10.1	**Rating determination** *The North Pacific Fishing Vessel Owners association (NPFVO) provides a large and diverse training program that many of the professional crew members that participate in the Alaska flatfish fisheries 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 crew members that participate in the Alaska flatfish fisheries 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#ixzz1Xt1ESQqh. 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-sharply.html#ixzz1Xt1ESQqh http://www.sfos.uaf.edu/pcc/projects/07/brown/	

Clause:

10.2 States, with the assistance of relevant international organizations, shall endeavour to ensure through education and training that all those engaged in fishing operations be given information on the most important provisions of this Code, as well as provisions of relevant international conventions and applicable environmental and other standards that are essential to ensure responsible fishing operations.

FAO CCRF 8.1.10

Evidence adequacy rating:

☑High **☐ Medium** **☐ Low**

☑ Full Conformity **☐ Minor Non-conformity** **☐ Major Non-conformity**

☐ Critical Non-conformity

Clause:	**Evidence**	
10.2	**Rating determination** *The MAP provides education and training in several sectors, including fisheries*	

	management, in the forms of seminars and workshops. While there is not much education and training which explicitly deals with the Code, the Alaska fishery management process itself is an excellent de facto educational process. The MAP provides education and training in several sectors, including fisheries management, in the forms of seminars and workshops. 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 (eg- MSA), to seafood markets & marketing. The target audience for these Summits is young Alaskans from coastal communities. The 2013 summit will be hosted in Anchorage, Alaska, from December 10th to the 12th. The summit provides three days of training in the land-based aspects of running a fishing operation: marketing, business management, the fisheries regulatory process, and the science impacting fisheries management, a visit to the Anchorage office of the Alaska Department of Fish & Game, where participants will talk with fisheries managers and meet researchers using cutting-edge genetic science to better understand Alaska salmon runs and other important stocks. The 2012 Summit covered the following points: • **Business of Fishing - A Banker's Perspective:** Casey Campbell, Wells Fargo • **Insurance Tools to Reduce Risk:** Christopher Trainer, Chinook Insurance Group • **Financial Record Keeping and Taxes**: Bruce Gabrys, CPA, F/V *Blue Chip II* • **Alaska's Seafood Markets at Home and Abroad:** Chris McDowell, McDowell Group, F/V Sumo Heather Hardcastle, Taku River Reds • **Introduction to the History of Alaska Fisheries Management:** Phil Smith, Smith Consulting, NOAA Fisheries (retired) • **The Role of Science in Fisheries Management** Gordon Kruse, UAF School of Fisheries and Ocean Sciences • **Climate Change, Ocean Acidification** - **What it Means to Alaska's Fisheries:** Michael Sigler, NOAA Alaska Fisheries Science Center • **Where and how a young fisherman can get involved:** Cora Campbell, Commissioner, Alaska Department of Fish and Game • **Public Speaking Training: Making your Testimony Count:** Barclay Kopchak, Prince William Sound Community College • **Introduction to Federal management processes:** Dave Benton, past chairman, North Pacific Fishery Management Council • **Group discussion on participants' issues and report back to established fishermen:** Eric Jordan, F/V *I Gotta* Jim and Rhonda Hubbard, F/V *Kruzof* Paula Cullenberg, Bristol Bay setnetter Sam Cotten, F/V *Sea Maid* • **Introduction to the Alaska Legislature:** Erin Harrington, Staff to Rep. Alan Austerman • **The Alaska Legislature and the Fishing Industry:** Rep. Alan Austerman, R-Kodiak, House Majority Leader, Rep. Bill Thomas, R-Klukwan, Co-Chair, House Finance Committee; Rep. Bryce Edgmon, D-Dillingham, Member, House Finance Committee; Rep. Paul Seaton, R-Homer, Co-Chair, House Resources Committee	

	• **House Fisheries Committee Hearing:** Public Hearing on HCR18, Alaska House Special Committee of Fisheries • **USCG-Certified Drill Conductor Course:** Alaska Marine Safety Education Association. This 10-hour practical, hands on course meets the USCG safety training requirements for commercial fishermen operating documented vessels operating beyond the Boundary Line. • **Alaska Fishing Business Success: A Deeper Look:** Join Bruce Gabrys CPA, MBA F/V Blue Chip, Jim Hubbard F/V Kruzof and Chris Trainer Chinook Insurance in a fast-paced workshop covering the four building blocks of a successful fishing business: fishing business risk assessment, insurance, recordkeeping, and taxes. • **Nonprofit Boards: Understanding the Rules of the Road:** Joining a board, board member roles and responsibilities, how to effectively participate in the non-profit verse advocacy world – all within the context of boards commercial fishermen need to join to strengthen business and community ties. While there is not much education and training which explicitly deals with the Code, the Alaska fishery management process itself is an excellent *de facto* educational process. Anyone who seeks to understand Alaska's fisheries management process unavoidably winds up becoming very familiar with the Code. **Evidence** http://seagrant.uaf.edu/map/ http://seagrant.uaf.edu/map/workshops/2012/ayfs/agenda.php http://sustainability.alaskaseafood.org/fao	

Clause:

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

FAO CCRF 8.1.8

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	**Evidence**	
10.3	**Rating determination** *Alaska maintains records of fishers (RAM, CFEC), and whenever possible, contain*	

	information on their service and qualifications, including certificates of competency, in accordance with national laws. The RAM is responsible for managing Alaska Region permit programs, including those that limit access to the Federally-managed fisheries of the North Pacific. RAM responsibilities include: providing program information to the public, determining eligibility and issuing permits, processing transfers, collecting landing fees and related activities. The CFEC helps to conserve and maintain the economic health of Alaska's commercial fisheries by limiting the number of participating fishers. CFEC issues permits and vessel licenses to qualified individuals in both limited and unlimited state waters fisheries, and provides due process hearings and appeals as and when needed. The RAM division as well as the CFEC maintain on their websites, all the fishermen records for which fishing permits are issued (http://www.fakr.noaa.gov/ram/ , http://www.cfec.state.ak.us/).	

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***					
Confidence Ratings	**Low**	**0 out of 6**	**Medium**	**0 out of 6**	**High**	**3 out of 6**

11.1.	**Effective mechanisms shall be established for fisheries monitoring, surveillance, control and enforcement measures including, where appropriate, observer programmes, inspection schemes and vessel monitoring systems, to ensure compliance with the conservation and management measures for the fishery in question.** ***FAO CCRF 7.1.7 Others 7.7.3, 8.1.1*** ***Eco 29.5***
Evidence adequacy rating: ☑**High** ☐ **Medium** ☐ **Low**	
☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**	
Clause:	**Evidence**
11.1	**Rating determination** *Management of the flatfish fisheries in Alaska by the NPFMC 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 boardings and inspection activities and dockside landing inspections.* **Observer program** Details of the observer program and coverage for the BSAI and GOA flatfish fisheries are provided under **Clause 4.2** of this report. Coverage in the BSAI is virtually 100% but less in the GOA. **VMS requirements**

On January 8, 2002, an emergency interim rule (67 FR 956) was issued by NMFS to implement Steller sea lion protection measures. Vessels that catch flatfish also catch Pacific cod since it found in similar fishing grounds and they have quota for it. 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.

Bering Sea/Aleutian Islands Flatfish

Flatfish fisheries in the Bering Sea are primarily targeted by trawl vessels, although there are some longliners that also target various flatfish species. The active fleet size of vessels targeting these species is approximately 87 vessels each year, and the Coast Guard attempts to board 18 of these vessels annually. This fleet has a VMS requirement, which makes them relatively easy to track.

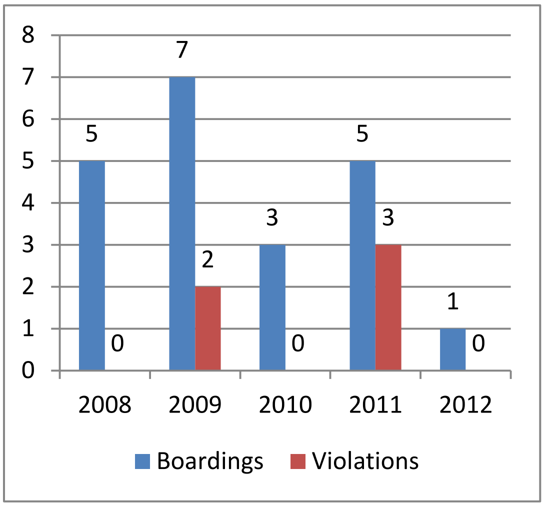
With regards to the question of checking gear, vessels using bottom contact trawl gear in the Bering Sea are required to have elevating devices installed on their trawl sweeps to raise them off the sea floor to reduce interactions with other species. To date, since the implementation of this requirement, there have been no violations detected by at-sea boardings of this requirement. This is the only gear measurement requirement that is in place.

From fiscal year 2008 through the end of fiscal year 2012, the Coast Guard boarded 90 vessels targeting flatfish in the Bering Sea with 7 violations detected on 7 vessels, providing a detected violation rate of 7.77%. A detail of the number of boardings and violations by fiscal year is provided below.

Boardings/Fiscal Year:
2012 – 17 with 2 violations for logbook errors
2011 – 20 with 1 violation for logbook errors
2010 – 20 Boardings with 2 violations
1) Boarding Ladder
2) Case weight discrepancies

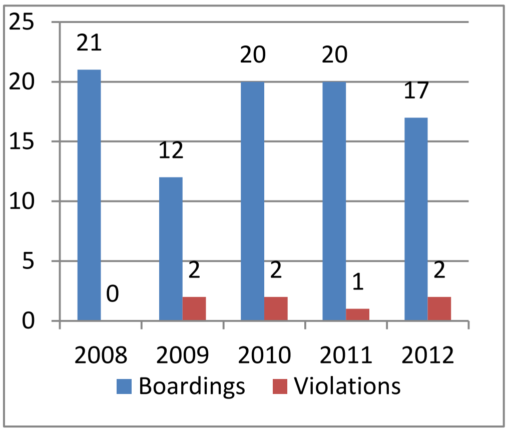
2009 – 12 Boardings 2 violations
1) Boarding Ladder
2) Illegal fishing in the Bristol Bay No Trawl area

2008 – 21 with 0 violations



Gulf of Alaska Flatfish

Flatfish fisheries in the Gulf of Alaska are targeted primarily by trawl vessels. The active fleet size of vessels targeting these species is approximately 85 vessels each year, and the Coast Guard attempts to board 17 of these vessels annually. This fleet has a VMS requirement, which makes them relatively easy to track. Currently, there are no gear requirements for this fishery, although there are provisions being put in place to mimic the Bering Sea trawl sweep elevating devices. Given the success of that problem and some of the gains realized by the fishermen for using these devices, there are not expected significant violations associated with implementation of these regulations. From fiscal year 2008 through the end of fiscal year 2012, the Coast Guard boarded 21 vessels targeting flatfish in the Gulf of Alaska with 5 violations noted on two vessels, providing a detected violation rate of 9.52%. A detail of the number of boardings and violations by fiscal year is provided below.



Boardings /Fiscal Year:

2012 – 1 with 0 violations

2011 – 5 with 3 violations issued (all to the same vessel)

1) Exceeded the maximum retainable allowance of bycatch species
2) Logbook errors
3) Failure to submit logbooks

2010 – 3 Boardings with 0 violations

2009 – 7 Boardings with 2 violations issued to one vessel

1) Minor logbook errors
2) Boarding Ladder

2008 – 5 with 0 violations

Stated-managed waters

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.

http://www.nmfs.noaa.gov/ole/index.html
http://dps.alaska.gov/AWT/marine.aspx

Clause:		
11.2 Fishing vessels shall not be allowed to operate on the resource in question without specific authorization. ***FAO CCRF 7.6.2 Other 8.1.2, 8.2.1***		
Evidence adequacy rating: **☑High**	**☐ Medium**	**☐ Low**
☑ Full Conformity	**☐ Minor Non-conformity**	**☐ Major Non-conformity**
☐ Critical Non-conformity		

Clause:	**Evidence**	
11.2	**Rating determination** *Fishing vessels are not allowed to operate on the resource in question without specific authorization.* Every fishing vessel targeting flatfish in Alaska is required to have a federal permit. See the NMFS's RAM websites for more details (http://www.fakr.noaa.gov/ram/).	

Clause:

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

FAO CCRF 8.1.4

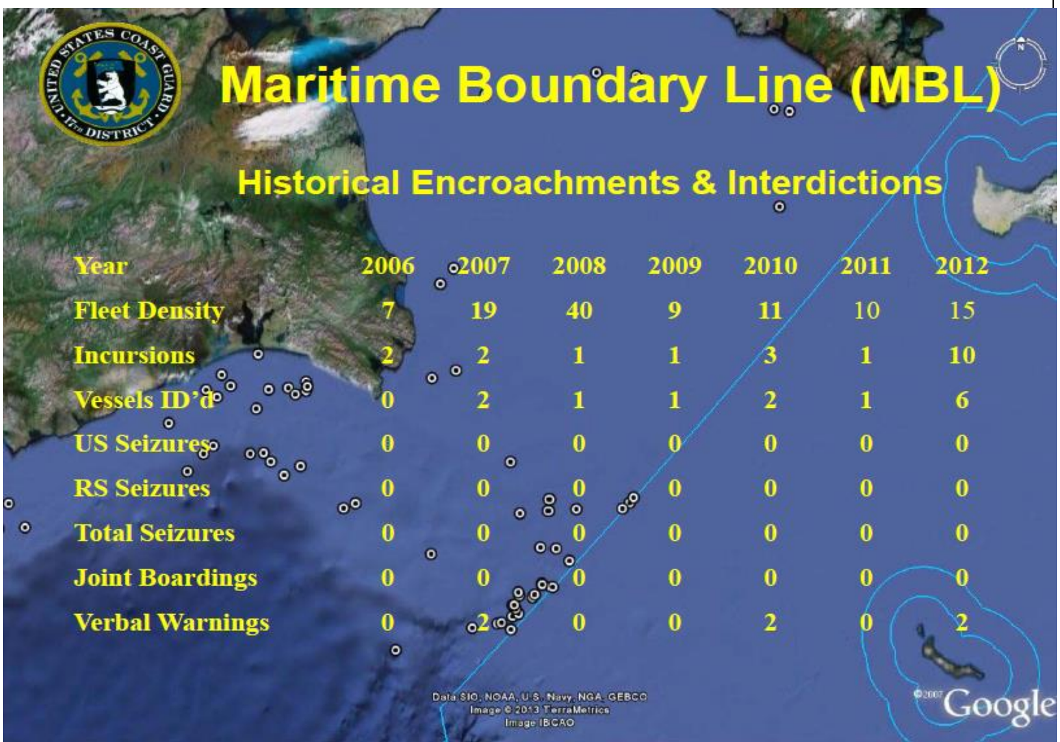
11.3.1 States which are members of or participants in sub-regional or regional fisheries management organizations or arrangements shall implement internationally agreed measures adopted in the framework of such organizations or arrangements and consistent with international law to deter the activities of vessels flying the flag of non-members or non-participants which engage in activities which undermine the effectiveness of conservation and management measures established by such organizations or arrangements.

FAO CCRF 7.7.5, 8.3.1

Evidence adequacy rating:

☑High	☐ Medium	☐ Low
☑ **Full Conformity**	☐ **Minor Non-conformity**	☐ **Major Non-conformity**
☐ **Critical Non-conformity**		

Clause:	Evidence
11.3	The flatfish fisheries of Alaska under assessment here are harvested exclusively within the Alaska EEZ only. Those fisheries are not part of any international agreement or part of a framework of sub-regional or regional fisheries management organizations or arrangements. Flatfish fisheries in international waters abutting the GOA or BSAI EEZ occur in northwestern British Columbia and in Russian waters across the Bering Sea Convention Line. Those fisheries are regulated by their own Governments. The U.S. and Russia have signed an Agreement on Mutual Fisheries Relations (first signed in 1988) for conservation, management and optimal utilization of shared fisheries resources between both nations. The agreement is not specific to flatfish alone, but does call for cooperation, shared science, conservation and management of fisheries resources. A joint statement reaffirming the agreement between the U.S. and Russia was issued in April, 2013. It identifies combating global Illegal Unreported and Unregulated (IUU) fishing as the first of three major areas of future cooperation. The U.S. Coast Guard patrols the international area known as the "Donut Hole", in international waters, which is now closed to fishing, and the Maritime Boundary Line between the U.S. EEZ and Russian waters.



	http://www.nmfs.noaa.gov/ia/slider_stories/2013/04/us_russia.html http://www.nmfs.noaa.gov/ia/slider_stories/2013/04/agreement.pdf

Evidence adequacy rating:

☐**High** ☐ **Medium** ☐ **Low**

☐ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	**Evidence**
11.3.1	The Alaska flatfish fisheries under assessment here are harvested exclusively within the Alaska EEZ only. These fisheries are not part of any international agreement or part of a framework of sub-regional or regional fisheries management organizations or arrangements. However, the U.S. Coast Guard participates in multiple international engagements to control illegal unreported and unregulated fishing, document the violation of border agreements, and support U.S. fisheries interests.

Clause:

11..4 Flag States shall ensure that no fishing vessels entitled to fly their flag fish on the high seas or in waters under the jurisdiction of other States unless such vessels have been issued with a Certificate of Registry and have been authorized to fish by the competent authorities. Such vessels shall carry on board the Certificate of Registry and their authorization to fish.

FAO CCRF 8.2.2

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

FAO CCRF 8.2.3

Evidence adequacy rating:

☐**High** ☐ **Medium** ☐ **Low**

☐ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	**Evidence**	
11.4	**Not Applicable.** The Alaska flatfish harvests are conducted in Alaskan waters by American vessels. All of these vessels are issued certificate of registry. No foreign fleet is allowed to fish in the U.S. EEZ. All fishing vessels must be at least 75% U.S. ownership.	

Evidence adequacy rating:

☐**High** ☐ **Medium** ☐ **Low**

☐ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	**Evidence**	
11.4.1	**Not Applicable.** The Alaskan flatfish harvests are conducted in Alaskan waters by American vessels. All US-flagged vessels are required to comply with U.S. marking requirements, and US-flagged flatfish vessels do not hold authorizations to fish in Canadian or Russian waters.	

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***				
Confidence Ratings	**Low**	**0 out of 4**	**Medium**	**0 out of 4**	**High**	**2 out of 4**

Clause:

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

12.1.1 Sanctions shall be in force that affects authorization to fish and/or to serve as masters or officers of a fishing vessel, in the event of non-compliance with conservation and management measures.

FAO CCRF 7.7.2/8.1.9/8.2.7

Evidence adequacy rating:

☑ **High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	**Evidence**	
12.1	***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
VIOLATIONS REGARDING GEAR	
Minor-Moderate Violations 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.	II - III
Moderate Violations Example: Fishing for Western Pacific bottomfish management unit species (MUS) using prohibited gear.	IV
VIOLATIONS REGARDING THE FACILITATION OF ENFORCEMENT, SCIENTIFIC MONITORS OR OBSERVERS	
Minor - Moderate Violations 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.	II-III

Magnuson-Stevens Penalty Matrix

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

http://www.nmfs.noaa.gov/sfa/reg_svcs/Councils/ccc_2011/Tab%20L%20-%20Enforcement%20Issues/Enforcement%20Issues.pdf

Also, 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

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause: **Evidence**

12.1.1	**Rating determination** *Sanctions are in force that affects authorization to fish and/or to serve as masters or officers of a fishing vessel, in the event of non-compliance with conservation and management measures.* Please see evidence in section 12.1 above and details provided in the "Policy for the Assessment of Civil Administrative Penalties and Permit Sanctions" issued by NOAA Office of the General Counsel – Enforcement and Litigation - March 16, 2011. This Policy provides guidance for the assessment of civil administrative penalties and permit sanctions under the statutes and regulations enforced by NOAA. The purpose of this Policy is to ensure that: (1) civil administrative penalties and permit sanctions are assessed in accordance with the laws that NOAA enforces in a fair and consistent manner; (2) penalties and permit sanctions are appropriate for the gravity of the violation; (3) penalties and permit sanctions are sufficient to deter both individual violators and the regulated community as a whole from committing violations; (4) economic incentives for noncompliance are eliminated; and (5) compliance is expeditiously achieved and maintained to protect natural resources. Under this Policy, NOAA expects to improve consistency at a national level, provide greater predictability for the regulated community and the public, improve transparency in enforcement, and more effectively protect natural resources. For significant violations, the NOAA attorney may recommend charges under NOAA's civil administrative process (see 15 C.F.R. Part 904), through issuance of a Notice of Violation and Assessment of a penalty (NOVA), Notice of Permit Sanction (NOPS), Notice of Intent to Deny Permit (NIDP), or some combination thereof. Alternatively, the NOAA attorney may recommend that there is a violation of a criminal provision that is sufficiently significant to warrant referral to a U.S. Attorney's office for criminal prosecution. http://www.noaanews.noaa.gov/stories2011/pdfs/Penalty%20Policy%20--%20FINAL.pdf At each of the five annual NPFMC meetings, representatives of the USCG, OLE, NMFS, ADFG and AWT meet in an Enforcement Meeting where enforcement concerns with plan amendments are discussed and materials relating to those concerns are prepared for the NPFMC. During staff reports to the NPFMC the USCG and the OLE present information about vessel boardings and enforcement violations by the fishing industry that occurred since the last NPFMC meeting. http://www.fakr.noaa.gov/npfmc/resources-publications/summary-reports.html	

Clause:

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

12.2.1 Sanctions applicable in respect of violations and illegal activities shall be adequate in severity to be effective in securing compliance and discouraging violations wherever they occur.

FAO CCRF 8.2.7

Evidence adequacy rating:

☐**High** ☐ **Medium** ☐ **Low**

☐ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	**Evidence**	
12.2	**Not applicable.** The entire flatfish harvests are conducted in Alaskan waters by American vessels. US exercises flag-state authority over fishing vessels wherever they may be and US-flagged vessels found to violate international fishing agreements are subject to the same sort of penalties applied to vessels fishing within the EEZ.	

Evidence adequacy rating:

☐**High** ☐ **Medium** ☐ **Low**

☐ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	**Evidence**	
12.2.1	**Not applicable.** The entire flatfish harvests are conducted in Alaskan waters by American vessels. In the case that US-flagged vessels are found to violate international fishing agreements, they are subject to the same sort of penalties applied to vessels fishing within the EEZ.	

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***						
Confidence Ratings	**Low**	**0 out of 13**	**Medium**	**0 out of 13**	**High**	**13 out of 13**

Clause:

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

FAO CCRF 7.2.3

13.1.1 Adverse environmental impacts on the resources from human activities are assessed and, where appropriate, corrected.

FAO CCRF 7.2.2

13.1.2 The most probable adverse impacts of the fishery on the ecosystem/environment shall be considered, taking into account available scientific information, and local knowledge.

Eco 31

13.1.3 In the absence of specific information on the ecosystem impacts of fishing for the unit of certification, generic evidence based on similar fishery situations can be used for fisheries with low risk of severe adverse impact. However, the greater the risk the more specific evidence is necessary to ascertain the adequacy of mitigation measures.

Eco 30.4, 31.4

13.1.4 Impacts that are likely to have serious consequences shall be addressed. This may take the form of an immediate management response or a further analysis of the identified risk.

Eco 29.3,29.4, 31

Evidence adequacy rating:

☑**High**	☐ **Medium**	☐ **Low**
☑ **Full Conformity**	☐ **Minor Non-conformity**	☐ **Major Non-conformity**
☐ **Critical Non-conformity**		

Clause:	**Evidence**
13.1	**Rating determination** *The NPFMC, NOAA/NMFS, and other institutions interested in the North Pacific conduct assessments and research on environmental factors concerning flatfish, species associated with and dependent on flatfish and their habitats. Findings and conclusions are published in SAFE reports, annual Ecosystem Considerations documents, and other research reports. The SAFE documents for BSAI and GOA flatfish summarize ecosystem considerations for the stocks. They include sections for 1) Ecosystem effects on the stock; and 2) Effects of the flatfish fisheries on the ecosystem. Biomass of both flatfish prey and predators appears to be stable or increasing in recent years. Habitat interactions of this fishery are considered and managed in multiple ways.* The SAFE reports summarize best available scientific information, including the outcomes of SEIS, and use it to recommend management actions for the coming year, primarily fishing quotas. Over the last 25 years, groundfish fisheries regulations have been modified numerous times to address environmental and economic issues. Such actions include the establishment of: • Bottom trawl closure areas in the GOA and BSAI based on historic king crab abundance to reduce bycatch and enhance the recovery of depressed crab stocks. • A constraining cap on optimum yield in the Bering Sea and Aleutian Islands and GOA as a buffer against uncertainty. • A domestic observer program for the purposes of collecting important fishery information and to provide monitoring compliance with regulations and license conditions. • Overfishing definitions to protect target groundfish stocks, which reduce the fishing mortality rate when stocks are at low biomass levels. • A moratorium on new entry into the groundfish fisheries. • Specific allocations to inshore and offshore processing sectors to prevent the preemption of and provide economic stability to Alaska coastal communities. • Closure areas around Steller sea lion rookeries to protect these marine mammals from adverse effects of commercial groundfish fishing. • An individual fishing quota (IFQ) Program for the sablefish fishery. • Allocations of flatfish quota among the various gear types to promote economic stability.

	• Closed areas to protect sensitive marine habitat. **SAFE documents** SAFE documents for the BSAI and GOA flatfish summarize ecosystem considerations for the stocks. They include sections for 1) Ecosystem effects on the stock; and 2) Effects of the flatfish fisheries 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 Resource Ecology and Ecosystem Modeling (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, the section has included information on indicators of ecosystem status and trends, and ecosystem-based management performance measures (http://www.afsc.noaa.gov/REFM/docs/2012/ecosystem.pdf). http://access.afsc.noaa.gov/reem/ecoweb/ **Ecosystem Effects on Alaskan flatfish stocks** The prey and predators of BSAI and GOA flatfish are well understood. The composition of most flatfish prey varies by species, time and area. NOAA's AFSC REFM division has done extensive diet studies on multiple species occurring in Alaska's commercial fisheries. ● **Alaska plaice** Alaska plaice predate primarily on polychaetes and amphipods. Alaska plaice contribute a relatively small portion of the diets of Pacific cod, Pacific halibut, and yellowfin sole as compared with other flatfish. The habitats occupied by Alaska plaice are influenced by temperature, which has shown considerable variation in the eastern Bering Sea in recent years. For example, the timing of spawning and advection to nursery areas are thought to be affected by environmental variation. ● **BSAI Arrowtooth flounder** In the BSAI, arrowtooth flounder predate on juvenile pollock (47% of their overall diet), adult pollock (19%) and euphausiids (9%). Unlike the Gulf of Alaska however, they are not at the top of the food chain on the eastern Bering Sea shelf. Arrowtooth flounder in the Bering Sea are an occasional prey in the diets of groundfish in the Bering Sea and are eaten by Pacific cod, walleye pollock, Alaska skates, and sleeper sharks. However, given the large biomass of these species as juveniles in the Bering Sea overall, these occasionally recorded events translate into considerable total mortality for the arrowtooth flounder population in the Bering Sea ecosystem. Using the year 1991 as a baseline, the top three predators on arrowtooth flounder >30 cm, by relative importance, are walleye pollock (29% of the total mortality), Alaska skate (21%) and sleeper shark (11%). After these predators the next highest sources of mortality (1991) on arrowtooth flounder are four fisheries, the flatfish trawl (7%) pollock trawl (6%),	

cod trawl (4) and the cod longline fishery (2%). In the Aleutian Islands, sleeper sharks are the primary predators on arrowtooth flounder adults, while Pacific cod are the primary predator on arrowtooth flounder juveniles.

The three major predators listed above do not depend on arrowtooth flounder in terms of their total consumption. Arrowtooth flounder only comprise approximately 2% of the diet of Bering Sea Pollock, 3% of Alaska skate and 12% of the sleeper shark diet. Therefore it is not expected that a change in arrowtooth flounder would have a great effect on these species' prey availability, while decreases in the large adults of these species might reduce overall predation mortality experienced by arrowtooth flounder.

Arrowtooth flounder are an important ecosystem component as predators. This is particularly relevant as this stock assessment indicates that they are now increasing rapidly in abundance in the eastern Bering Sea. Nearly half of the adult diet is comprised of juvenile pollock (47%) followed by adult pollock (19%) and euphausids (9%). This is in marked contrast to their diet in the Gulf of Alaska, where pollock are a relatively small percentage of their forage base, which instead consists primarily of shrimp.

The balance of the arrowtooth flounder diet in the eastern Bering Sea includes eelpouts, shrimp, herring, eulachon and flathead sole juveniles. Diets of juvenile arrowtooth flounder are more similar to other Bering Sea shelf flatfish species than to arrowtooth flounder adults. Nonpandalid shrimp compose 42% of the total consumption, euphausids 25%, juvenile Pollock 22% and then polychaetes, sculpins and mysids accounting for another 10%. With the exception of juvenile pollock, juvenile arrowtooth flounder exhibit a stronger benthic pathway in their diet than adults. In the Aleutian Islands, arrowtooth flounder feed on the range of available forage fishes, including myctophids, Atka mackerel, and pollock. They are an important predator on Atka mackerel juveniles, making up 23% of the assumed natural mortality of this species.

In terms of the size of pollock consumed, arrowtooth flounder consume a greater number of Pollock between the range of 15-25 cm fork length than do Pacific cod or Pacific halibut, which consume primarily adult fish and fish smaller than 15 cm.

● GOA Arrowtooth flounder

Although GOA arrowtooth flounder are of limited economic importance as a fisheries product, trophic studies suggest they are an important component in the dynamics of the Gulf of Alaska benthic ecosystem. The majority of the prey by weight of arrowtooth larger than 40 cm was pollock, the remainder consisting of herring, capelin, euphausids, shrimp and cephalopods (Yang 1993). The percent of pollock in the diet of arrowtooth flounder increases for sizes greater than 40 cm. Arrowtooth flounder 15 cm to 30 cm consume mostly shrimp, capelin, euphausiids and herring, with small amounts of pollock and other miscellaneous fish. Groundfish predators include Pacific cod and halibut.

● BSAI Flathead sole

Stomach content data collected in the early 1990's, indicates that flathead sole occupy an intermediate trophic level in the eastern Bering Sea ecosystem. They feed upon a variety of species, including juvenile walleye pollock and other miscellaneous fish, brittlestars, polychaetes, and crustaceans. The proportion of the diet composed of fish appears to increase with flathead sole size.

The dominant predators of adult flathead sole are Pacific cod and walleye pollock. Pacific cod, along with skates, also account for most of the predation upon flathead sole less than 5 cm (Lang et al. 2003). Arrowtooth flounder, Greenland turbot, walleye pollock, and Pacific halibut comprised other predators.

The habitats occupied by flathead sole are influenced by temperature, which has shown considerable variation in the eastern Bering Sea in recent years.

● **GOA Flathead sole**

Flathead sole in the Gulf of Alaska occupy an intermediate trophic level as both juvenile and adults. Pandalid shrimp and brittle stars were the most important prey for adult flathead sole in the Gulf of Alaska, while euphausids and mysids constituted the most important prey items for juvenile flathead sole. Other major prey items included polychaetes, mollusks, bivalves and hermit crabs for both juveniles and adults. Commercially important species that were consumed included age-0 Tanner crab (3%) and age-0 walleye pollock (< 0.5% by weight). Little to no information is available to assess trends in abundance for the major benthic prey species of flathead sole.

Important predators on flathead sole include arrowtooth flounder, walleye pollock, Pacific cod, and other groundfish. Pacific cod and Pacific halibut are the major predators on adults, while arrowtooth flounder, sculpins, walleye pollock and Pacific cod are the major predators on juveniles. The flatfish directed fishery constitutes the third-largest known source of mortality on flathead sole adults. However, the largest component of mortality on adults is unexplained.

● **Greenland turbot**

Greenland turbot predate on euphausiids, polychaetes and small fish (e.g. pollock) as they mature. In the North Pacific, juveniles are prey for Pacific cod and Pacific halibut.

● **Kamchatka flounder** presence has been documented in 17 stomach samples from the BSAI where the predators included Pacific cod, pollock, Pacific halibut, arrowtooth flounder and two sculpin species. The prey of Kamchatka flounder can be discerned from 152 stomachs collected in 1983. The principle diet was composed of walleye pollock, shrimp (most Crangonidae) and euphausids. Pollock was the most important prey item for all sizes of fish, ranging from 56 to 86% of the total stomach content weight. An examination of diet overlap with arrowtooth flounder indicated that these two congeneric species basically consume the same resources.

● **BSAI Northern rock sole** diet by life stage varies as follows: Larvae consume plankton and algae, early juveniles consume zooplankton, late juvenile stage and adults prey includes bivalves, polychaetes, amphipods, mollusks and miscellaneous crustaceans.

As juveniles, it is well-documented from studies in other parts of the world that flatfish are prey for shrimp species in near shore areas. This has not been reported for Bering Sea northern rock sole due to a lack of juvenile sampling and collections in near shore areas, but is thought to occur. As late juveniles they are found in stomachs of pollock, Pacific cod, yellowfin sole, skates and Pacific halibut; mostly on small rock sole ranging from 5 to 15 cm standard length.

● **Rex sole** are benthic feeders, preying primarily on amphipods, polychaetes, and some shrimp.

● **Yellowfin sole** larvae consume plankton and algae, early juveniles consume zooplankton, late juvenile stage and adults prey includes bivalves, polychaetes, amphipods, mollusks, euphausids, shrimps, brittle stars, sculpins and miscellaneous crustaceans.

BSAI Alaska plaice SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIplaice.pdf

BSAI arrowtooth flounder SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIatf.pdf

BSAI flathead sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIflathead.pdf

BSAI Greenland turbot SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIturbot.pdf

BSAI Kamchatka flounder SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIkamchatka.pdf

BSAI northern rock sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIrocksole.pdf

BSAI yellowfin sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIyfin.pdf

GOA flathead sole SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOAflathead.pdf

GOA arrowtooth flounder SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOAatf.pdf

GOA rex sole SAFE 2011: http://www.afsc.noaa.gov/REFM/Docs/2011/GOArex.pdf

GOA northern and southern rock sole SAFE 2012: http://www.afsc.noaa.gov/REFM/Docs/2012/GOAnsrocksole.pdf

FATE research

NOAA also supports the Fisheries and the Environment (FATE) program to ensure the sustainable use of US fishery resources under a changing climate. The focus of FATE is on the development, evaluation, and distribution of leading ecological and performance indicators (http://fate.nmfs.noaa.gov/projects).

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

The North Pacific ecosystem status report is a contribution by the North Pacific Marine Science Organization (PICES) to identify, describe, and integrate observations of change in the North Pacific Ocean that are occurring now, and have occurred during the past several years; it will remain a work-in-progress. Publication 4 represents a description of the status and trends of climate and marine ecosystems of the North Pacific Ocean. This document pays special attention to the state of the marine ecosystems of the North Pacific Ocean between 2003-2008, also the recent past and longer variability (trends); it summarizes regional assessments into a broad basin-wide synthesis; identifies critical factors that cause changes in these ecosystems; and it identifies key questions and critical data gaps that inhibit understanding of these marine ecosystems (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. While the NPRB has invested millions of dollars on achieving 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 (GOAIERP), 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. From 2010 to 2014, oceanographers, fisheries biologists and modelers will look at the gauntlet faced by commercially important groundfishes, specifically walleye pollock, Pacific cod, Pacific ocean perch, sablefish and arrowtooth flounder, during their first year of life as they are transported from offshore areas where they are spawned to nearshore nursery areas. The study includes two field years (2011 and 2013) followed by one synthesis year (http://gulfofalaska.nprb.org/GOAStudy.html).

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 are combining 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. The NSF-BEST program focuses on understanding the impacts of changing sea-ice conditions on the chemical, physical, and biological characteristics of the ecosystem and human resource use activities. BSIERP focuses on understanding key processes regulating the production, distribution and abundance of marine organisms in the Bering Sea, especially marine mammals, seabirds, and fish, and how they may respond to natural and human-induced influences, particularly those related to climate change and its economic and

	sociological impacts (http://bsierp.nprb.org/results/progress.html). **USFWS** The U.S. Fish and Wildlife Service (USFWS) conducts research and monitors walrus, short-tailed albatross, and other seabird populations off Alaska. The ADFG actively monitors and manages all fishing within state waters and has taken numerous actions to protect nearshore habitats from trawling. The U.S. Congress has also prioritized research, expanded programs, and developed measures that have addressed problems including the phasing-out of foreign fishing, the overcapacity of the groundfish harvesting and processing sectors, and the potential adverse effects of groundfish fishing on Steller sea lions. **PSEIS** NEPA requires that a significant federal action (such as a federally authorized fishery) be evaluated for its potential effects on the human environment, which include physical, biological and socioeconomic components. This is achieved for the Alaska groundfish fisheries by periodical Supplemental Environmental Impact Statements (SEIS) (the last of which was published in 2004). The Programmatic SEIS includes a cumulative impact analysis of actions that have occurred, and examines policies and potential future actions from a variety of environmental perspectives. It provides information about effects of the fishery on the ecosystem and effects of the ecosystem on the groundfish fishery. http://alaskafisheries.noaa.gov/sustainablefisheries/seis/final062004/Exec_sum.pdf http://alaskafisheries.noaa.gov/sustainablefisheries/seis/final062004/Chaps/chpt_3/chpt_3_5.pdf Lastly, the NPFMC has and will continue to consider habitat protection measures. They are particularly tasked with the assessment of EFH as it pertains to managed species (i.e., Alaskan flatfish). http://www.fakr.noaa.gov/npfmc/conservation-issues/habitat-protections.html	
Evidence adequacy rating: ☑**High** ☐ **Medium** ☐ **Low**		
☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**		
Clause:	**Evidence**	
13.1.1	**Rating determination** *Adverse environmental impacts on the resources from human activities (fishing and non-fishing activities) are assessed and, where appropriate, corrected (NEPA).*	

The BSAI and the GOA Alaska flatfish complex stocks are above the reference point and are not depleted, with the exception of Greenland turbot. Also, Kamchatka flounder and rex sole are conservatively managed using harvest rate reference points which are well below biomass estimates. None of the stocks are currently overfished or undergoing overfishing.

Table 13.1. Biomass, OFL and ABC for BSAI flatfish.

BSAI	Year	$B_{35\%}$ (t)	$B_{40\%}$ (t)	Projected B_{SB} (t)	Projected B (t)	F_{OFL}	F_{ABC}	OFL (t)	Max ABC (t)
Alaska plaice	2013	133,000	152,000	260,500	588,500[3]	0.19	0.158	67,000	55,200
	2014			253,600	580,400[3]	0.19	0.158	60,200	55,800
arrowtooth flounder	2013	215,667	246,476	638,377	1,021,060[2]	0.21	0.17	131,985	111,204
	2014			642,518	1,014,250[2]	0.21	0.17	134,443	112,484
flathead sole	2013	112,250	128,286	245,175	748,454[3]	0.348	0.285	81,535	67,857
	2014			236,009	747,838[3]	0.348	0.285	80,069	66,657
Greenland turbot	2013	41,726	47,686	23,485	80,989[2]	0.14	0.12	2,539	2,064
	2014	41,726	47,686	26,537	94,752[2]	0.16	0.13	3,266	2,655
Kamchatka flounder	2013				108,800	0.13	0.098	16,300	12,200
	2014				108,800	0.13	0.098	16,300	12,200
northern rock sole	2013			260,000	1,465,600[1]	0.164	0.146	241,000	214,000
	2014			260,000	1,393,200[1]	0.164	0.146	229,000	204,000
yellowfin sole	2013			582,300	1,963,000[1]	0.112	0.105	220,000	206,000
	2014			601,000	1,960,000[1]	0.112	0.105	219,000	206,000

[1]—age 6+

[2]—age 1+

[3]—age 3+

Table 13.2. Biomass, OFL and ABC for GOA flatfish.

GOA	Year	$B_{35\%}$ (t)	$B_{40\%}$ (t)	Projected B_{SB} (t)	Projected B (t)	F_{OFL}	F_{ABC}	OFL (t)	Max ABC (t)
arrowtooth flounder	2012	421,953	482,231	1,263,150	2,161,690[3]	0.207	0.174	250,100	212,882
	2013	421,953	482,231	1,278,530	2,133,320[3]	0.207	0.174	249,066	212,033
flathead sole	2012	36,354	41,547	104,301	292,189[3]	0.593	0.45	59,380	47,407
	2013	36,354	41,547	105,127	286,274[3]	0.593	0.45	60,219	48,081
northern rock sole	2013	17,600	20,100	42,700	89,300[3]	0.18	0.152	11,400	9,700
	2014	17,600	20,100	36,500	80,000[3]	0.18	0.152	9,900	8,500
southern rock sole	2013	39,500	45,100	82,800	208,800[3]	0.23	0.193	21,900	18,600
	2014	39,500	45,100	72,500	192,700[3]	0.23	0.193	19,300	16,400
rex sole	2012				87,162	0.17	0.128	12,561	9,612
	2013				85,528	0.17	0.128	12,326	9,432

[3]—age 3+

	NEPA The NPFMC's analytical review documents that evaluate proposed changes to the conservation and management of groundfish and shellfish stocks for which they are responsible, are NEPA compliant documents. These documents are widely distributed and made available so that the public at large and other natural resource, management or development agencies will have an opportunity to testify or comment on possible impacts to their sphere of influence. In like manner, when other resource, development or management agencies that receive federal funds wish to implement new activities or develop new regulations that may impact fisheries under the auspices of the NPFMC, they must also develop NEPA documents which show their project's plan conform to existing FMPs and seek comments from the NPFMC on ways that their proposed activities may impact the NPFMC. Specifically, NEPA requires federal agencies to prepare Environmental Assessments or Environmental Impact Statements prior to making decisions. http://www.solano.com/pdf/N20_TOC.pdf (The NEPA Book) **See also the evidence provided in clause 13.1.** 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 Alaska groundfish fisheries on the ecosystem and effects of the ecosystem on the groundfish fisheries. http://alaskafisheries.noaa.gov/sustainablefisheries/seis/final062004/Exec_sum.pdf http://alaskafisheries.noaa.gov/sustainablefisheries/seis/final062004/Chaps/chpt_3/chpt_3_5.pdf **Impacts of non-fishing activities** The waters and substrates that comprise EFH are susceptible to a wide array of human activities unrelated to fishing. Broad categories of such activities include, but are not limited to, mining, dredging, fill, impoundment, discharges, water diversions, thermal additions, actions that contribute to nonpoint source pollution and sedimentation, introduction of potentially hazardous materials, introduction of exotic species, and the conversion of aquatic habitat that may eliminate, diminish, or disrupt the function of EFH. In November 2011, the NMFS produced a report relating to the impacts to EFH from non-fishing activities in Alaska. The general purpose of this document is to identify non-fishing activities that may adversely impact EFH and provide conservation recommendations that can be implemented for specific types of activities to avoid or minimize adverse impacts to EFH. This information must be included in FMPs. Non-fishing activities discussed in the document are subject to a variety of regulations and restrictions designed to limit environmental impacts under federal, state, and local laws. Also, NEPA requires federal agencies to prepare Environmental Assessments or	

	Environmental Impact Statements prior to making decisions. NEPA documents on oil and gas exploration are very common, and in many cases involve interaction with fisheries management organizations due to potential or proposed spatial overlap between living and non-living resources. **Evidence** http://alaskafisheries.noaa.gov/habitat/efh/nonfishing/impactstoefh112011.pdf	

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	**Evidence**	
13.1.2	**Rating determination** *Fishery Effects on the Ecosystem are assessed in the SAFE Ecosystem Considerations appendix. Overall there are significant efforts to consider and limit the adverse effect of the fishery on the ecosystem and environment.* Potentially, fisheries for Alaskan flatfish 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 flatfish and other species), by reducing prey availability for predators of flatfish, 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. **Ecosystem impacts and gear modifications** Gear modifications have been implemented in the BSAI and are in the process of being implemented in the GOA (scheduled for a 2014 start) 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 for vessels fishing with longline gear. Gillnets for groundfish have been prohibited to prevent ghost fishing and bycatch of non-target species. For further information, see **clause 8.4.2**. Escape panels have been used for trawl gear to reduce the capture of halibut and	

salmon. Although a proposal for trawl mesh restrictions was evaluated several years ago, it was not implemented due to enforcement difficulties and other concerns. Research suggests that because many pollock that escape from trawls may have delayed mortality, a regulation specifying a minimum mesh size may be counterproductive. There is ongoing research into the usage of halibut excluding devices and salmon excluding devices in non-pelagic trawl nets.

Bycatch

Detailed bycatch reduction programs are in place for priority species impacted by the fishery such as crab, halibut, seabirds, as well as measures to allow sufficient groundfish resources for Steller sea lions predation. Crab, Pacific halibut, herring and salmon are categorized as prohibited species (PSC) and they may not be retained. Their bycatch in all groundfish fisheries is carefully monitored and can be used to close the fishery once a quota is reached.
http://www.afsc.noaa.gov/REFM/Stocks/assessments.htm

Prohibited Species Catch

Table 13.2. Prohibited species catch in the Gulf of Alaska by species, gear, and groundfish target fishery, 2010 – 2011 (Metric tons (t) or number in 1,000s)

		Target	Halibut (t)	Herring (t)	Chinook (1,000s)	Other salmon (1,000s)	Other King Crab (1,000s)	Bairdi (1,000s)	Other tanner (1,000s)
2010	Hook & line	Sablefish	-	-	-	0.2	-	0.1	0.1
		Pacific Cod	-	-	-	0	-	2.4	0
		All	-	-	-	0.2	-	2.4	0.1
	Pot	Pacific Cod	24.3	-	-	-	-	140	-
	Trawl	Pollock, Bottom	18.3	-	32	0.4	-	0.1	-
		Pollock, Pelagic	13.8	0.9	12.7	0.3	-	0	-
		Sablefish	2.9	-	-	*	-	*	*
		Pacific Cod	246.8	-	0.4	0.1	-	2.6	-
		Arrowtooth	410	0	3.9	0.1	-	47.2	-
		Flathead Sole	166.8	0.8	0.5	-	-	6.5	-
		Rex Sole	248	*	2.3	*	-	14.3	-
		Flatfish, Deep	*	-	-	-	-	-	-
		Flatfish, Shallow	434.2	0	1	0.4	-	21.8	-
		Rockfish	94.8	0.2	1.6	0.4	3	*	-
		Atka Mackerel	*	-	-	*	-	-	-
		All	1635.6	1.9	54.5	1.7	3	92.4	*
2011	Hook & line	Sablefish	-	-	-	0.3	0.1	-	-
		Pacific Cod	-	-	-	-	-	5.5	-
		All	-	-	-	0.3	0.1	5.5	-
	Pot	Pacific Cod	38.3	-	-	-	-	12.3	-
	Trawl	Pollock, Bottom	104	-	4.3	0.4	-	10	-
		Pollock, Pelagic	12.4	10.5	9.5	0.8	-	-	-
		Sablefish	4	-	-	-	0.1	-	-
		Pacific Cod	455.4	-	1.4	-	*	0.2	-
		Arrowtooth	791.6	-	3	0.4	0	75.1	0.8
		Flathead Sole	59.7	-	0	-	-	5.2	-
		Rex Sole	109.8	-	1.4	0.2	-	6.1	-
		Flatfish, Shallow	245.8	-	*	0.6	-	5.1	-
		Rockfish	72.5	-	1	0.2	*	*	-
		Atka Mackerel	*	-	*	-	-	-	-
		All	1855.3	10.5	20.5	2.6	0.1	101.8	0.8
	All gear	All	1893.6	10.5	20.5	2.9	0.3	119.6	0.8

Notes: These estimates include only catches counted against federal TACs. Totals may include additional categories. The target, determined by AKR staff, is based on processor, trip, processing mode, NMFS area and gear. The estimates of halibut PSC mortality are based on the International Pacific Halibut Commission discard mortality rates that were used for in-season management. The halibut Individual Fishing Quota program allows retention of halibut in the hook-and-line groundfish fisheries, making true halibut PSC numbers unavailable. Therefore, estimates of halibut PSC mortality are not included in this table for those fisheries.

Source: NMFS Alaska Region Catch-accounting system estimates (housed at the Alaska Fisheries Information Network (AKFIN)). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 13.3. Prohibited species catch in the Bering Sea and Aleutian Islands by species, gear, agroundfish target fishery, 2010 – 2011 (metric tons (t) or number in 1000s)

		Target	Halibut (t)	Herring (t)	Chinook (1,000s)	Other salmon (1,000s)	Red King Crab (1,000s)	Other King Crab (1,000s)	Bairdi (1,000s)	Other tanner (1,000s)
2010	Hook & line	Sablefish	-	-	-	-	-	1	-	-
		Pacific Cod	620	-	0	0	2	1.3	26	61.2
		Arrowtooth	0.3	-	-	-	-	0.1	0	-
		Turbot	10.4	-	-	0	*	0.1	0	0.1
		Rockfish	*	-	-	-	-	*	-	-
		Other Ground-fish	*	-	-	-	-	-	-	-
		All	630.7	-	0	0.1	2	2.4	26.1	61.4
	Pot	Sablefish	*	-	-	-	-	*	-	*
		Pacific Cod	2.3	-	-	-	2.5	44.4	374.9	288.9
		All	5.3	-	-	-	2.5	70.4	374.9	288.9
	Trawl	Pollock, Bottom	143.9	161.3	2.5	0.9	1	-	12	5.1
		Pollock, Pelagic	120.5	190.2	7.2	12.7	0	0	0.8	4.3
		Pacific Cod	290.7	*	1.2	0	0.5	0	27.6	5.4
		Arrowtooth	190.4	*	*	-	0.8	5.5	3	1.2
		Flathead Sole	176.9	0.5	-	*	0.8	0.2	74.4	96.9
		Rock Sole	918.6	0.5	0.5	0.2	36.8	*	97.4	29.7
		Turbot	*	-	-	-	-	*	-	-
		Yellowfin	863.7	3.3	0.1	*	18.5	0.2	290.2	1577.6
		Other Flatfish	*	-	-	-	-	*	1.4	0.4
		Rockfish	57.7	-	0.5	-	-	3.5	0.7	0.5
		Atka Mackerel	55.4	-	0.2	0.8	1.3	3.1	*	-
		Other Ground-fish	*	-	-	-	-	-	*	*
		All	2817.7	355.8	12.4	14.8	59.7	12.5	507.6	1721.1

		Pollock, Bottom	*	-	-	-	-	-	-	-
		Sablefish	-	-	-	-	0	0.5	-	0
	Hook & line	Pacific Cod	547.7	*	0	0.1	6.2	1.2	22	62.1
		Arrowtooth	-	-	-	-	-	*	-	-
		Turbot	4.4	-	-	0.1	-	0.1	-	0
		Other Ground-fish	*	-	-	-	-	-	-	-
		All	552.1	*	0	0.2	6.2	1.9	22	62.1
		Sablefish	1.4	-	-	-	0.4	190.9	0.9	0.3
2011	Pot	Pacific Cod	5.1	-	-	-	16.5	1	290	132
		All	6.4	-	-	-	16.9	191.9	291	132.4
		Pollock, Bottom	146.9	31.7	1.4	9	0.6	-	7.5	2.1
		Pollock, Pelagic	235.2	345.6	24.1	184.6	*	*	2.9	4.3
		Pacific Cod	260.4	*	0.4	0.1	2.3	0.1	14.7	9.9
		Arrowtooth	181.1	0.2	-	*	*	2.9	2.9	2
	Trawl	Kamchatka Flounder	92.7	-	-	-	-	10.5	*	*
		Flathead Sole	69.2	*	-	*	1.9	-	33.6	53.8
		Rock Sole	504.6	0.2	*	*	29.4	*	73.5	13.5
		Turbot	1	-	-	-	-	-	-	-
		Yellowfin	906.5	19	-	0.4	9.7	*	763.5	675.3
		Other Flatfish	8.1	-	-	-	*	-	2.3	1.6
		Rockfish	97.4	-	*	-	*	5.3	0.4	*
		Atka Mackerel	114.9	-	0.3	0.1	1.8	33.5	*	-
		Other Ground-fish	*	-	-	-	-	-	-	-
		All	2617.9	396.8	26.2	194.3	45.5	52.2	901.1	762.5
	All gear	All	3176.5	396.8	26.3	194.5	68.7	246	1214.1	957

Notes: These estimates include only catches counted against federal TACs. Totals may include a categories. The target, determined by AKR staff, is based on processor, trip, processing mode area and gear. The estimates of halibut PSC mortality are based on the International Pacific Commission discard mortality rates that were used for in-season management. The halibut Individua Quota program allows retention of halibut in the hook-and-line groundfish fisheries, making tru PSC numbers unavailable. This is particularly a problem in the Bering Sea and Aleutian Islands hook-and-line fishery. Therefore, estimates of halibut PSC mortality are not included in this table fishery.

Source: NMFS Alaska Region Catch-accounting system estimates (housed at the Alaska Fisheries Inf Network (AKFIN)). National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

From 2012 Economic SAFE

BSAI Yellowfin sole

Fishery Effects on the ecosystem

1) The yellowfin sole target fishery contribution to the total bycatch of other target species is shown for 1992-2011 in Table 4.23. The catch of non-target species from 2003-2011 is shown in Table 4.24. The yellowfin sole target fishery contribution to the total bycatch of prohibited species is shown for 2009 and 2010 in Table 13 of the Economic SAFE (Appendix C) and is summarized for 2010 as follows:

Prohibited species	Yellowfin sole fishery % o
Halibut mortality	28.4
Herring	36.0
Red King crab	26.4
C. bairdi	34.4
Other Tanner crab	23.4
Salmon	0

2) Relative to the predator needs in space and time, the yellowfin sole target fishery has a low selectivity for fish 7-25 cm and therefore has minimal overlap with removals from predation.

3) The target fishery is not perceived to have an effect on the amount of large size target fish in the population due to its history of light exploitation (6%) over the past 30 years.

4) Yellowfin sole fishery discards are presented in the Catch History section.

5) It is unknown what effect the fishery has had on yellowfin sole maturity-at-age and fecundity.

6) Analysis of the benthic disturbance from the yellowfin sole fishery is available in the Preliminary draft of the Essential Fish Habitat Environmental Impact Statement.

Table 13.4. Catch and bycatch (t) of other BSAI target species in the yellowfin sole directed fishery from 1992-2011 estimated from a combination of regional office reported catch and observer sampling of the catch.

Species	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Pollock	16,502	14,489	11,396	10,382	10,312	6,084	4,041	9,867	7,024	3,749	8,685
Arrowtooth Flounder	1,845	998	1,125	279	645	352	216	1,969	1,858	868	2,338
Pacific Cod	6,531	6,259	4,621	3,606	3,767	2,588	2,529	5,769	10,849	8,649	16,300
Groundfish, General	3,936	2,678	3,133	1,612	2,134	2,333	4003			3,048	
Rock Sole	5,810	10,665	8,419	10,068	10,086	8,113	8,218	10,487	9,109	9,030	9,762
Flathead Sole	3,231	2,190	2,899	1,102	1,246	2,039	1,744	5,581	3,525	1,895	3,236
Sablefish	0				1			<1	<1		<1
Atka Mackerel	0	0	17		110	17		<1	<1		<1
Pacific ocean Perch	1	1	11		15			<1	<1		<1
Rex Sole	2	0						2			
Flounder, General	4,854	378	214	434	654	877	2,852	1,132		981	
Squid	0	0	1					<1			<1
Dover Sole											
Thornyhead											
Shortraker/Rougheye	1										
Butter Sole		7									
Starry Flounder	82	133									
Northern Rockfish		1			3						
Dusky Rockfish		0									
Yellowfin Sole	54,722	66,178	68,954	65,604	82,420	84,178	108,254	131,000	98,194	90,008	136,905
English Sole		1									
Unsp.demersal rockfish											
Greenland Turbot	32	2		1	7	8	1	<1	4		6
Alaska Plaice	1,905	10,396	365	5,891	8,707	14,043	16,389	13,519	10,748	10,749	18,340
Sculpin, General	12	1,226						2,891	1,438		1,808
Skate, General	21	1,042						1,301	1,481		1,969
Sharpchin Rockfish											
Bocaccio											
Rockfish, General	1		1	3	1	1		<1			
Octopus											
Smelt, general	0										
Chilipepper											
Eels	0	0									
Lingcod	2										
Jellyfish (unspecified)	173	161									
Snails	0	4									
Sea cucumber		0									
Korean horsehair crab	0										
Greenling, General											

Table 13.5. Estimated non-target species catch (t) in the yellowfin sole fishery, 2003-2012 (PSC not included).

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Benthic urochordata	1670846	1695563	674762	520091	114427	347756	205806	155571	132867	80023
Birds			0				0	0	0	
Bivalves	1543	1113	1327	343	448	1484	1300	1822	1671	321
Brittle star unidentified	34303	32271	28706	19961	7526	19048	5209	4082	14024	1476
Capelin	3	4519	45	108	321	161	251	718	3769	2275
Corals Bryozoans	240	46	1232	9378	162	8309	312	504	950	611
Eelpouts	19044	12256	7729	4514	2344	5598	5188	5144	29320	11444
Eulachon	12	278	33	115	5075	22	89	133	453	106
Giant Grenadier									236	
Greenlings	646	753	283	703	474	183	24	53	49	98
Grenadier					339		358			
Gunnels					1					
Hermit crab unidentified	87940	51999	82996	26898	35820	36606	15623	16760	15898	4407
Invertebrate unidentified	556495	625561	418512	177181	40009	70401	30665	25883	65462	55579
Misc crabs	14432	21524	11774	10571	27967	14095	11052	11681	20216	5504
Misc crustaceans	14	186	225	2325	1402	719	1335	935	539	458
Misc fish	95745	91469	66164	42470	70971	66422	48913	29256	40108	76536
Misc inverts (worms etc)	20	123	25	50	46	152	170	105	181	79
Other osmerids	4258	4292	497	634	35770	9833	849	2830	2053	4692
Pacific Sand lance	9	167	97	33	17	37	15	35	395	147
Pandalid shrimp	216	920	115	772	101	305	494	744	2273	554
Polychaete unidentified	16	68	42	360	69	175	75	102	212	39
Scypho jellies	111900	299034	115550	46785	42346	146153	222944	152367	309001	144892
Sea anemone unidentified	6087	6202	2581	4896	8791	24840	25572	20526	14668	5187
Sea pens whips	9	28	164	3	12	324	185	635	20	52
Sea star	1939624	1865768	1606948	1308482	1456620	1831017	684867	791632	1662779	816611
Snails	118257	191064	69769	141517	95876	139765	58354	57060	74718	15067
Sponge unidentified	11434	6807	12205	3118	405	6721	69506	16623	11312	10018
Stichaeidae	72	32		10	784	239	10	171	384	135
Surf smelt						1.02				
urchins dollars cucumbers	2253.73	314.93	2548.64	845.45	3477.35	4897.16	7548.42	1278.18	987.46	550.86

Ecosystem effects on yellowfin sole			
Indicator	Observation	Interpretation	Evaluation
Prey availability or abundance trends			
Benthic infauna	Stomach contents	Stable, data limited	Unknown
Predator population trends			
Fish (Pacific cod, halibut, skates)	Stable	Possible increases to yellowfin sole mortality	
Changes in habitat quality			
Temperature regime	Cold years yellowfin sole catchability and herding may decrease, timing of migration may be prolonged	Likely to affect surveyed stock	No concern (dealt with in model)
Winter-spring environmental conditions	Affects pre-recruit survival	Probably a number of factors	Causes natural variability

***Yellowfin sole* effects on ecosystem**			
Indicator	Observation	Interpretation	Evaluation
Fishery contribution to bycatch			
Prohibited species	Stable, heavily monitored	Minor contribution to mortality	No concern
Forage (including herring, Atka mackerel, cod, and pollock)	Stable, heavily monitored	Bycatch levels small relative to forage biomass	No concern
HAPC biota	Low bycatch levels of (spp)	Bycatch levels small relative to HAPC biota	No concern
Marine mammals and birds	Very minor direct-take	Safe	No concern
Sensitive non-target species	Likely minor impact	Data limited, likely to be safe	No concern
Fishery concentration in space and time	Low exploitation rate	Little detrimental effect	No concern
Fishery effects on amount of large size target fish	Low exploitation rate	Natural fluctuation	No concern
Fishery contribution to discards and offal production	Stable trend	Improving, but data limited	Possible concern
Fishery effects on age-at-maturity and fecundity	Unknown	NA	Possible concern

<u>BSAI Northern Rock Sole</u>

Fishery Effects on the ecosystem

1) The rock sole target fishery contribution to the total bycatch of other target species is shown for 1991-2009 in Table 8.23 and the catch of non-target species from the rock sole fishery is shown in Table 8.24.

The northern rock sole target fishery contribution to the total bycatch of prohibited species is shown for 2008 and 2009 in Table 13 of the Economic SAFE (Appendix C) and is summarized for 2009 as follows:

Prohibited species	Rock sole fishery % of total bycatch
Halibut mortality	27
Herring	<1
Red King crab	57
C. bairdi	33
Other Tanner crab	<1
Salmon	< 1

2) Relative to the predator needs in space and time, the rock sole target fishery is not very selective for fish between 5-15 cm and therefore has minimal overlap with removals from predation.

3) The target fishery is not perceived to have an effect on the amount of large size target fish in the population due to the history of very light exploitation (3%) over the past 30 years.

4) Rock sole fishery discards are presented in the Catch History section.

5) It is unknown what effect the fishery has had on rock sole maturity-at-age and fecundity.

6) Analysis of the benthic disturbance from the rock sole fishery is available in the Essential Fish Habitat Environmental Impact Statement.

Ecosystem effects on rock sole			
Indicator	Observation	Interpretation	Evaluation
Prey availability or abundance trends			
Benthic infauna	Stomach contents	Stable, data limited	Unknown
Predator population trends			
Fish (Pollock, Pacific cod, halibut, yellowfin sole, skates)	Stable	Possible increases to rock sole mortality	
Changes in habitat quality			
Temperature regime	Cold years rock sole catchability and herding may decrease	Likely to affect surveyed stock	No concern (dealt with in model)
Winter-spring environmental conditions	Affects pre-recruit survival	Probably a number of factors	Causes natural variability

Rock sole effects on ecosystem			
Indicator	Observation	Interpretation	Evaluation
Fishery contribution to bycatch			
Prohibited species	Stable, heavily monitored	Minor contribution to mortality	No concern
Forage (including herring, Atka mackerel, cod, and pollock)	Stable, heavily monitored	Bycatch levels small relative to forage biomass	No concern
HAPC biota	Low bycatch levels of (spp)	Bycatch levels small relative to HAPC biota	No concern
Marine mammals and birds	Very minor direct-take	Safe	No concern
Sensitive non-target species	Likely minor impact	Data limited, likely to be safe	No concern
Fishery concentration in space and time	Low exploitation rate	Little detrimental effect	No concern
Fishery effects on amount of large size target fish	Low exploitation rate	Natural fluctuation	No concern
Fishery contribution to discards and offal production	Stable trend	Improving, but data limited	Possible concern
Fishery effects on age-at-maturity and fecundity	unknown	NA	Possible concern

Table 13.6. Catch and bycatch in the rock sole target fisheries, 1993-2011, from blend of regional office reported catch and observer sampling.

Species	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Walleye Pollock	4,577	9,942	4,643	8,937	7,240	6,922	3,212	4,995	6,124	6,016.33	7,091.35
Arrowtooth Flounder	835	314	419	346	599	516	220	464	600	1,841.27	447.60
Pacific Cod	3,391	4,366	3,195	5,648	5,192	4,901	3,238	3,927	3,608	6,658.66	7,331.82
Groundfish, General	1,198	692	978	801	910	1,605	1,807	3			6
Rock Sole	14,437	20,168	18,681	24,287	16,667	20,129	21,217	35,180	29,703	37,311.26	39,682.50
Flathead Sole	1,051	771	744	881	850	1,691	1,061	1,945	1,770	3,446.22	2,027.85
Sablefish	12	4	2	9			3	1			
Atka Mackerel	3	0	1	16	48	87	210	4	<1	<1	<1
Pacific Ocean Perch	0	0					<1			<1	1
Rex Sole	18	7						33			
Flounder, General	726	307	783	820	937	620	1,009	2	691	517.11	411.21
Shortraker/Rougheye											
Butter Sole	72	94						560			
Starry Flounder	152	329						622			
Northern Rockfish		1					4	<1	<1	<1	
Yellowfin Sole	3,951	3,777	6,546	3,888	7,579	9,983	8,916	12,903	6,608	12,037.54	9,827.40
Greenland Turbot	15	0	1	4	1	27	8		7	3	1
Alaska Plaice	75	621	375	1,111	1,352	1,828	1,810	2,710	2,299	2,445.89	3,162.49
Sculpin, General	2	271						1,104			904.90
Skate, General	5	306						559			711.18

Table 13.7. Non-target species catch in the northern rock sole fishery.

NONTARGET_GROUP_NAME	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Benthic urochordata	118678.21	220868.12	318778.02	105544.22	12743.01	30837.08	9764.36	58513.05	5800.61	14243.14
Birds		0	0	0	0		0	0		0
Bivalves	4700.1	338.89	205.78	364.76	396.08	299.4	288.47	477.22	383.14	170.95
Brittle star unidentified	32.28	865.38	1773.68	7290.08	1537.3	1102.53	261.76	1397.61	82.92	69.71
Capelin	1.3	388.38	24.42	4.35	6.44	22.24	43.44	102.71	316.39	56.41
Corals Bryozoans	689.8	693.16	15.88	1346.97	20.6	100.19	19.44	1983.59	104.55	303.5
Eelpouts	1000.13	4296.25	2155.67	3244.69	6894.93	135.7	149.5	4899.66	1860.63	83.87
Eulachon		14.26			1.53	3.83	2.32	33.36	92.83	3.89
Giant Grenadier					4565.52			3331.41		
Greenlings	1150.07	334.24	428.82	335.32	267.23	44.59		18.06	35.12	
Grenadier	0.01	502.51								
Hermit crab unidentified	19169.2	7150.1	7587.56	10401.32	5758	2683.38	636.88	4087.12	2307.71	3464.48
Invertebrate unidentified	105865.92	3128.94	84181.35	6938.09	24211.11	1582.26	2392.49	14526.44	6896.9	2786.48
Misc crabs	18830.36	6423.86	9293.16	6507.53	13605.15	8921.52	3262.82	6369.49	2877.41	6161.04
Misc crustaceans	380.19	151.76	45.36	499.7	198.27	180.15	257.17	1045.61	173.51	354.09
Misc fish	12857.03	16943.73	22421.71	17280.98	70905.19	25201.73	11690.28	14957.04	16735.97	17440.07
Misc inverts (worms etc)	1.44	51.71		24.14	100	8.26	11.34	121.36	16.07	10.82
Other osmerids	3715.91	63.5	725.58	267.83	184.39	627.18	82.26	22.35	124.17	39.69
Pacific Sand lance	16.11	44.72	6.95	32.67	42	30.67	104.59	15.33	6.18	7.45
Pandalid shrimp	200.89	85.94	29.59	20.26	52.6	21.5	59.3	59.84	58.4	55.19
Polychaete unidentified	1.8	7.02		1.19	102.99	21.06	19.14	15.27	4.29	12.42
Scypho jellies	257846.79	304924.73	393490.99	73281.45	94417.73	185158	233299.12	348530.19	264224.6	312587.28
Sea anemone unidentified	18449.18	13291.01	6456.26	8994.76	6338.35	6735.32	2559.5	8769.55	9462.29	4326.69
Sea pens whips		19.31	36.2	0.15		29.39	50	200.88	28.48	78.72
Sea star	1171098.13	333432.64	555351.08	731040.88	710413.9	206604.53	30564.78	174184.47	67505.41	86306.41
Snails	23795.37	23966.73	12922.55	28386.12	24383.93	9313.33	2694.03	11207.04	9697.99	13697.13
Sponge unidentified	198370.76	67555.06	69937.3	40984.67	19224.67	19270.16	64698.87	139966.11	115984.83	63068.37
Stichaeidae	41.87	1.28	2.86		0.41	3.56	0.67	3.32	6.1	
urchins dollars cucumbers	13420.33	8889.78	9279.99	3899.54	32164.61	6035	1104.59	4173.13	3449.36	1601.22

BSAI Arrowtooth Flounder

Fishery Effects on the ecosystem

At the present time there is no directed fishery for arrowtooth flounder in the eastern Bering Sea. However, arrowtooth flounder is caught in a number of fisheries.

1) Arrowtoooth flounder are not pursued as a target fishery at this time and thus have no “fishery effect” on the ecosystem. In instances when arrowtooth flounder were caught in sufficient quantities in the catch that they could be classified as a target, their contribution to the total bycatch of prohibited species is summarized for 2006 and 2007 in Table 13 of the Economic SAFE (Appendix C) and is summarized for 2007 as follows:

Prohibited species	Arrowtooth flounder "fishery" bycatch
Halibut mortality	<1
Herring	0
Red King crab	0
C. bairdi	<1
Other Tanner crab	<1
Salmon	<1

2) Relative to the predator needs in space and time, harvesting of arrowtooth flounder selects few fish between 5-15 cm and therefore has minimal overlap with removals from predation.

3) The catch is not perceived to have an effect on the amount of large size target fish in the population due to its history of very light exploitation (2%) over the past 30 years.

4) Arrowtooth flounder discards are presented in the Catch History section.

5) It is unknown what effect the catch has had on arrowtooth flounder maturity-at-age and fecundity.

6) Analysis of the benthic disturbance from harvesting arrowtooth flounder is available in the Preliminary draft of the Essential Fish Habitat Environmental Impact Statement.

Ecosystem effects on arrowtooth flounder			
Indicator	Observation	Interpretation	Evaluation
Prey availability or abundance trends			
Benthic infauna	Stomach contents	Stable, data limited	Unknown
Predator population trends			
Fish (Pollock, Pacific cod)	Stable	Possible increases to arrowtooth mortality	
Changes in habitat quality			
Temperature regime	Cold years arrowtooth catchability and herding may decrease	Likely to affect surveyed stock	No concern (dealt with in model)
Winter-spring environmental conditions	Affects pre-recruit survival	Probably a number of factors	Causes natural variability

Arrowtooth flounder effects on ecosystem			
Indicator	Observation	Interpretation	Evaluation
Fishery contribution to bycatch			
Prohibited species	Stable, heavily monitored	Minor contribution to mortality	No concern
Forage (including herring, Atka mackerel, cod, and pollock)	Stable, heavily monitored	Bycatch levels small relative to forage biomass	No concern
HAPC biota	Low bycatch levels of (spp)	Bycatch levels small relative to HAPC biota	No concern
Marine mammals and birds	Very minor direct-take	Safe	No concern
Sensitive non-target species	Likely minor impact	Data limited, likely to be safe	No concern
Fishery concentration in space and time	Very low exploitation rate	Little detrimental effect	No concern
Fishery effects on amount of large size target fish	Very low exploitation rate	Natural fluctuation	No concern
Fishery contribution to discards and offal production	Stable trend	Improving, but data limited	Possible concern
Fishery effects on age-at-maturity and fecundity	Unknown	NA	Possible concern

From 2012 SAFE

BSAI Kamchatka flounder

Kamchatka flounder predation The prey of Kamchatka flounder can be discerned from 152 stomachs collected in 1983 (Yang and Livingston 1986). The principle diet was composed of walleye pollock, shrimp (mostly Crangonidae) and euphausids. Pollock was the most important prey item for all sizes of fish, ranging from 56 to 86% of the total stomach content weight. An examination of diet overlap with arrowtooth flounder indicated that these two congeneric species basically consume the same resources. Therefore the following sections are from the arrowtooth flounder assessment but pertain to Kamchatka flounder.

Ecosystem effects on Kamchatka flounder			
Indicator	Observation	Interpretation	Evaluation
Prey availability or abundance trends			
Benthic infauna	Stomach contents	Stable, data limited	Unknown
Predator population trends			
Fish (Pollock, Pacific cod)	Stable	Possible increases to Kamchatka mortality	
Changes in habitat quality			
Temperature regime	Cold years Kamchatka catchability and herding may decrease	Deeper water species so less likely to affect surveyed stock	No concern (dealt with in model)
Winter-spring environmental conditions	Affects pre-recruit survival	Probably a number of factors	Causes natural variability

***Arrowtooth flounder* effects on ecosystem**			
Indicator	Observation	Interpretation	Evaluation
Fishery contribution to bycatch			
Prohibited species	Stable, heavily monitored	Minor contribution to mortality	No concern
Forage (including Pollock, shrimp and euphausids)	Stable, heavily monitored	Bycatch levels small relative to forage biomass	No concern
HAPC biota	Low bycatch levels of (spp)	Bycatch levels small relative to HAPC biota	No concern
Marine mammals and birds	Very minor direct-take	Safe	No concern
Sensitive non-target species	Likely minor impact	Data limited, likely to be safe	No concern
Fishery concentration in space and time	Recent high exploitation rate	Little detrimental effect	No concern
Fishery effects on amount of large size target fish	Recent high exploitation rate, but unknown effect	Natural fluctuation	No concern
Fishery contribution to discards and offal production	Stable trend	Improving, but data limited	Possible concern
Fishery effects on age-at-maturity and fecundity	Unknown	NA	Possible concern

BSAI Flathead sole

Fishery effects on the ecosystem

Prohibited species catches (PSC) in the flathead sole target fishery since 2008, the first year of fishing under Amendment 80, have typically been smaller than in years prior to Amendment 80 (Tables 18a-c). The “target fishery” comprises those hauls that the NMFS Alaska Region has identified as targeting flathead sole. The annual halibut bycatch in the flathead sole directed fishery was smaller in 2008-2012 than in the four years prior to Amendment 80 and has constituted 3% or less of the total halibut PSC in the Bering Sea groundfish fisheries. Blue and red king crab PSC in the target fishery tends to be fairly variable over time. In 2009, the target fishery accounted for 7.9% of the blue king crab PSC but only 0.2% in 2010 and 0.0% in 2011 and 2012. The fishery also took 2.7% of the total red king crab PSC in 2011, but only 1.1% in 2010 and 2012. In contrast, PSC of golden king crab in the target fishery has always been small: 0.2% or less of the total PSC for this species by year since 2003. The target fishery takes substantially more tanner crab than king crab, both in absolute numbers and as fractions of the species-specific total PSC. The PSC for Bairdi crab in the target fishery was larger in 2010 than 2009, 2011 or 2012 in both absolute (> 80,000 vs. < 50,000 crabs, respectively) and relative (9.1% vs. ≤ 7.0%) terms. For Opilio, the PSC in the directed fishery was larger in 2009 in both absolute and relative terms than in 2010-2012 (>200,000 vs. < 100,000 crabs; 16.5% vs. < 6%). The target fishery accounts for very little salmon PSC, either in absolute or relative terms—less than 350 individuals and less than 1% of total salmon PSC per year in both Chinook and non-Chinook categories since 2008.

Table 13.8. Catch of non-prohibited species in the flathead sole target fishery. Note the change in species for 2011 from 2006-2011.

species	2011 Total (t)	2011 % retained
flathead sole	2,415	99%
pollock	1,491	85%
Pacific cod	937	100%
misc. rock sole	890	99%
yellowfin sole	872	100%
arrowtooth flounder	430	72%
Alaska plaice	398	91%
misc. sculpins	118	0%
skates	112	48%
Pacific ocean perch	59	99%
Kamchatka flouder	56	67%
misc. flatfish	7	97%
shortraker	3	100%
Greenland turbot	2	82%
rougheye	0	--
sharks	0	--
squid	0	--
Atka mackerel	0	--
misc. rockfish	0	--
octopus	0	--

	2010		2009		2008		2007		2006	
species	Total (t)	% retained	Total (t)	% retained	Total (t)	% retained	Total (t)	% retained	Total (t)	% retained
flathead sole	8,806	98%	8,561	99%	11,511	99%	7,783	84%	7,662	90%
pollock	2,904	86%	3,166	77%	4,234	74%	3,962	60%	2,640	59%
yellowfinsole	1,418	95%	1,419	98%	3,780	96%	2,448	55%	2,602	86%
pacific cod	1,882	99%	1,970	97%	1,919	97%	1,989	90%	2,002	92%
arrowtooth flounder	2,223	53%	1,211	57%	2,527	56%	1,863	26%	1,599	59%
rock sole spp.	2,372	92%	1,531	95%	1,823	91%	2,303	56%	1,525	84%
all sharks, skates, sculpin, octopus	496	16%	771	14%	1,300	27%	1,301	28%	1,359	29%
alaska plaice	1,255	85%	616	86%	973	74%	687	19%	895	26%
misc flatfish	7	95%	5	78%	18	85%	19	46%	56	77%
atka mackerel	0	--	0	100%	1	39%	138	92%	48	88%
turbot	13	82%	49	86%	98	92%	30	47%	28	95%
POP	98	92%	210	90%	41	75%	104	78%	1	33%
northern rockfish	0	--	1	100%	0	68%	9	1%	1	98%
other rockfish complex	0	67%	0	88%	2	89%	7	16%	1	0%
squid	0	--	0	0%	0	2%	0	--	0	--
sablefish	0	--	0	0%	0	100%	19	100%	0	--
rougheye	0	--	0	0%	0	100%	0	--	0	--

Eelpouts, sea pens and sea whips, and miscellaneous invertebrates were the categories of non-target (ecosystem) species catch in the directed fishery that accounted for the largest components of non-target (ecosystem) species catch in the directed fishery by percentage caught across all BSAI fisheries (18.9%, 11.4%, and 10.1%, respectively). Giant grenadier, eelpouts, and miscellaneous snails accounted for the largest components by weight (21, 13, and 12 t, respectively).Over the last 5 years, pollock has been the largest non-prohibited incidental catch species in the flathead sole-directed fishery, followed variously by yellowfin sole, arrowtooth flounder, Pacific cod and rock sole (Table 9.19). In 2011, 2,415 t of pollock were caught in the directed flathead sole fishery, similar to that in recent years.

Table 13.9. Catch of nontarget species in the flathead sole target fishery. Values are in t.

Nontarget Species Group	Year 2012	2011	2010	2009	2008	2007	2006	2005	2004
Benthic urochordata	2	2	16	0	19	16	26	7	1
Birds	0	0	0	0	0	0	0	0	0
Bivalves	0	0	0	0	0	0	0	0	1
Brittle star unidentified	0	0	1	2	0	0	0	1	4
Capelin	0	0	0	0	0	0	0	0	0
Corals Bryozoans	0	0	1	0	0	0	0	0	0
Dark Rockfish	0	0	0	0	0	--	--	--	--
Deep sea smelts (bathylagidae)	--	--	--	--	--	0	0	--	0
Eelpouts	13	7	4	1	3	7	6	12	20
Eulachon	0	0	0	0	0	0	0	0	0
Giant Grenadier	21	3	0	0	11	1	0	0	2
Greenlings	0	0	0	0	0	0	0	0	0
Grenadier	0	0	0	0	0	0	0	4	50
Gunnels	0	0	--	--	0	0	--	0	0
Hermit crab unidentified	0	0	1	0	2	6	1	7	10
Invertebrate unidentified	0	1	12	8	26	2	6	17	36
Lanternfishes (myctophidae)	0	0	0	0	0	0	0	0	0
Misc crabs	0	0	0	0	1	2	1	1	1
Misc crustaceans	0	0	0	0	0	0	0	0	0
Misc deep fish	0	0	0	0	0	0	0	0	0
Misc fish	0	2	2	7	6	5	12	12	13
Misc inverts (worms etc)	0	0	0	0	0	0	0	2	2
Other osmerids	0	0	0	0	0	0	0	0	0
Pacific Sand lance	0	0	0	0	0	0	0	0	0
Pandalid shrimp	0	0	0	0	0	0	0	0	0
Polychaete unidentified	0	0	0	0	0	0	0	0	0
Scypho jellies	1	11	22	18	6	5	4	6	21
Sea anemone unidentified	4	4	18	5	12	51	8	3	43
Sea pens whips	4	0	0	0	0	0	0	0	0
Sea star	12	58	50	77	245	139	258	129	283
Snails	2	5	7	3	19	16	10	12	59
Sponge unidentified	0	0	4	0	1	0	1	0	1
Stichaeidae	0	0	0	0	0	0	0	0	0
Surf smelt	--	--	--	--	0	0	--	--	--
urchins dollars cucumbers	0	1	0	0	1	1	0	0	2

The flathead sole fishery is not likely to diminish the amount of flathead sole available as prey due to its low selectivity for fish less than 30 cm. Additionally, the fishery is not suspected of affecting the size structure of the population due to its relatively light fishing mortality, averaging 0.053 yr -1 over the last 5 years. It is not known what effects the fishery may have on the maturity-at-age of flathead sole, although these are also be expected to be small.

It seems unlikely that the flathead sole fishery presents a substantial risk to the Bering flounder population in the Bering Sea. The survey conducted last year in the northern Bering Sea suggests that a substantial fraction (> 50%) of the stock in federally-managed waters in the Bering Sea is outside the current extent of fishing operations. In addition, the NPFMC has formally closed a significant fraction of this area (the Northern Bering Sea Research Area) to bottom trawling pending scientific assessment of the effect of bottom trawling on this region (http://www.fakr.noaa.gov/npfmc/current_issues/ecosystem/NBSRA.htm).

From BSAI flathead sole 2012

BSAI Alaska Plaice

Fishery effects on the ecosystem

Alaska plaice are not a targeted species and are harvested in a variety of fisheries in the BSAI area. Since 2002, when single-species management for Alaska plaice was initiated, harvest estimates by fishery are available. Most Alaska plaice are harvested within the yellowfin sole fishery, accounting for 81%-87% of the Alaska plaice catch in 2002-2006. Flathead sole, rock sole, and Pacific cod fisheries make up the remainder of the catch. The ecosystem effects of the yellowfin sole fishery can have been presented above within this section.

Due to the minimal consumption estimates of Alaska plaice (Lang et al. 2003) by other groundfish predators, the yellowfin sole fishery does not have a significant impact upon those species preying upon Alaska plaice. Additionally, the relatively light fishing mortality rates experienced by Alaska plaice are not expected to have significant impacts on the size structure of the population or the maturity and fecundity at age. It is not known what effects the fishery may have on the maturity-at-age of Alaska plaice. The yellowfin sole fishery, however, does contribute substantially to the total discards in the EBS.

BSAI Greenland Turbot

Ecosystem Considerations

Greenland turbot have undergone dramatic declines in the abundance of immature fish on the EBS shelf region compared to observations during the late 1970's. It may be that the high level of abundance during this period was unusual and the current level is typical for Greenland turbot life history pattern. Without further information on where different life-stages are currently residing, the plausibility of this scenario is speculation. Several major predators on the shelf were at relatively low stock sizes during the late 1970's (e.g., Pacific cod, Pacific halibut) and these increased to peak levels during the mid 1980's. Perhaps this shift in abundance has reduced the survival of juvenile Greenland turbot in the EBS shelf. Alternatively, the shift in recruitment patterns for Greenland turbot may be due to the documented environmental regime that occurred during the late 1970's. That is, perhaps the critical life history stages are subject to different oceanographic conditions that affect the abundance of juvenile Greenland turbot on the EBS shelf. Specific bycatch data for this stock are not available. Given the small catches the bycatch data is incorporated for other fisheries (i.e. flathead sole, Alaska plaice), given that multiple species are targeted at once.

Table 13.10. Estimates of Greenland Turbot catch (t) by gear and "target" fishery, 2004-2011. Source: NMFS AK Regional Office catch accounting system. Note, 2011 data are preliminary.

	"Target" fishery	2004	2005	2006	2007	2008	2009	2010	2011
Longline and pot	Greenland turbot	1,168	1,527	1,212	1,097	573	1,192	1,818	1,371
	Sablefish	90	75	114	130	119	122	77	41
	Pacific cod	221	170	77	129	76	84	121	152
	Shallow-water flatfish	64	57	61	15	15	7	77	26
	Arrowtooth flounder	0	2	140	16	0	9	53	0
	Others	1	0	3	12	22	4	0	
Trawl	Greenland turbot	61	24	0	2	205	1,349	118	4
	Pacific cod	79	15	19	89	11	2	7	0
	Arrowtooth flounder	53	154	21	3	1,176	1,435	1,689	892
	Kamchatka flounder								582
	Atka mackerel	123	167	117	130	201	118	62	45
	Flathead sole	191	150	28	30	98	49	12	2
	Pollock	18	31	65	107	82	44	1	4
	Rockfish	74	139	74	47	143	73	59	22
	Other Flatfish	51	34	1	12	11	4	1	0
	Rock sole	4	1	27	8	0	2	3	1
	yellowfin sole	1	7	8	1	1	4	1	4
	Sablefish	12	7	0	0	6	0	12	6
	Others	8	0	0	0	0	0	0	0

From 2011 BSAI Greenland turbot SAFE

GOA Flathead Sole

Fishery effects on ecosystem

Catches of flathead sole have been concentrated in several areas in the Gulf of Alaska over the past few years. These areas include Shelikof Straight, Portlock Bank and Davidson Bank. The ecosystem effects of this spatial concentration of fishing activity are unknown. Prohibited species such as halibut, salmon, and crab are also taken to some extent in the flathead sole directed fishery (Table 8.21). In 2011 thus far, the overall prohibited species catch (PSC) for crab in the directed fishery was exclusively Bairdi tanner crab, with catches sometimes fluctuating by factors of 3-4 between years. The PSC for crab thus far in the 2011 directed fishery was approximately 5,000 Bairdi tanner crab, somewhat less than that caught in 2008-2010. As a fraction of the total Bairdi crab PSC, the fishery accounted for 5.8% in 2011 but less than 3% in 2008-2010—even though the absolute numbers were greater in 2008-2010. The PSC for halibut was almost 92,000 kg halibut—a decrease from the 2010 catch of almost 257,000 kg and similar to the 2009 and 2008 catches (approximately 98,000 and 92,000 kg, respectively). Except for 2011, these catches constituted less than 2.5% of the total halibut PSC. In 2011, the percentage was 5.7%. The PSC for salmon in the directed fishery is mainly Chinook, with 498 individuals caught in 2010 and 118 in 2009. These accounted for 0.9% and 1.5% of the total salmon PSC in those years. In the previous two years (2007-8), no individuals were caught.

Bycatch of non-target species in the flathead sole fishery tends be highly variable between years, at least when expressed as a percentage of the total observed bycatch in the FMP by non-target species group. In 2011, the flathead sole fishery accounted for more than 5% of the bycatch of six species groups: benthic urochordata (tunicates; 8.5%), eelpouts (9.2%), grenadier (6.4%), unidentified polychaetes (39.2%), sea pens and whips (8.6%), and stichaeidae (pricklebacks; 12.0%). In 2010, the fishery reportedly caught no unidentified polychaetes or grenadier, but again accounted for more than 5% of the bycatch of benthic urochordata (14.1%), eelpouts (11.3%), sea pens and whips (14.0%), and stichaeidae (13.5%), as well as unidentified brittle stars (9.7%), Giant grenadiers (5.1%), greenlings (5.5%), and pandalid shrimp (6.1%). The fishery has had no bycatch of birds and has accounted for less than 5% of bycatch in all shark, skate, and forage fish (capelin, eulachon, sandlance) species groups over the time frame analyzed (2003-2011).

Over the past five years, the flathead sole-directed fishery caught more arrowtooth flounder than any other non-prohibited FMP species, including flathead sole. Flathead sole was the second most-caught species in the directed fishery. Only small amounts of arrowtooth were retained (typically 10%), while generally more than 90% of flathead sole was retained. Pacific cod was the third most caught species, with retention rates typically greater than 90%. Effects of discards and offal production on the ecosystem are unknown for the flathead sole fishery.

Table 13.11. Catch of non target species in the flathead sole target fishery, expressed as the fraction of species catch by all fisheries in the FMP.

Nontarget Species Group	Year 2011	2010	2009	2008	2007	2006	2005	2004	2003
Benthic urochordata	8.5%	14.1%	0.0%	0.0%	0.0%	0.0%	0.0%	1.8%	0.0%
Birds	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bivalves	3.0%	4.2%	2.5%	2.0%	1.7%	2.8%	6.4%	5.6%	4.2%
Brittle star unidentified	2.4%	9.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%
Capelin	0.0%	0.0%	0.0%	0.0%	--	0.0%	0.0%	0.0%	0.0%
Corals Bryozoans	0.0%	6.9%	0.0%	1.3%	0.0%	0.0%	0.0%	0.0%	1.8%
Dark Rockfish	0.0%	0.0%	9.3%	0.0%	--	--	--	--	--
Eelpouts	9.2%	11.3%	0.0%	6.0%	7.1%	4.9%	6.9%	6.3%	9.3%
Eulachon	1.8%	3.9%	2.6%	2.1%	0.0%	1.2%	2.9%	0.4%	1.4%
Giant Grenadier	0.0%	5.1%	4.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Greenlings	2.4%	5.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%	0.3%
Grenadier	6.4%	0.0%	0.0%	0.0%	0.0%	1.3%	5.8%	3.3%	4.5%
Gunnels	--	--	--	2.8%	--	100.0%	--	--	0.0%
Hermit crab unidentified	2.7%	3.6%	0.0%	1.8%	0.0%	0.0%	0.1%	0.6%	4.4%
Invertebrate unidentified	2.6%	0.0%	4.8%	2.1%	0.0%	1.6%	0.0%	2.6%	2.4%
Lanternfishes (myctophidae)	--	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Large Sculpins	1.0%	2.0%	1.6%	0.6%	0.8%	1.0%	2.7%	3.0%	1.9%
Misc crabs	2.1%	4.2%	3.1%	0.0%	0.0%	0.0%	0.0%	3.6%	0.9%
Misc crustaceans	0.0%	0.0%	0.0%	--	--	--	0.0%	0.0%	0.0%
Misc deep fish	--	--	--	0.0%	--	--	--	--	--
Misc fish	1.1%	2.5%	1.5%	0.9%	0.7%	0.5%	2.0%	1.7%	2.3%
Misc inverts (worms etc)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	--	--
Octopus	0.0%	1.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.2%
Other osmerids	2.6%	0.0%	0.0%	0.6%	0.0%	2.7%	0.0%	0.0%	3.1%
Other Sculpins	2.1%	4.7%	2.3%	0.9%	0.9%	2.0%	4.2%	0.4%	3.3%
Pacific Sand lance	0.0%	--	0.0%	0.0%	--	0.0%	0.0%	0.0%	0.0%
Pandalid shrimp	2.1%	6.1%	2.9%	1.6%	0.9%	2.2%	3.7%	0.5%	4.8%
Polychaete unidentified	39.2%	0.0%	0.0%	0.0%	0.0%	--	51.1%	--	0.0%
Scypho jellies	0.0%	2.3%	3.1%	0.0%	0.0%	1.0%	0.0%	1.0%	0.8%
Sea anemone unidentified	2.2%	3.2%	2.2%	0.0%	0.0%	2.0%	0.0%	1.6%	3.8%
Sea pens whips	8.6%	14.0%	0.0%	0.0%	0.0%	0.0%	0.0%	7.2%	0.0%
Sea star	1.3%	3.1%	2.1%	1.0%	1.3%	0.8%	2.9%	2.5%	2.8%
Shark, Other	0.0%	0.0%	0.0%	0.0%	0.0%	1.3%	4.3%	3.9%	1.2%
Shark, Pacific sleeper	0.0%	1.6%	0.2%	0.0%	1.6%	1.0%	1.1%	0.8%	2.8%
Shark, salmon	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%	0.0%
Shark, spiny dogfish	0.1%	2.0%	0.1%	0.0%	0.0%	0.1%	0.7%	0.0%	4.1%
Skate, Alaska	0.7%	0.1%	--	--	--	--	--	--	--
Skate, Aleutian	0.2%	--	--	--	--	--	--	--	--
Skate, Big	1.8%	4.1%	2.6%	1.9%	0.7%	2.6%	2.5%	1.3%	--
Skate, Longnose	1.8%	4.0%	2.0%	1.4%	1.2%	1.3%	1.3%	1.8%	1.1%
Skate, Other	1.7%	4.2%	2.2%	1.5%	1.8%	1.9%	4.2%	2.9%	4.4%
Skate, Whiteblotched	0.0%	--	--	--	--	--	--	--	--
Snails	2.0%	4.0%	2.8%	1.4%	0.8%	1.4%	4.3%	0.9%	4.7%
Sponge unidentified	2.1%	3.8%	0.0%	0.0%	0.0%	0.0%	0.0%	3.1%	4.9%
Squid	0.1%	0.1%	0.2%	0.0%	0.0%	0.1%	0.0%	0.1%	2.7%
Stichaeidae	12.0%	13.5%	6.8%	0.6%	0.0%	8.3%	20.8%	7.5%	19.0%
Surf smelt	--	--	--	0.0%	--	--	0.0%	0.0%	--
urchins dollars cucumbers	2.0%	3.9%	0.0%	0.0%	0.0%	0.0%	4.0%	0.9%	2.9%

Table 13.12. Catch of non-prohibited species in the flathead sole target fishery. The species accounting for two largest totals are highlighted.

	2011		2010		2009		2008		2007	
Species	total (t)	% retained	total (t)	% retained	total (t)	% retained	total (t)	% retained	total (t)	% retained
all sculpins, sharks, squid, octopus	6	78%	22	20%	9	57%	14	74%	35	0%
arrowtooth flounder	779	7%	2650	6%	1337	10%	801	21%	723	10%
Atka mackerel	18	99%	10	98%	17	99%	3	98%	36	71%
big skate	39	94%	112	92%	53	96%	66	84%	23	99%
Dover sole and turbot	1	100%	45	48%	18	8%	4	98%	1	0%
flathead sole	367	97%	1242	96%	696	98%	572	92%	423	90%
longnose skate	12	95%	30	97%	24	66%	11	81%	13	19%
northern rockfish	1	89%	6	53%	1	89%	0	100%	2	0%
other rockfish complex	0	--	2	4%	0	--	2	53%	0	99%
pacific cod	108	94%	297	81%	279	97%	125	84%	131	90%
pelagic shelf rockfish	1	82%	9	72%	4	94%	2	100%	2	0%
pollock	57	94%	319	46%	135	81%	45	97%	27	99%
POP	2	6%	74	7%	2	5%	2	2%	11	13%
rex sole	77	86%	397	96%	184	94%	86	98%	110	98%
rougheye	2	16%	15	94%	3	44%	0	42%	0	100%
sablefish	8	98%	13	98%	19	77%	1	61%	4	100%
shallow water flatfish	56	97%	122	98%	95	98%	41	98%	26	95%
shortraker	2	97%	1	78%	3	98%	0	--	0	--
thornyhead	5	100%	13	76%	8	100%	0	100%	7	100%
unidentified skate	9	52%	19	13%	13	49%	5	28%	20	64%

From 2011 GOA flathead sole

GOA Rex Sole

Catches of rex sole are widely distributed in the Gulf of Alaska over the past few years. The ecosystem effects of this spatial distribution of fishing activity are unknown. Prohibited species such as halibut, salmon, and crab are also taken to some extent in the rex sole-directed fishery. In 2011 (through September), the overall prohibited species catch (PSC) rate for Bairdi crab was 6,102 individuals, which accounted for 6.8% of the total Bairdi PSC. No king crab or opilio crab were caught in the rex sole fishery. The halibut PSC in the rex sole fishery was 172 t—less than half that in 2010 (388 t). This accounted for 3.9% of the total PSC for halibut in 2011. The salmon PSC in the rex sole fishery was 2,300 Chinook and 93 non-Chinook in 2010. This accounted for 4.2% of the total Chinook PSC and 4.6% of the total non-Chinook PSC in 2010. No information was available at the time this document was compiled for 2011.

Bycatch of non-target species in the rex sole fishery tends be highly variable between years, at least when expressed as a percentage of the total observed bycatch in the FMP by non-target species group. In 2010, the rex sole fishery accounted for more than 10% of the bycatch of four species groups: corals and bryozoans (10.3%), unidentified invertebrates (14.3%), miscellaneous invertebrates (e.g., worms) (100%) and unidentified polychaetes (100%). In 2009, by contrast, the fishery reportedly accounted for over 10% of total bycatch in 19 species groups, including three of the four species groups caught in 2010 (miscellaneous worms were not caught in 2009). The fishery has had no bycatch of birds and has accounted for less than 10% of bycatch

	in all shark and skate species groups over the time frame analyzed (2003-2011), except for other skates (2003, 2006, 2009). The rex sole fishery has played a substantial role in bycatch of forage fish (capelin, eulachon, sandlance) in certain years, accounting for over 50% of capelin bycatch in 2008 and 2009 and almost 20% of eulachon bycatch in 2009. Over the past five years, the rex sole-directed fishery caught more arrowtooth flounder than any other non-prohibited FMP species, including rex sole. Rex sole was the second most-caught species in the directed fishery. Only small amounts of arrowtooth were retained (typically 10-20%), while generally more than 98% of rex sole was retained. Catches of other non-prohibited species in the rex sole fishery were typically less than 20% of the rex sole catch. Effects of discards and offal production on the ecosystem are unknown for the rex sole fishery. **Table 13.13.** Catch of nontarget species in the rex sole target fishery, expressed as the fraction of species catch by all fisheries in th FMP.	

Nontarget Species Group	Year 2011	2010	2009	2008	2007	2006	2005	2004	2003
Benthic urochordata	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	28.8%	0.3%	48.9%
Birds	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bivalves	0.5%	0.0%	9.6%	9.9%	0.0%	0.0%	5.4%	8.4%	8.6%
Brittle star unidentified	4.0%	0.1%	15.1%	3.8%	7.1%	0.0%	0.2%	0.0%	0.0%
Capelin	0.0%	0.0%	51.0%	95.5%	--	0.0%	0.0%	0.0%	17.3%
Corals Bryozoans	3.1%	10.3%	13.5%	0.0%	6.7%	0.0%	0.0%	0.0%	17.8%
Dark Rockfish	0.0%	0.0%	0.0%	0.0%	--	--	--	--	--
Eelpouts	2.6%	9.8%	19.3%	0.0%	0.0%	0.0%	0.3%	0.5%	11.0%
Eulachon	0.0%	5.5%	11.5%	2.9%	4.4%	0.0%	1.9%	0.0%	9.9%
Giant Grenadier	3.6%	8.9%	21.5%	3.2%	5.2%	8.6%	3.6%	0.0%	0.0%
Greenlings	0.0%	8.4%	10.5%	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%
Grenadier	11.2%	0.0%	0.0%	4.0%	0.0%	0.0%	0.0%	0.4%	7.8%
Gunnels	--	--	--	12.9%	--	0.0%	--	--	0.0%
Hermit crab unidentified	4.9%	4.3%	11.7%	4.6%	5.8%	15.6%	4.8%	0.0%	10.2%
Invertebrate unidentified	0.0%	14.3%	17.0%	5.9%	0.5%	0.0%	0.0%	0.3%	9.0%
Lanternfishes (myctophidae)	--	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Large Sculpins	1.8%	3.4%	7.9%	1.5%	3.2%	5.8%	3.1%	3.3%	7.8%
Misc crabs	0.2%	5.7%	14.2%	4.5%	5.6%	12.6%	3.9%	0.2%	8.3%
Misc crustaceans	10.0%	0.0%	0.0%	--	--	--	64.7%	0.0%	65.1%
Misc deep fish	--	--	--	0.0%	--	--	--	--	--
Misc fish	2.1%	3.5%	8.5%	2.5%	3.4%	4.1%	1.9%	2.5%	5.7%
Misc inverts (worms etc)	50.5%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	--	--
Octopus	0.2%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.2%
Other osmerids	4.4%	7.7%	16.1%	4.2%	6.5%	0.0%	0.0%	0.0%	5.2%
Other Sculpins	4.1%	6.3%	11.2%	3.4%	4.1%	8.8%	4.3%	0.3%	7.6%
Pacific Sand lance	0.0%	--	0.0%	0.0%	--	0.0%	0.0%	0.0%	0.0%
Pandalid shrimp	4.0%	6.4%	18.8%	4.3%	5.8%	8.7%	2.9%	0.0%	10.4%
Polychaete unidentified	0.0%	100.0%	100.0%	0.0%	0.0%	--	40.4%	--	0.0%
Scypho jellies	2.4%	3.6%	12.6%	0.0%	5.3%	0.0%	2.2%	0.0%	5.2%
Sea anemone unidentified	3.2%	3.7%	9.3%	0.5%	4.2%	0.0%	3.0%	4.5%	7.2%
Sea pens whips	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.3%	16.3%
Sea star	2.6%	4.8%	9.5%	3.3%	4.7%	4.9%	3.0%	3.4%	7.7%
Shark, Other	2.0%	0.0%	0.5%	0.0%	0.1%	0.9%	0.6%	8.8%	4.1%
Shark, Pacific sleeper	0.4%	0.5%	1.8%	0.1%	0.1%	2.6%	1.1%	1.4%	3.7%
Shark, salmon	0.0%	0.2%	0.0%	0.0%	0.7%	0.0%	0.0%	0.0%	0.7%
Shark, spiny dogfish	0.2%	2.0%	0.3%	0.0%	0.0%	0.6%	1.3%	0.8%	3.0%
Skate, Alaska	0.1%	0.1%	--	--	--	--	--	--	--
Skate, Aleutian	0.6%	--	--	--	--	--	--	--	--
Skate, Big	3.3%	4.3%	7.0%	2.2%	5.8%	8.9%	4.7%	2.9%	--
Skate, Longnose	4.0%	4.9%	7.4%	4.1%	6.1%	5.9%	2.2%	2.5%	0.0%
Skate, Other	3.2%	6.3%	11.4%	5.2%	8.9%	10.0%	6.4%	5.9%	10.0%
Skate, Whiteblotched	0.0%	--	--	--	--	--	--	--	--
Snails	3.2%	5.9%	9.5%	4.3%	4.6%	9.2%	3.8%	4.7%	8.0%
Sponge unidentified	3.0%	5.6%	12.4%	0.0%	10.0%	0.0%	6.1%	0.0%	9.7%
Squid	0.2%	0.6%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%
Stichaeidae	0.0%	14.1%	21.8%	22.8%	13.7%	0.0%	17.5%	0.0%	34.7%
Surf smelt	--	--	--	0.0%	--	--	0.0%	0.0%	--
urchins dollars cucumbers	4.0%	7.7%	15.1%	3.7%	4.8%	0.0%	4.8%	0.4%	7.7%

Table 13.14. Catch of non-prohibited species in the rex sole target fishery. The species accounting for the two largest totals are highlighted.

Species	2011 total (t)	2011 % retained	2010 total (t)	2010 % retained	2009 total (t)	2009 % retained	2008 total (t)	2008 % retained	2007 total (t)	2007 % retained
Atka mackerel	4	99%	225	83%	225	83%	0	0%	1	89%
arrowtooth flounder	1,790	19%	5,628	10%	6,207	9%	2,501	12%	3,108	8%
big skate	106	84%	214	83%	264	85%	70	96%	74	99%
deep water flatfish	47	7%	269	7%	321	6%	227	3%	68	0%
flathead sole	178	94%	497	93%	629	94%	283	81%	264	92%
longnose skate	44	94%	76	93%	82	94%	36	97%	24	97%
northern rockfish	12	39%	37	38%	37	39%	12	0%	12	0%
all sharks, squid, sculpin, octopus	--	--	31	1%	36	2%	9	0%	15	0%
Pacific cod	155	87%	557	86%	592	85%	238	96%	409	88%
pelagic rockfish complex	11	78%	35	89%	42	91%	5	94%	31	94%
pollock	118	83%	550	70%	615	72%	70	95%	110	99%
POP	291	25%	399	34%	420	32%	76	2%	68	10%
rex sole	1,073	98%	3,142	99%	3,401	99%	1,091	98%	1,556	100%
rougheye	3	92%	10	27%	10	29%	14	41%	4	94%
other rockfish	1	37%	3	9%	3	9%	1	0%	0	0%
sablefish	29	91%	122	93%	125	93%	35	76%	42	83%
shallow water flatfish	11	93%	32	88%	46	92%	12	82%	10	100%
shortraker	9	78%	20	62%	21	62%	4	71%	4	92%
thornyheads	27	95%	52	99%	54	97%	29	100%	24	95%
unidentified skates	21	28%	50	66%	60	63%	22	56%	103	50%
octopus	0	8%	--	--	--	--	--	--	--	--
sculpin	3	6%	--	--	--	--	--	--	--	--
USRK (???)	6	0%	--	--	--	--	--	--	--	--

Total catch of groundfish by target

GOA Arrowtooth flounder				GOA Shallow-water flatfish				
Target	Year	Species	Metric tons	Target	Year	Species	Metric tons	
W	2011	AMCK	30	H	2011	AMCK		confidential
W	2011	ARTH	23,515	H	2011	ARTH	1,495	
W	2011	BSKT	812	H	2011	BSKT	190	
W	2011	DFL4	191	H	2011	DFL4	13	
W	2011	FSOL	1,504	H	2011	FSOL	267	
W	2011	LSKT	238	H	2011	LSKT	78	
W	2011	NORK	198	H	2011	NORK	1	
W	2011	OCTP	3	H	2011	OCTP	2	
W	2011	PCOD	1,728	H	2011	PCOD	843	
W	2011	PEL7	140	H	2011	PEL7	8	
W	2011	PLCK	2,167	H	2011	PLCK	267	
W	2011	POPA	562	H	2011	POPA	2	
W	2011	REXS	1,429	H	2011	REXS	62	
W	2011	REYE	58	H	2011	REYE	2	
W	2011	ROCK	13	H	2011	SABL	6	
W	2011	SABL	346	H	2011	SCLP	102	
W	2011	SCLP	69	H	2011	SFL1	1,823	
W	2011	SFL1	779	H	2011	SRKR		confidential
W	2011	SQID	16	H	2011	THDS		confidential
W	2011	SRKR	72	H	2011	USKT	12	

W	2011	THDS	21		H	2011	USRK	2		
W	2011	USKT	243		H	2012	AMCK		confidential	
W	2011	USRK	101		H	2012	ARTH	1,318		
W	2012	AMCK	0		H	2012	BSKT	288		
W	2012	ARTH	14,291		H	2012	DFL4	2		
W	2012	BSKT	677		H	2012	DUSK	3		
W	2012	DFL4	95		H	2012	FSOL	205		
W	2012	DUSK	311		H	2012	LSKT	65		
W	2012	FSOL	899		H	2012	NORK	3		
W	2012	LSKT	181		H	2012	OCTP	0		
W	2012	NORK	73		H	2012	PCOD	1,042		
W	2012	OCTP	1		H	2012	PLCK	701		
W	2012	PCOD	934		H	2012	POPA	3		
W	2012	PLCK	965		H	2012	REXS	34		
W	2012	POPA	496		H	2012	REYE		confidential	
W	2012	REXS	1,192		H	2012	SABL	2		
W	2012	REYE	103		H	2012	SCLP	227		
W	2012	ROCK	32		H	2012	SFL1	2,361		
W	2012	SABL	177		H	2012	SRKR		confidential	
W	2012	SCLP	21		H	2012	USKT	33		
W	2012	SFL1	361		H	2012	USRK	34		
W	2012	SQID	0							
W	2012	SRKR	11							
W	2012	THDS	39							
W	2012	USKT	174							
W	2012	USRK	157							

BSAI Arrowtooth flounder		BSAI Greenland turbot							
Target	Year	Species	Metric tons		Target	Year	Species	Metric tons	
W	2011	AKPL	0		T	2011	AMCK	confidential	
W	2011	AMCK	116		T	2011	ARTH	249	
W	2011	ARTH	10,551		T	2011	FLO5	4	
W	2011	FLO5	517		T	2011	FSOL	6	
W	2011	FSOL	308		T	2011	GTRB	1,777	
W	2011	GTRB	893		T	2011	KMKA	6	

	W	2011	KMKA	3,434		T	2011	NORK		confidential
	W	2011	NORK	7		T	2011	OCTP	0	
	W	2011	OCTP	0		T	2011	PCOD	72	
	W	2011	PCOD	186		T	2011	PLCK	14	
	W	2011	PLCK	864		T	2011	POPA		confidential
	W	2011	POPA	304		T	2011	REYE	0	
	W	2011	REYE	23		T	2011	ROCK	41	
	W	2011	ROCK	49		T	2011	RSOL		confidential
	W	2011	RSOL	42		T	2011	SABL	22	
	W	2011	SABL	25		T	2011	SCLP	1	
	W	2011	SCLP	130		T	2011	SQID		confidential
	W	2011	SQID	67		T	2011	SRKR	7	
	W	2011	SRKR	26		T	2011	USKT	370	
	W	2011	USKT	122		T	2011	YSOL		confidential
	W	2011	USRK	1		T	2012	ARTH	389	
	W	2011	YSOL	0		T	2012	FLO5	7	
	W	2012	AKPL	2		T	2012	FSOL	13	
	W	2012	AMCK	148		T	2012	GTRB	1,908	
	W	2012	ARTH	15,589		T	2012	KMKA	340	
	W	2012	FLO5	314		T	2012	OCTP	0	
	W	2012	FSOL	558		T	2012	PCOD	79	
	W	2012	GTRB	927		T	2012	PLCK	11	
	W	2012	KMKA	2,106		T	2012	POPA		confidential
	W	2012	NORK	7		T	2012	REYE	1	
	W	2012	OCTP	0		T	2012	ROCK	40	
	W	2012	PCOD	187		T	2012	SABL	28	
	W	2012	PLCK	730		T	2012	SCLP	1	
	W	2012	POPA	209		T	2012	SRKR	12	
	W	2012	REYE	7		T	2012	USKT	359	
	W	2012	ROCK	24		T	2012	USRK		confidential
	W	2012	RSOL	18						
	W	2012	SABL	54						
	W	2012	SCLP	115						
	W	2012	SQID	60						

W	2012	SRKR	18								
W	2012	USKT	207								
W	2012	USRK	6								
W	2012	YSOL	2								

BSAI Kamchatka flounder					
Target	Year	Species	Metric tons		
M	2011	AMCK	54		
M	2011	ARTH	2,542		
M	2011	FLO5	16		
M	2011	FSOL	47		
M	2011	GTRB	590		
M	2011	KMKA	5,626		
M	2011	NORK	4		
M	2011	OCTP	0		
M	2011	PCOD	33		
M	2011	PLCK	344		
M	2011	POPA	332		
M	2011	REYE	18		
M	2011	ROCK	51		
M	2011	RSOL	0		
M	2011	SABL	39		
M	2011	SCLP	49		
M	2011	SQID	48		
M	2011	SRKR	9		
M	2011	USKT	93		
M	2011	USRK		confidential	
M	2011	YSOL	1		
M	2012	AKPL		confidential	
M	2012	AMCK	486		
M	2012	ARTH	1,577		
M	2012	FLO5	16		
M	2012	FSOL	13		
M	2012	GTRB	1,362		
M	2012	KMKA	5,886		
M	2012	NORK	7		
M	2012	OCTP	0		
M	2012	PCOD	31		
M	2012	PLCK	131		
M	2012	POPA	148		
M	2012	REYE	22		
M	2012	ROCK	44		

M	2012	RSOL	5		
M	2012	SABL	141		
M	2012	SCLP	23		
M	2012	SQID	76		
M	2012	SRKR	12		
M	2012	USKT	101		
M	2012	USRK		confidential	
M	2012	YSOL	1		

This above is the total catch of groundfish species by target fisheries not presented in SAFE reports, screened for confidentiality when catches were < 2 mt.

This is for all gear types and includes the CDQ program in the BSAI.

Also, in the GOA there is not a rock sole target fishery. Rock sole is in the "shallow water flatfish" group defined in Table 1 of the harvest specifications http://alaskafisheries.noaa.gov/sustainablefisheries/specs13_14/goatable1.pdf

5 "Shallow-water flatfish" means flatfish not including "deep-water flatfish," flathead sole, rex sole, or arrowtooth flounder.

6 "Deep-water flatfish" means Dover sole, Greenland turbot, Kamchatka flounder, and deepsea sole.

Here is a link to the code definitions

http://alaskafisheries.noaa.gov/2013/fielddefinitions.pdf

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

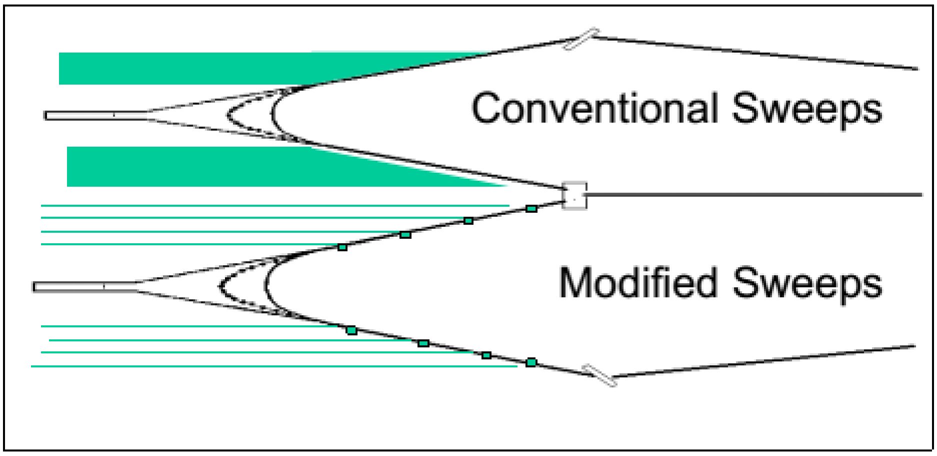
☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	Evidence
13.1.3	**As detailed above in Clause 13.1.2,** there is specific information on the ecosystem impacts of fishing for the units of certification.

Evidence adequacy rating:		
☑**High**	☐ **Medium**	☐ **Low**
☑ **Full Conformity**	☐ **Minor Non-conformity**	☐ **Major Non-conformity**
☐ **Critical Non-conformity**		

Clause:	**Evidence**
13.1.4	**Rating determination** *Impacts that are likely to have serious consequences (e.g. overfishing, habitat interaction, bycatch and endangered species interactions) are addressed.* Impacts with serious consequences are assessed in the SAFE *Ecosystem Considerations appendix*, and are summarized in the respective chapters of each individual species annual or biennial SAFE report. **Habitat interaction** The issues of primary concern with respect to the effects of fishing on benthic habitat are the potential for damage or removal of fragile biota within each area that are used by fish as habitat and the potential reduction of habitat complexity, benthic biodiversity, and habitat suitability. Based on the information available to date, the predominant direct effects caused by nonpelagic trawling include smoothing of sediments, moving and turning of rocks and boulders, resuspension and mixing of sediments, removal of seagrasses, damage to corals, and damage or removal of epibenthic organisms. Trawls affect the seafloor through contact of the doors and sweeps, footropes and footrope gear, and the net sweeping along the seafloor. Ninety percent of the area impacted by flatfish trawling is due to contact between the seafloor and the sweeps. Some contact with living habitat species would continue from the elevating devices contacting the bottom, however, fishery-wide adoption of devices to reduce seafloor contact with trawl sweeps is expected to be positive. Because potential recovery of some living habitat species after exposure to nonpelagic trawling may occur, and trawling will continue in areas already impacted, the overall impacts on habitat complexity, benthic biodiversity, or habitat suitability is not expected to be a substantial change from status quo.



Source: C. Rose, NMFS Alaska Fisheries Science Center.

The EFH EIS (NMFS 2005) contained the description and location of EFH for all managed fish stocks off Alaska. When overlaid, all areas of habitat are considered essential for some species life stage. In the Bering Sea area, the pelagic waters over the deepwater basin areas are essential for juvenile Pacific salmon. The continental slope area is considered essential fish habitat for Bering Sea rockfish species, Greenland turbot, and sablefish. The shelf area is essential fish habitat for virtually every life stage of nearly all flatfish species, walleye pollock, Pacific cod, red and blue king crabs, Tanner crabs, C. opilio crabs, and other managed stocks. More information on these and other species is available in the EFH EIS. A thorough literature review of the effects of fishing on fish habitat was contained in the EFH EIS.

The EFH EIS evaluated the effects of fishing on habitat by using a quantitative mathematical model developed by the NMFS Alaska Fisheries Science Center (NMFS 2005, Appendix B). The model estimated the proportional reductions in habitat features relative to an unfished state, assuming that fishing will continue at the current intensity and distribution until the alterations to habitat and the recovery of disturbed habitat reach equilibrium. The model provided a tool for bringing together all available information on the effects of fishing on habitat, such as fishing gear types and sizes used in Alaska fisheries, fishing intensity information from observer data, and gear impacts and recovery rates for different habitat types. Due to the uncertainty regarding some input parameters (e.g., recovery rates of different habitat types), the results of the model were displayed as point estimates, as well as a range of potential effects. Nevertheless, the model was deemed to provide the best available scientific information for assessing effects of fishing on habitat by NMFS, the Council, and the Council's SSC, and the Council of Independent Experts.

The analysis indicated that fishing, and particularly nonpelagic trawling, has long-term effects on benthic habitat features off Alaska, but these effects were considered to have minimal impacts on fish stock productivity. If the current pattern of fishing intensity and distribution continues into the future, living habitat features that provide managed species with structure for refuge would be reduced by 0 to 11 percent in each habitat area, with the largest reduction occurring on soft substrates of the Aleutian slope area. There would be almost no reduction (0 to 3 percent) in infaunal and epifaunal prey for managed species. Viewed another way, habitat loss due to fishing off Alaska is relatively small overall, with most of the available habitats unaffected by fishing (infaunal prey are 97 to 100 percent unaffected, epifaunal prey are 97 to 100 percent unaffected, living structure is 89 to 100 percent unaffected, and hard corals are 84 to 98 percent unaffected). The model's long term effect indices (LEI) values for the Bering Sea habitat features are shown in the table below.

Table 13.15. Long term effect indices (LEI in % reduction) for fishing effects on benthic habitat features of the Bering Sea.

Habitat Features	Sand	Sand/mud	Mud	Slope
Infauna prey	0	2	0	3
Epifauna prey	0	2	0	3
Living structure	4	11	0	11
Non-living structure	0	1	0	4

Source: NMFS 2005 (EFH EIS, Table B.2-9)

Potential effects of fishing activities on sessile invertebrates have been of particular concern, as they account for the higher LEI values in the sand/mud habitat of the Bering Sea. There are a number of benthic invertebrate species in the Bering Sea that as a group are considered emergent epifauna available for potential use as fish habitat, including sponges, bryozoans, sea raspberries, sea whips and sea pens, anemones, and ascidians. Sea whips and sea pens (Pennatulacea) are distributed along the slope area.

Sponges (Porifera) are found on the continental shelf, particularly in outer Bristol Bay. Anemones (Actiniaria), ascidians (Ascidiacea), and bryozoans (Ectoprocta) are found at mid-depths of the shelf, particularly in the vicinity of the Pribilof Islands and in Bristol Bay. Information on the effects of trawl fisheries on these invertebrate species is provided in Appendix B of the EFH EIS (NMFS 2005). A comprehensive review of the distribution of these invertebrates can be found in the EFH EIS and in Malecha et al. (2005). A review of habitat conservation measures implemented for Alaska fisheries prior to implementation of EFH and HAPC Identification and Protection Measures is provided in the EFH EIS (NMFS 2005).

Measures included fishing equipment restrictions, marine protected areas, harvest limits, and effort controls. These measures were further augmented by the EFH and HAPC protection measures implemented in July 2006 (71 FR36694, June 28, 2006). These measures established new and expansive marine protected areas in the Aleutian Islands and Gulf of Alaska. To date, over 655,162 nm of the EEZ have been closed to bottom trawling. In addition, over 5,400 nm of habitat have been protected from commercial bottom contact gear. These areas include coral gardens, Primnoa coral thickets, and all seamounts off Alaska. Amendment 89 implemented in August 2008 provided additional bottom habitat protection in the Bering Sea (73 FR43362, July 25, 2008).

Trawl sweep gear modification resulted in a decrease of the trawl sweeps contact with seabed by about 90% and was effective in reducing trawl sweep impact effects to basket stars and sea whips. Some contact with living habitat species would continue from the elevating devices contacting the bottom. Therefore, fishery-wide adoption of devices to reduce seafloor contact with trawl sweeps is expected to be significantly positive. Dr. Rose's research has shown some recovery of sea whips one year after exposure to modified sweeps. Because potential recovery of some living habitat species after exposure to nonpelagic trawling may occur, and trawling will continue in areas already impacted, the overall impacts on habitat complexity is not expected to be a substantial change. However trawl sweep modifications would likely have a less adverse effect on benthic habitat compared to the "no sweep modification" because the flatfish trawl sweep modification would radically decrease the amount of surface directly contacted per hour of nonpelagic trawling.

The general similarity of GOA trawl gear to that used in the Bering Sea tests indicates that the results of those tests should approximate mortality rates in GOA fisheries. The smaller area swept by the sweeps in the GOA indicates that the benefits of sweep modifications would be somewhat smaller than those for Bering Sea fisheries, but still substantial. Although trawl sweep modification in the Central GOA flatfish fishery will result in benefits to crab stocks, by reducing unobserved crab mortality and reduce damage to several components of the community structure, including living structure animals and other, small epibenthos, the overall benefits of trawl sweep modification measured at the scale of the GOA ecosystem are not likely to have a significant impact on the GOA ecosystem.

Overall, habitat interaction is not considered significant, more so due to the development and fleet wide adoption of trawl sweep modification, formally implemented in the BSAI Region and to be implemented in the GOA in 2014.

Bycatch is recorded in detail and endangered species interactions with Steller sea lions and short-tailed albatross are tightly monitored and regulated. The BSAI and GOA stocks are not overfished. Furthermore serious impacts are regulated in the FMPs by identifying ecosystem components and non-target stocks that are vulnerable or important for food web functioning.

These are:

a) Prohibited Species – are those species and species groups the catch of which must be avoided while fishing for groundfish, and which must be immediately returned to the sea with a minimum of injury except when their retention is authorized by other applicable law or when their retention is required under section 3.6.1.2 of the FMP (see also Prohibited Species Donation Program described in section 3.6.1.1 of the FMP). Groundfish species and species groups under the FMP for which the quotas have been achieved shall be treated in the same manner as prohibited species. Pacific halibut, Pacific herring, Pacific salmon, steelhead trout, king crab, and Tanner crab are prohibited species in the BSAI and the GOA.

b) Forage fish species, which are a critical food source for many marine mammal, seabird and fish species. The forage fish species category is established to allow for the management of these species in a manner that prevents the development of a commercial directed fishery for forage fish. Management measures for this species category will be specified in regulations and may include such measures as prohibitions on directed fishing, limitations on allowable bycatch retention amounts, or limitations on the sale, barter, trade or any other commercial exchange, as well as the processing of forage fish in a commercial processing facility. Forage species are also assessed via a SAFE report for the GOA, and beginning in 2013 will be assessed in the BSAI. The results of these SAFE documents are analyzed for the annual Ecosystem Considerations report.

The state of the prohibited and forage species is considered in the setting MSY- and OY-levels. A programmatic supplemental environmental impact statement (PSEIS) was completed in June, 2004. The preferred alternative identified in the PSEIS retained the existing OY range. In addition to impacts on the stocks and stock complexes in the "target species" category the PSEIS analyzed impacts on prohibited species, forage fish, non-specified species, habitat, seabirds, and marine mammals. Ecosystem-level variables analyzed were pelagic forage availability, removal of top predators, introduction of non-native species, energy removal, energy redirection, species diversity, functional diversity (in terms of both trophic relationships and structural habitat), and genetic diversity. Effects were partitioned into direct and indirect effects, persistent past effects, reasonably foreseeable future external effects, and cumulative effects. For the preferred alternative, approximately half of the ecosystem-level effects were determined to be insignificant, conditionally significant/positive, or significant/positive; none were determined to be significant/negative.

The ecological factors that may be considered in the reduction of OY from MSY are described in section 4.6 of Ecosystem Consideration for Management of the Groundfish Fisheries, and is addressed in the ongoing consideration of this information in the development of the SAFE reports.

Evidence
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf
http://www.afsc.noaa.gov/REFM/Docs/2012/ecosystem.pdf
http://www.afsc.noaa.gov/REFM/Docs/2012/GOAforage.pdf

Clause:

13.2 Appropriate measures shall be applied to minimize:

- **Catch, waste and discards of non-target species (both fish and non-fish species).**
- **Impacts on associated, dependent or endangered species**.

FAO CCRF 7.6.9

Eco 31.1

13.2.1 Non target catches, including discards, of stocks other than the "stock under consideration" shall be monitored and shall not threaten these non-target stocks with serious risk of extinction; if serious risks of extinction arise, effective remedial action shall be taken.

Eco 31.1

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	Evidence
13.2	**Rating determination**

Appropriate measures are applied to minimize catch, waste and discards of non-target species (PSC, area closures, trawl gear modifications, longline seabird avoidance) and impacts on associated, dependent or endangered species.

Bycatch is managed operationally by assessing bycatch species (see SAFE-reports and **clause 13.1.2**), having bycatch caps (PSC and other species, see below), as well as data collection and validation by the observer program to account for total catches (see below).

Table 13.16. Catch data for Alaskan flatfish species through September 21, 2013. Data are from weekly production and Observer Reports (includes CDQ).

	Retained catch (mt)	Discarded catch (mt)
BSAI Alaska plaice	14462	7132
BSAI arrowtooth flounder	16236	2800
BSAI flathead sole	14550	1424
BSAI Greenland turbot	1010	336
BSAI Kamchatka flounder	6874	718
BSAI northern rock sole	54160	3118
BSAI yellowfin sole	113538	4604

GOA arrowtooth flounder	10708	4440
GOA flathead sole	2004	322
GOA rex sole	3287	55
GOA shallow water flatfish	4516	218

http://alaskafisheries.noaa.gov/2013/car230_disc_ret.csv

The BSAI Alaskan plaice fishery was closed in May of 2013 due to the initial TAC having been reached. Vessels fishing flatfish in the BSAI were prohibited from retaining Alaska plaice and forced to move their operations away from areas with high Alaska plaice catches. http://www.gpo.gov/fdsys/pkg/FR-2013-05-20/html/2013-11950.htm

Measures applied to minimize catch, waste and discards of non-target species are described in the Management Measures for the BSAI and GOA Groundfish Fisheries given in the FMPs.

These include for the BSAI:

Time and Area Restrictions

All trawl: Fishing with trawl vessels is not permitted year-round in the Crab and Halibut Protection Zone and the Pribilof Island Habitat Conservation Area. The Nearshore Bristol Bay Trawl Closure area is also closed year-round except for a subarea that remains open between April 1 and June 15 each year. The Chum Salmon Savings Area is closed to trawling from August 1 through August 31.

Nonpelagic trawl: The Red King Crab Savings Area is closed to nonpelagic trawling year round, except for a subarea that may be opened at the discretion of the NPFMC and NMFS when a guideline harvest level for Bristol Bay red king crab has been established. The Aleutian Islands Habitat Conservation Area, Bering Sea Habitat Conservation Area, St. Matthew Island Habitat Conservation Area, St. Lawrence Island Habitat Conservation Area, Nunivak Island, Etolin Strait, and Kuskokwim Bay Habitat Conservation Area, and the Northern Bering Sea Research Area are closed to nonpelagic trawling year-round. Owners and operators of fishing vessels using nonpelagic trawl gear in the Modified Gear Trawl Zone, regardless of target species, must use modified nonpelagic trawl gear as required for the Bering Sea flatfish fishery.

Bottom contact gear: The use of bottom contact gear is prohibited in the Aleutian Islands Coral and Alaska Seamount Habitat Protection Areas year-round. The use of mobile bottom contact gear is prohibited year-round in Bowers Ridge Habitat Conservation Zone.

Marine mammal measures: Regulations implementing the FMP include conservation measures that temporally and spatially limit fishing effort around areas important to marine mammals. NMFS uses Stellar sea lion protection measures (SSLPM) to ensure the groundfish fisheries off Alaska are not likely to jeopardize the continued existence of the western population of Steller sea lions or adversely modify their critical habitat. The management measures disperse fishing over time and area to protect against potential competition for important Steller sea lion prey species near rookeries and important haulouts.

Gear test area exemption: Specific gear test areas for use when the fishing grounds are closed to that gear type, are established in regulations that implement the FMP.

For the GOA these include:

Time and Area Restrictions

All vessels: Fishing or anchoring within the Sitka Pinnacles Marine Reserve is prohibited at all times.

All trawl: Use of trawl gear is prohibited at all times in the Southeast Outside district.

Non-pelagic trawl: The use of non-pelagic trawl is prohibited in Cook Inlet. Three types of closure areas are designated around Kodiak Island. Type I areas prohibit non-pelagic trawling year-round; Type II prohibit non-pelagic trawl from February 15 to June 15; adjacent areas designated as Type III may be reclassified by the Regional Administrator as Type I or Type II following a recruitment event. The Gulf of Alaska Slope Habitat Conservation Area is closed to non-pelagic trawling year-round.

The NMFS proposes regulations that would implement Amendment 89 to the FMP for Groundfish of the GOA. The proposed rule would establish a protected area in Marmot Bay, northeast of Kodiak Island, and close that area to fishing with trawl gear except for directed fishing for Pollock with pelagic trawl gear. The proposed closure would reduce bycatch of Tanner crab in GOA groundfish fisheries. The stakeholder comments period ended on July 17, 2013.

http://alaskafisheries.noaa.gov/prules/78fr36150.pdf

Bottom contact gear: The use of bottom contact gear is prohibited in the Gulf of Alaska Coral and Alaska Seamount Habitat Protection Areas year-round.

Anchoring: Anchoring by fishing vessels in the Gulf of Alaska Coral and Alaska Seamount Habitat Protection Areas is prohibited.

Marine mammal measures: NMFS uses Steller sea lion protection measures (SSLPM) to disperse fishing over time and area to protect against potential competition for important Steller sea lion prey species near rookeries and important haulouts.

Gear test area exemption: Specific gear test areas for use when the fishing grounds are closed to that gear type, are established in regulations that implement the FMP.

http://www.fakr.noaa.gov/habitat/efh/review/efh_5yr_review_sumrpt.pdf

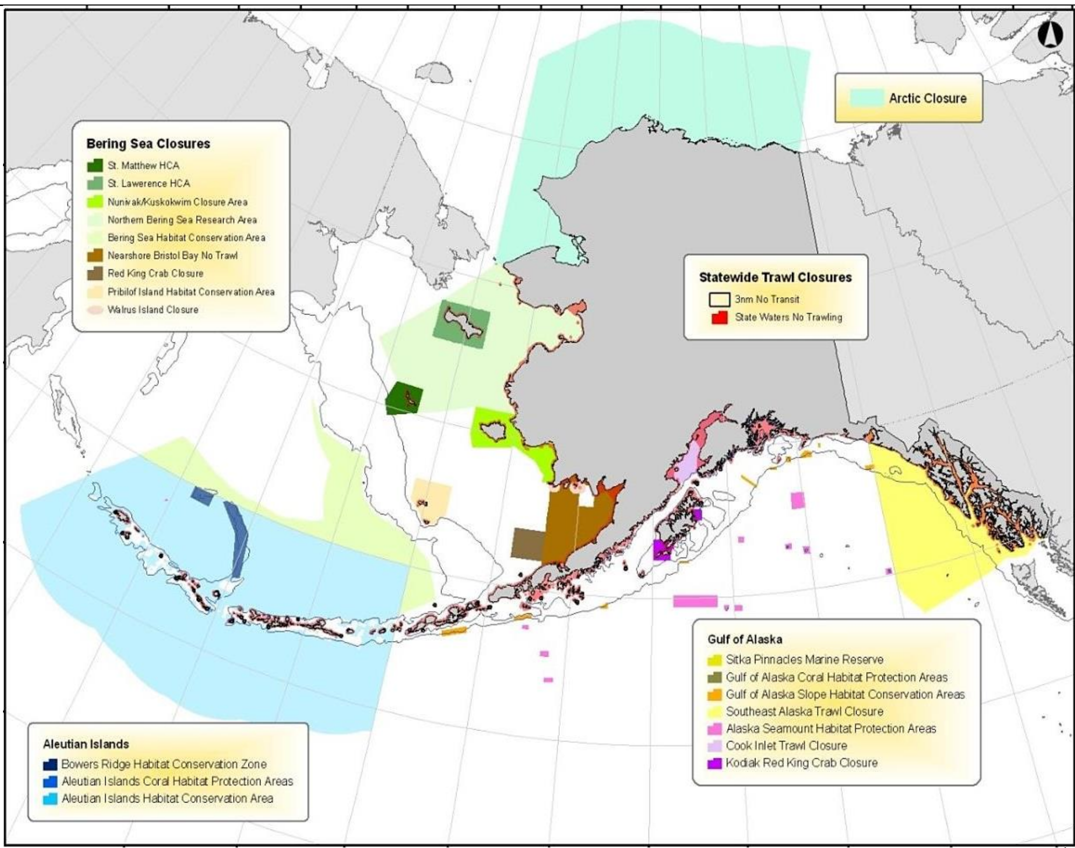


Figure 13.7. EFH, closures and HAPC Conservation Areas in the GOA and the AI.
http://alaskafisheries.noaa.gov/npfmc/conservation-issues/habitat-protections.html

PSC Limits

Pacific halibut, Pacific herring, Pacific salmon and steelhead, king crab, and Tanner crab are prohibited species and must be avoided while fishing for groundfish and must be returned to the sea with a minimum of injury, except when their retention is required or authorized by other applicable law. Groundfish species and species under this FMP for which TAC has been achieved shall be treated in the same manner as prohibited species. When a target fishery attains a PSC limit apportionment or seasonal allocation, the bycatch zone or management area to which the PSC limit applies will be closed to that target fishery for the remainder of the year or season.

Red king crab: Based on the size of the spawning biomass of red king crab, the PSC limit in Zone 1 for trawl fisheries is either 23,000, 97,000 or 197,000 red king crab; attainment closes Zone 1.
C. bairdi crab: Established in regulation for trawl fisheries based on population abundance; attainment closes Zone 1 or Zone 2.
C. opilio crab: Established in regulation for trawl fisheries in the *C. opilio* Bycatch Limitation Zone based on population abundance, with minimum and maximum limits; attainment closes zone.
Pacific halibut: Halibut mortality limits established in regulation for trawl and non-trawl fisheries.

	Pacific herring: 1% of the annual biomass of eastern Bering Sea herring, for trawl fisheries; attainment may close the Herring Savings Areas. *Chum salmon:* Attainment of 42,000 fish limit in the Catcher Vessel Operational Area between August 15 and October 14 closes the Chum Salmon Savings Area for the rest of that time period. The NPFMC is currently accepting public comment on Amendment 95 to the American Fisheries Act which will minimize the amount of Pacific halibut caught as PSC in the GOA. Regulatory reductions in limits are scheduled to begin as early as 2014, if the proposed amendment is passed. http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/halibut/GOAPSC512_exsum.pdf Gear modifications and regulation In addition to these measures, gear restrictions and other regulations have been implemented in all fisheries to reduce bycatch (**See clause 8.4.2 for further discussion**). For example: • Gillnets for groundfish have been prohibited to prevent ghost fishing and bycatch of non-target species. • In 2011, a trawl sweep modification requirement was implemented for vessels participating in the Bering Sea flatfish fishery, to raise the trawl sweep off the seafloor. Research has demonstrated that this gear modification reduces crab bycatch and unobserved mortality of red king crab, Tanner crab, and snow crab. This gear modification is due to be implemented and required of trawl vessels in the GOA starting in 2014. • There are several regulations in place towards seabird avoidance for vessels fishing with hook-and-line gear. Since 1997, NMFS has implemented and revised seabird avoidance measures to mitigate interactions between the federal hook and-line fisheries and seabird. The measures used in longline fisheries in Alaska include the use of streamer lines; sink baited hooks, circle hooks, line shooters, lining tubes, night settings etc. http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/conservation_issues/trawlmods412.pdf http://www.afsc.noaa.gov/Quarterly/jfm2010/jfm2010feature.pdf ftp://ftp.afsc.noaa.gov/posters/pRose03_development-implementation.pdf http://fishbull.noaa.gov/1111/rose.pdf Observer Program Data gathered under the auspices of the North Pacific Groundfish Observer Program (NPGOP) cover 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. All vessels fishing for groundfish in federal waters are required to carry observers, at their own expense, for at least a	

	portion of their fishing time. Annual 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 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 that 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. http://alaskafisheries.noaa.gov/sustainablefisheries/observers/draft2014adp.pdf 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

As well as providing demographic data for scientific purposes, the observer program is also used extensively in- 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.

Bycatch Reduction Programs

The NPFMC will annually review the GOA fisheries that exceed a discard rate of 5% of shallow water flatfish, and may propose management measures to reduce bycatch in these fisheries.

Details on each management measure can be found in the FMPs. Time trends in discards of the groundfish fishery are reported in the SAFE *Ecosystem Considerations appendix* as an ecosystem-based management indicator. The current ESA biological opinion species that the expected take (bycatch) in the longline fishery is four in any 2-year period. In the event that a fifth bird is bycaught, an ESA Section 7 consultation involving the U.S. Fish and Wildlife Service and the National Marine Fisheries Service must be initiated. This process can lead to additional regulatory action on the fishery.

Reports for 2012 show that the bycatch rate for seabirds in fisheries is 40% below the 5-year average, with no short-tailed albatross catches.

The short-tailed albatross were hunted to near extinction from the 1880s to the 1930s; by 1949 there were no known breeding colonies left. Since that time, the population has been increasing rapidly due to a combination of high annual breeding success (≥54%) and high adult and juvenile survival (≥95% and ≥91%, respectively) (Zador et al., 2008b). These high survival rates suggest that fishery-related mortality currently appears to be a low risk for this population. However, given that the short-tailed albatross population is expanding rapidly (~7% annually; USFWS (2005), Zador et al. (2008b)) it has been suggested that their spatial and temporal overlap with the Alaskan commercial fisheries will become more extensive (Zador et al., 2008a). Recent actions by the NPFMC to restructure the observer program and increase data quality may allow for more detailed monitoring and analysis of bycatch incidents.

Other ecosystem-based management indicators related to the issue and referred to in the SAFE *Ecosystem Considerations appendix* include structural epifauna, forage species, Seabird Bycatch Estimates for Alaskan Groundfish Fisheries, Time Trends in Groundfish Discards, Time Trends in Non-Target Species Catch, Areas Closed to Bottom Trawling in the EBS/ AI and GOA and Number of endangered or threatened species.

Evidence

http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf

	http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf http://www.fakr.noaa.gov/npfmc/conservation-issues/protected-species.html http://www.afsc.noaa.gov/refm/stocks/assessments.htm http://www.afsc.noaa.gov/REFM/Docs/2012/ecosystem.pdf	
Evidence adequacy rating: ☑**High** ☐ **Medium** ☐ **Low**		
☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**		
Clause:	**Evidence**	
13.2.1	**Rating determination** *Non target catches, including discards, of stocks other than the "stock under consideration" are monitored (observer program) and do not threaten these non-target stocks with serious risk of extinction; if serious risks of extinction arise, effective remedial action are taken (fishery closure).* All retained and discarded catch of the managed species count toward TAC. Please see the evidence provided in **Clause 13.2**. U.S. fishing vessels that catch groundfish in the EEZ, or receive groundfish caught in the EEZ, and shoreside processors that receive groundfish caught in the EEZ, are required to accommodate NMFS-certified observers as specified in regulations, in order to verify catch composition and quantity, including at-sea non target discards, and collect biological information on marine resources. Data gathered under the auspices of the North Pacific Groundfish Observer Program (NPGOP) cover 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 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

As well as providing demographic data for scientific purposes, the observer program is also used extensively in- 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.

http://www.fakr.noaa.gov/sustainablefisheries/observers/
http://alaskafisheries.noaa.gov/sustainablefisheries/observers/draft2014adp.pdf

Associated Species (other flatfish)

Single species stock assessments are provided at the single species level for the species with the highest commercial value and catch, while minor flatfish species are assessed within the shallow, deep water and other flatfish groups. These species were assessed originally in the as part of the validation report to frame the unit of certification. These associated flatfish species generally tend to have catches limited to about 1000 tonnes or less and were considered like associated catch to key target fisheries. Here below the original tables from the validation are presented.

Location	**Species**	**Clause evidence adequacy rating**													**Considerations (see below)**
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	
BSAI	Alaska plaice	H	H	H	H	H	H	H	H	H	H	H	H	H	Viable for Full Assessment
	Arrowtooth flounder	H	H	H	H	H	H	H	H	H	H	H	H	H	Viable for Full Assessment
	Flathead sole	H	H	H	H	H	H	H	H	H	H	H	H	H	Viable for Full Assessment
	Bering flounder	H	H	H	M	L	L	M	M	H	H	H	H	H	Aggregated species (with flathead sole), minimal catches (<1000 t), no biomass reference point
	Greenland turbot	H	H	H	H	H	M	M	H	H	H	H	H	H	Requires further analysis but maybe viable for Full Assessment
	Kamchatka flounder	H	H	H	H	H	M	M	H	H	H	H	H	H	Requires further analysis but maybe viable for Full Assessment
	Northern rock sole	H	H	H	H	H	H	H	H	H	H	H	H	H	Viable for Full Assessment
	Yellowfin sole	H	H	H	H	H	H	H	H	H	H	H	H	H	Viable for Full Assessment
	Other flatfish														
	Starry flounder	H	H	H	H	H	L	M	H	H	H	H	H	H	No biomass reference point
	Sakhalin sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t

	Rex sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Dover sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Longhead dab	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Butter sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Arctic flounder	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Deepsea sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	English sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Petrale sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Pacific sanddab	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Roughscale sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Sand sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Slender sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Curlfin sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t

Location	**Species**	**Clause evidence adequacy rating**													**Considerations (see below)**
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	
GOA	Arrowtooth flounder	H	H	H	H	H	H	H	H	H	H	H	H	H	Viable for Full Assessment
	Flathead sole	H	H	H	H	H	H	H	H	H	H	H	H	H	Viable for Full Assessment
	Rex sole	H	H	H	H	H	M	M	H	H	H	H	H	H	Requires further analysis but maybe viable for Full Assessment
	Deep-water flatfish complex														
	Dover sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Greenland turbot	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Deepsea sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Shallow flatfish complex														
	Yellowfin sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Northern rock sole	H	H	H	H	H	H	H	H	H	H	H	H	H	Viable for Full Assessment
	Southern rock sole	H	H	H	H	H	H	H	H	H	H	H	H	H	Viable for Full Assessment
	Butter sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Starry flounder	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	English sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Sand sole	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t
	Alaska plaice	H	H	H	H	H	L	M	H	H	H	H	H	H	Total catch is <1,000 t

GOA Shallow water flatfish

The "flatfish" species complex previous to 1990 was managed as a group in the Gulf of Alaska and included the major flatfish species inhabiting the region with the exception of Pacific halibut (*Hippoglossus stenolepis*). The North Pacific Fishery Management Council divided the flatfish assemblage into four categories for management in 1990; "shallow flatfish" and "deep flatfish", flathead sole (*Hippoglossoides elassodon*) and arrowtooth flounder (*Atheresthes stomias*). This classification was made because of the significant difference in halibut bycatch rates in directed fisheries targeting on shallow-water and deep-water flatfish species. Arrowtooth flounder, because of its present high abundance and low commercial value, was separated from the group and managed under a separate acceptable biological catch (ABC). Flathead sole were likewise assigned a separate ABC since they overlap the depth distributions of the shallow-water and deep-water groups. In 1993 rex sole (*Glyptocephalus zachirus*) was split out of the deep-water management category because of concerns regarding the Pacific ocean perch bycatch in the rex sole target fishery.

The major species, which account for the majority of the current biomass for shallow-water flatfish are: northern rock sole (*Lepidopsetta polyxystra*), southern rock sole (*Pleuronectes bilineata*), butter sole (*Pleuronectes isolepis*), yellowfin sole (*Pleuronectes asper*), and starry flounder (*Platichthys stellatus*). For the assessment, biomass, fishing mortality rates, and ABC estimates are presented for each species and management category. Beginning with the 1996 triennial trawl survey, rock sole was split into two species, a northern rock sole and a southern rock sole. Due to overlapping distributions, differential harvesting of the two species may occur, requiring separate management in the future.

Shallow-water flatfish catch has fluctuated over the last 30 years. Shallow-water flatfish catch was 5,455 t in 1978, catch declined to a low of 957 t in 1986 then increased to 9,715 t in 1993. Catches fluctuated between about 2,577 t and 9,350 t from 1994 to 2003. Catches declined to 3,094 t in 2004 then increased to 9,708 t in 2008. Catch has declined since 2008 to 5,534 t in 2010 and was 3,617 t through October 8, 2011. Trawl fisheries in the Gulf of Alaska were closed due to halibut bycatch from September 3 to 14 and September 16 to 20, 2011. The flatfish fishery is likely to continue to be limited by the potential for high by-catches of Pacific halibut.

The NPFMC Central Gulf management area has produced the majority of the flatfish catch from the Gulf of Alaska. Since 1988 the majority of the harvest has occurred on the continental shelf and slope east of Kodiak Island. Although arrowtooth flounder comprised about half the catch, the fishery primarily targeted on rock, rex and Dover sole.

The shallow-water flatfish catch in 2011 through October 8, was about 6.4% of the ABC (56,242 t) and about 18.0% of the TAC (20,062 t). In 2010 (the most recent full year of data), total catch was 9.8% of the ABC and 27.6% of the TAC. Estimates of retained and discarded catch (t) in the various trawl target fisheries, since 1991, by management assemblage, were calculated from discard rates observed from at sea sampling and industry reported retained catch. Retention of shallow water flatfish was between 71% and 88% from 1994 to 2000. Retention for shallow-water flatfish has been between 87% and 94% from 2001 to 2009.

Table 13.18. Composition of the 1978 to October 8, 2011 Gulf of Alaska shallow water flatfish catch. Catch by North Pacific Fishery Management Council regulatory area available from 1991 to present.

		Area					
Year	Western	Central	Eastern	Total	ABC	OFL	TAC
1978				5,455			
1979				5,625			
1980				5,301			
1981				5,890			
1982				1,802			
1983				4,146			
1984				2,392			
1985				1,020			
1986				957			
1987				3,561			
1988				2,082			
1989				6,160			
1990				5,214			
1991	2223	3074	1	5,298			
1992	2470	6313	0	8,783			
1993	424	9291	0	9,715			
1994	189	3,742	12	3,943			
1995	366	5,057	7	5,430			
1996	443	8,876	31	9,350			
1997	400	7,328	47	7,775			
1998	270	3,204	91	3,565			
1999	268	2,298	11	2,577			
2000	560	6,319	49	6,928			
2001	207	5,955	0	6,162			
2002	223	5,970	2	6,195			
2003	174	4,289	2	4,465			
2004	135	2,958	1	3,094			
2005	107	4,656	6	4,769			
2006	239	7,401	1	7,641			
2007	281	8512	0	8793	51,450	62,418	22,256
2008	761	8947	0	9708	60,989	74,364	22,256
2009	97	8385	1	8483	60,989	74,364	22,256
2010	84	5448	2	5534	56,242	67,768	20,062
2011	110	3,506	1	3617	56,242	67,768	20,062

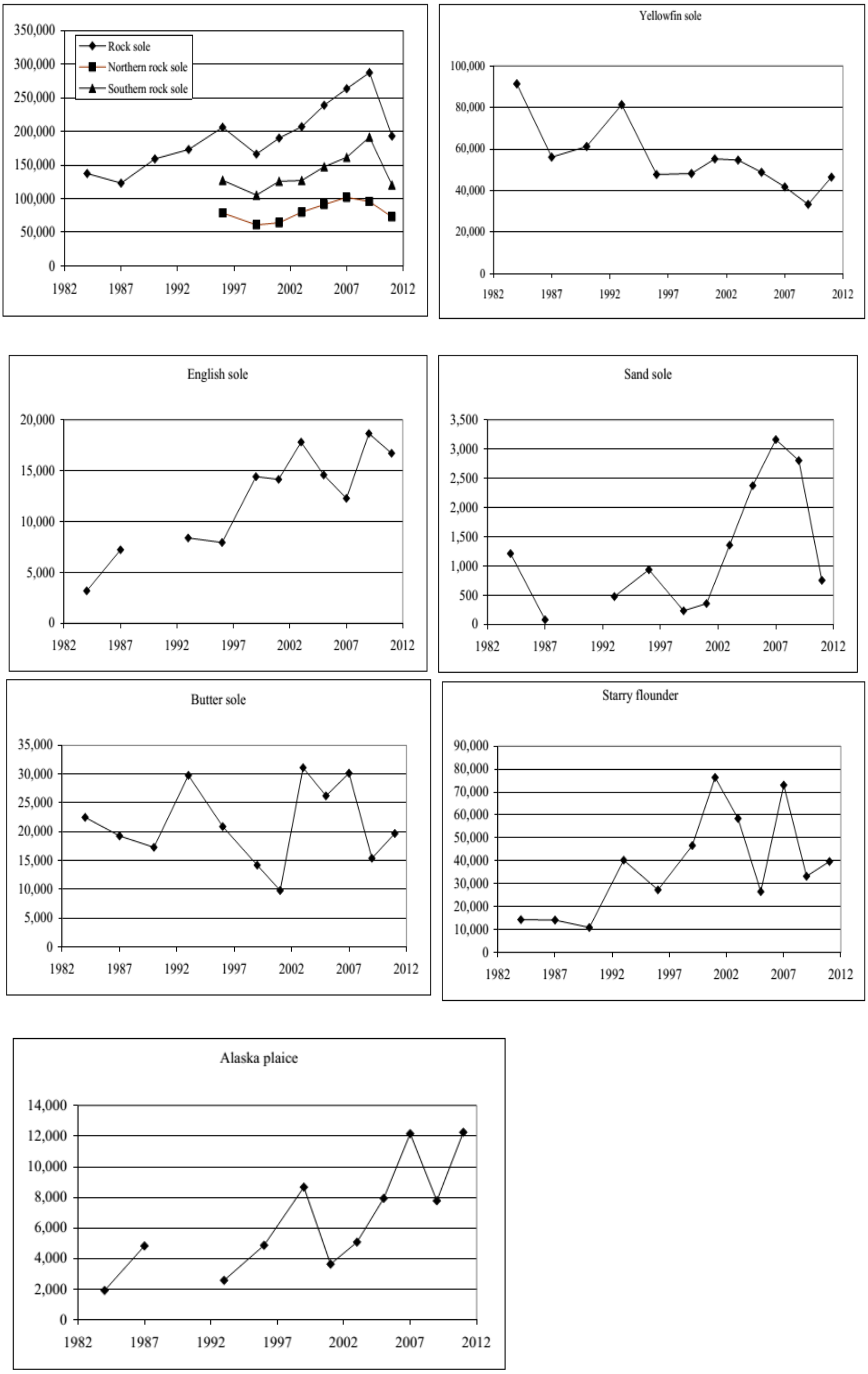


Figure 13.8. NMFS survey biomass estimates by shallow water flatfish species for 1984 to 2011.

Survey abundance estimates for the GOA shallow-water complex were lower in 2011 compared to 2009 for northern and southern rock sole, English sole and sand sole. The 2011 survey abundance estimates were higher than the 2009 estimates, for starry flounder, butter sole, yellowfin sole and Alaska plaice. CV of 011 survey biomass was 0.17 and 0.09 for northern and southern rock sole respectively, 0.25 to 0.29 for starry flounder, butter sole, yellowfin sole and English sole, and 0.37 and 0.46 for Alaska plaice and sand sole. The 2011 NMFS bottom-trawl survey biomass was used as current biomass for calculation of ABC for shallow-water flatfish species. The 2012 and 2013 ABC for shallow-water flatfish was 45,801.5 t, a decrease from 56,242 t, in 2010-11, due to lower survey biomass for the total shallow-water complex in 2011 relative to 2009.

http://www.afsc.noaa.gov/REFM/docs/2011/GOAshallowflat.pdf

GOA Deepwater flatfish

The deepwater complex in the GOA is composed of three species: Dover sole (*Microstomus pacificus*), Greenland turbot (*Reinhardtius hippoglossoides*) and deepsea sole (*Embassichthys bathybius*). Dover sole is by far the biomass-dominant in research trawl surveys and constitutes the majority of the fishery catch in the deepwater complex (typically over 98%). Little biological information exists for Greenland turbot or deepsea sole in the GOA. Better information exists for Dover sole, which allowed the construction of an age-structured assessment model in 2003 (Turnock et al., 2003). Greenland turbot are typically distributed from 200-1600 m in water temperatures from 1-4 C, but have been taken at depths up to 2200 m.

Dover sole occur from Northern Baja California to the Bering Sea and the western Aleutian Islands; they exhibit a widespread distribution throughout the GOA (Miller and Lea, 1972; Hart, 1973). Adults are demersal and are mostly found at depths from 300 m to 1500 m. Dover sole are batch spawners; spawning in the Gulf of Alaska has been observed from January through August, peaking in May (Hirschberger and Smith, 1983).

Deepwater flatfish are also caught in pursuit of other bottom-dwelling species as bycatch. They are taken as bycatch in Pacific cod, bottom pollock and other flatfish fisheries, and are caught along with these species in the deepwater flatfish-directed fishery. The gross discard rates for deepwater flatfish across all fisheries are relatively high, with 39% discarded in 2010 and 49% in 2011.

Historically, catch of Dover sole increased dramatically from a low of 23 t in 1986 to a high of almost 10,000 t in 1991. Following that maximum, annual catch has declined rather steadily, with perhaps a 6-year cycle imposed on the overall trend. The catch in 2011 (403 t as of Sept. 24) was the second lowest since 1987, although it will probably exceed catches in 2005-2006 by year end. Catch of Greenland turbot has been sporadic and has been over than 100 t only 5 times since 1978. The highest catch of Greenland turbot (3,012 t) occurred in 1992, coinciding with the second highest catch of Dover sole (8,364 t) since 1978. This was followed by a catch of 16 t for Greenland turbot the next year. Annual catch has been less than 25 t since 1995. Deepsea sole is the least caught of the three deepwater flatfish species. It has been taken only intermittently, with less than a ton of annual catch occurring 11 times since 1978. The highest annual catch occurred in 1998 (38 t), but since then annual catch has been less than 2 t for 9 out of the past 11 years. Less than 1 t of Greenland turbot and deepsea sole were taken in each of the past two years.

Annual catches of deepwater flatfish have been well below the TACs in recent years. Annual TACs, in turn, have been set equal to their associated ABCs. Limits on catch in the deepwater flatfish complex are driven by within-season closures of the directed fishery due to restrictions on halibut PSC, not attainment of the TAC. Currently, ABCs for the entire complex are based on summing ABCs for the individual species. Because population biomass estimates based on research trawl surveys are considered unreliable for Greenland turbot and deepsea sole, as well as there being an absence of basic biological information from the GOA for these two species, Tier 6 calculations are used to obtain species-specific contributions to the complex-level ABC and OFL for each year. As such, ABCs for Greenland turbot and deepsea sole (179 t and 4 t, respectively) are based on average historic catch levels and do not vary from year to year. Since 2003, the ABC for Dover sole has been based on an age-structured assessment model (Turnock et al., 2003).

Fishery Effects on the Ecosystem

Only small amounts of protected species (crab, halibut, and salmon) are typically taken in the deepwater flatfish directed fishery. In 2010 and thus far in 2011, essentially no halibut, crab, or salmon were caught in this fishery. Catches of Dover sole have been concentrated along the shelf edge east and southeast of Kodiak Island in the Gulf of Alaska over the past few years. It is unknown whether this level of spatial concentration by the fishery will have any effects on the stocks making up this complex, but it seems unlikely. Bycatch of non-target species in the deepwater flatfish fishery is almost non-existent. In addition to deepwater flatfish, the directed fishery has also caught small amounts of arrowtooth flounder, Pacific cod and rex sole as bycatch in recent years. Effects of discards and offal production on the ecosystem are unknown for the deepwater flatfish fishery.

Table 13.19. Time series of recent reference points (ABC, OFL), TACs, total catch and retention rates for the deepwater flatfish complex. All values are in metric tons.

Year	ABC	TAC	OFL	Total Catch	Retained	Discarded	Percent Retained
1995	14,590	11,080	17,040	2,213	1,746	467	79%
1996	14,590	11,080	17,040	2,193	1,584	609	72%
1997	7,170	7,170	9,440	3,664	3,006	658	82%
1998	7,170	7,170	9,440	2,286	2,064	222	90%
1999	6,050	6,050	8,070	2,285	1,824	461	80%
2000	5,300	5,300	6,980	985	701	284	71%
2001	5,300	5,300	6,980	804	607	197	75%
2002	4,880	4,880	6,430	559	357	202	64%
2003	4,880	4,880	6,430	946	470	476	50%
2004	6,070	6,070	8,010	680	549	131	81%
2005	6,820	6,820	8,490	412	171	241	42%
2006	8,665	8,665	11,008	405	162	243	40%
2007	8,707	8,707	10,431	287	116	171	41%
2008	8,903	8,903	11,343	563	210	353	37%
2009	9,168	9,168	11,578	466	99	367	21%
2010	6,190	6,190	7,680	544	333	211	61%
2011	6,305	6,305	7,823	403	205	198	51%

Table 13.20. Biomass estimates (t) for GOA deepwater flatfish by NPFMC regulatory area from the NMFS groundfish trawls surveys. Note that Eastern Gulf (West Yakutat + Southeast) was not surveyed in 2001. Maximum survey depth coverage and the assumed availability of dover sole to each survey are given in the first table, as well.

1) Dover sole.

Year	Western Gulf	Central Gulf	West Yakutat	Southeast	Total	Std. Dev	Max Depth (m)	Assumed availability
1984	4,460	52,469	7,516	4,076	68,521	6,136	1000	1
1987	2,623	34,577	21,067	5,127	63,394	7,388	1000	1
1990	1,649	71,109	18,699	5,140	96,597	12,375	500	0.82
1993	2,371	43,515	26,877	12,787	85,549	6,441	500	0.82
1996	1,458	37,144	29,766	11,162	79,531	5,624	500	0.82
1999	1,442	34,155	25,647	13,001	74,245	5,236	1000	1
2001	895	31,529	--	--	32,424	3,758	500	0.42
2003	3,149	49,283	31,609	15,256	99,297	10,544	700	1
2005	2,832	38,881	25,177	13,647	80,538	6,794	1000	1
2007	2,325	43,490	13,690	12,120	71,624	7,112	1000	1
2009	5,067	35,820	25,838	9,551	76,277	6,437	1000	1
2011	833	35,548	24,678	16,473	77,531	7,398	700	1

2) Greenland turbot

Year	Western Gulf	Central Gulf	West Yakutat	Southeast	Total	Std. Dev
1984	108	184	0	0	292	87
1987	76	67	0	0	143	61
1990	0	0	0	0	0	0
1993	0	0	0	0	0	0
1996	0	0	0	0	0	0
1999	0	0	--	--	0	0
2001	0	0	0	0	0	0
2003	109	0	0	0	109	108
2005	0	0	0	0	0	0
2007	122	0	0	0	122	122
2009	0	0	0	0	0	0
2011	0	0	0	0	0	0

3) Deepsea sole.

Year	Western Gulf	Central Gulf	West Yakutat	Southeast	Total	Std. Dev
1984	0	28	0	190	218	15
1987	0	5	8	147	160	45
1990	0	0	0	0	0	0
1993	0	0	0	0	0	0
1996	0	0	0	0	0	0
1999	0	97	0	0	97	34
2001	0	52	0	0	52	52
2003	12	117	32	19	180	122
2005	0	140	102	20	262	133
2007	0	208	35	30	274	88
2009	0	188	0	60	249	112
2011	0	0	0	41	41	26

http://www.afsc.noaa.gov/REFM/docs/2011/GOAdeepflat.pdf

BSAI "Other" Flatfish

The Bering Sea/Aleutian Islands "other flatfish" group have typically included those flatfish besides northern rock sole, yellowfin sole, arrowtooth flounder, Kamchatka flounder and Greenland turbot. Flathead sole (*Hippoglossoides elassodon*) were part of the other flatfish complex until they were removed in 1995, and Alaska plaice was removed from the complex in 2002, as sufficient biological data exists for these species to construct age-structured population models. In contrast, survey biomass estimates are the principal data source used to assess the remaining other flatfish. Although over a dozen species of flatfish are found in the BSAI area, the other flatfish biomass consists primarily of starry flounder, rex sole, longhead dab, Dover sole and butter sole.

These species are not pursued as fishery targets but are captured in fisheries for other flatfish species and Pacific cod. Catch from 1995-2003 were obtained from the NMFS Regional Office "blend" data, and the catch for some species are reported by species and in an aggregate flatfish group. The catch estimates for these years were produced by applying the proportional catch, by species, from fishery observer data to the estimated total catch for the aggregate other flatfish group, and adding this total to the catch that was reported by species. In the current catch accounting system (in use since

2003), catches of other flatfish are reported only in an aggregate group, and the catch estimates for these years were produced by applying the proportional catch, by species, from fishery observer data to the estimated total catch of the aggregate group. In recent years, starry flounder (*Platichthys stellatus*) and rex sole (*Glyptocephalus zachirus*) account for most of the harvest of other flatfish, contributing 93% of the harvest of other flatfish in 2012. The 2012 catch of 3,292 t through mid-October is well-below the ABC of 12,700 t. Other flatfish fisheries are grouped with Alaska plaice, rock sole, and flathead sole in a single prohibited species group (PSC) classification, with seasonal and total annual allowances of prohibited bycatch applied to the group. In past years, this group of fisheries was closed due to the bycatch of halibut, however, since 2007 there have been no closures.

The biomass of the other flatfish complex on the eastern Bering Sea shelf was relatively stable from 1983-1995, averaging 54,274 t, and then increased from 1996 to 2003, averaging 84,137 t. Since 2003 the biomass estimates have been at a higher level averaging 125,200 t. The 2012 shelf, slope and Aleutian Islands surveys combined estimate of 114,200 t, although lower than most years since 2002, is still at a high level relative to the time-series of observations since 1982. The estimated increases from the past five years are primarily due to the higher estimates of starry flounder on the Eastern Bering Sea shelf. In years when an AI survey was not conducted (2011) total BSAI biomass was calculated by fitting a linear trend to the observed survey data (1991-2010 for this assessment), and then adding the predicted AI biomass estimate to the observed EBS estimate. For the 2012 assessment, the linear model estimates were not used to calculate the 2012 biomass since an Aleutian Islands survey was conducted.

Individual species biomass estimates for the EBS and AI areas from 1997-2012 are shown in the table below. Estimates of total BSAI biomass were then used to compute species-specific exploitation rates (catch/biomass).

Exploitation rates for starry flounder and rex sole have been low, not exceeding 0.05 from 1997 to 2012. The exploitation rates for butter sole have been higher, exceeding 0.14 in 1997, 2000, 2001, and 2003-2009 and 2011-2012. In 2008 the butter sole catch exceeded the trawl survey biomass estimate. However these biomass estimates calculated for butter sole have large sampling variances, with coefficients of variation ranging from 0.44 to 0.86 in recent EBS trawl surveys dating back to 1999. The 2012 exploitation rate is 0.30. Closer inspection of the butter sole biomass variability suggests that occasional high exploitation rates may be an artifact of survey sampling. The 2003 and 2008 biomass estimates of butter sole were 429 t and 541 t, respectively, unusually low relative to biomass estimates from the past 20 years. These estimates are less than one-fourth the 2002 estimate of 2,382 t, and result in an estimated exploitation rate of nearly 70% in 2003 and 1.14 in 2008. However, butter sole were only captured in four hauls in the 2003 EBS trawl survey and in six hauls in the 2008 survey, causing a large coefficient of variation of 0.61 for the estimated biomass. Thus, it is likely that the population of butter sole is larger than that indicated from the survey, and the comparison of survey biomass to harvest should be interpreted accordingly.

Biomass estimates since 2003 have been much higher, and variable. The 2012 biomass estimate of 619 t for butter sole is fairly low relative to the time-series since 1991 (4^{th} lowest) and had a high CV (0.62). The timing of the butter sole fishery catches do not overlap with survey sampling and came primarily from waters less than 50 m in January and February, a depth and time not covered by the trawl survey. Butter sole are mostly caught by non-pelagic trawl catcher-processors in the rock sole and Pacific cod target fisheries in areas 509 and 516. The center of abundance for butter sole in Alaska is in the Gulf of Alaska whereas the survey and fishery catches on the north side of the Alaska Peninsula represent butter sole captured at the periphery of their distribution, where they are relatively rare. Several other species in this management category are relatively rare on the EBS shelf, including Dover sole, Sakhalin sole, and English sole, and it is useful to identify whether the EBS represents the edge of the distribution for these species. The distribution of English sole has been identified as Baja California to Unimak Island, and the distribution of Dover sole has been identified as from Baja California to the Bering Sea (Hart 1973). Thus, the eastern Bering Sea can be considered the periphery of the range for these species.

They are much more abundant in the Gulf of Alaska. For example, the abundance of Dover sole in the 1984-2011 GOA surveys has fluctuated between 63,000 t and 99,000 t, the abundance of butter sole has ranged between 17,000 t and 31,000 t, and the abundance of English sole has varied between 3,000 t and 18,600 t (Turnock et al. 2011). Dover sole and English sole were most common in the eastern portion of the GOA, consistent with their reported distribution along the west coast of North America. In the case of Sakhalin sole, which prefer colder water and are caught at the northern extent of the survey, their perceived abundance from survey biomass estimates may be related to annual mean bottom water temperature as they tended to be more abundant in colder years during the 1980s and 1990s. The recent trend from trawl surveys estimates Sakhalin sole at low abundance, however, sampling of the northern Bering Sea in 2010 indicated that their primary distribution is located to the north of the standard survey area. The northern Bering Sea biomass estimate of Sakhalin sole is 2,180 t compared to the 152 t average for the past 5 years estimated for the standard survey area. Tables of the species making up the other flatfish complex, historic harvest and estimated biomass are presented above (from 2012 Other Flatfish SAFE report).

Table 13.21. Flatfish species of the Bering Sea/Aleutian Islands "other flatfish" management complex.

Common Name	Scientific Name
Arctic flounder	*Liopsetta glacialis*
butter sole	*Isopsetta isolepis*
curlfin sole	*Pleuronectes decurrens*
deepsea sole	*Embassichths bathybius*
Dover sole	*Microstomus pacificus*
English sole	*Parophrys vetulus*
longhead dab	*Limanda proboscidea*
Pacific sanddab	*Citharichthys sordidus*
petrale sole	*Eopsetta jordani*
rex sole	*Glyptocephalus zachirus*
roughscale sole	*Clidodoerma asperrimum*
sand sole	*Psettichthys melanostictus*
slender sole	*Lyopsetta exilis*
starry flounder	*Platichthys stellatus*
Sakhalin sole	*Pleuronectes sakhalinensis*

Table 13.22. Harvest (t) of other flatfish from 1995-2012. 2012 catch is through October 18, 2012.

Year	Starry Founder	Rex Sole	Butter Sole	longhead dab	Dover sole	English sole	deep sea sole	Sakhalin sole	Total	ABC	TAC
1995	398	673	157	7	59	26	4	0	1,324	117,000	19,540
1996	1,171	1,148	218	175	6	0	0	30	2,748	102,000	35,000
1997	1,043	687	448	211	53	0	29	6	2,490	97,500	50,750
1998	402	998	229	93	41	0	0	0	1,765	164,000	89,434
1999	725	998	230	56	81	27	0	0	2,117	154,000	154,000
2000	1,151	1,069	458	277	66	4	0	0	3,027	117,000	83,813
2001	755	869	244	62	70	4	6	0	2,028	122,000	28,000
2002	1,075	1,192	222	107	34	0	1	0	2,631	18,100	3,000
2003	887	1,399	296	125	39	2	0	0	2,749	16,000	3,000
2004	2,062	1,858	514	146	82	6	0	0	4,669	13,500	3,000
2005	2,069	2,001	487	25	16	1	0	0	4,599	21,400	3,500
2006	1,663	1,266	261	33	10	0	0	0	3,233	18,100	3,500
2007	4,356	812	579	87	4	2	<1	<1	5,840	21,400	10,000
2008	1,978	968	618	47	10	2	<1	<1	3,623	21,600	21,600
2009	806	1,143	198	7	7	2	0	<1	2,163	17,400	17,400
2010	1,506	510	162	9	5	<1	<1	<1	2,194	17,300	17,300
2011	2,168	860	107	18	10	13	0	<1	3,176	14,500	3,000
2012	2,205	866	191	9	15	5	0	0	3,292	12,700	3,200

Table 13.22. Estimated biomass (t) and coefficient of variation (in parentheses) for miscellaneous species of the other "other flatfish" management complex in the Bering Sea trawl and Aleutian Islands surveys.

Eastern Bering Sea Shelf survey

Year	Dover Sole	Rex Sole	longhead dab	Sakhalin sole	starry flounder	butter sole	slender sole	sand sole
1982	--	5,994 (0.16)	103,806 (0.16)	--	7,781 (0.32)	182 (0.82)	--	--
1983	--	7,272 (0.18)	51,386 (0.38)	--	7,436 (0.25)	37 (0.45)	--	1,559(0.94)
1984	--	13,058 (0.28)	35,308 (0.16)	137 (0.43)	8,913 (0.36)	2,231 (0.64)	--	--
1985	10 (1.04)	10,751 (0.20)	9,107 (0.13)	102 (0.37)	12,181 (0.24)	2,421 (0.83)	--	--
1986	15 (1.00)	12,886 (0.22)	10,889 (0.14)	274 (0.48)	9,112 (0.33)	6,341 (0.58)	--	--
1987	81 (0.91)	12,931 (0.19)	11,897 (0.19)	110 (0.58)	22,702 (0.63)	2,043 (0.38)	--	--
1988	38 (0.59)	15,445 (0.15)	16,710 (0.19)	1,061 (0.40)	9,222 (0.30)	2,083 (0.47)	--	1,128(1.0)
1989	--	12,939 (0.15)	13,086 (0.16)	129 (0.57)	22,205 (0.35)	1,304 (0.54)	--	--
1990	47 (0.58)	11,857 (0.21)	18,601 (0.15)	587 (0.36)	15,048 (0.26)	986 (0.60)	--	--
1991	55 (0.70)	16,014 (0.28)	18,680 (0.14)	345 (0.68)	34,303 (0.23)	3,056 (0.50)	--	--
1992	137 (0.58)	14,001 (0.24)	10,827 (0.17)	212 (0.48)	27,544 (0.22)	1,233 (0.70)	--	--
1993	37 (0.75)	14,567 (0.32)	11,690 (0.21)	179 (0.31)	16,510 (0.22)	1,517 (0.75)	--	--
1994	73 (0.72)	15,943 (0.38)	18,533 (0.26)	506 (0.52)	18,218 (0.22)	1,095 (0.97)	--	--
1995	--	10,420 (0.28)	8,402 (0.15)	214 (0.27)	17,652 (0.29)	1,203 (0.54)	--	--
1996	--	10,532 (0.40)	8,567 (0.20)	185 (0.56)	40,409 (0.45)	683 (0.53)	--	--
1997	--	8,233 (0.27)	18,003 (0.21)	1,407 (0.84)	41,018 (0.21)	2,884 (0.43)	--	--
1998	41 (0.44)	7,588 (0.22)	14,737 (0.19)	770 (0.86)	49,605 (0.30)	1,942 (0.38)	--	--
1999	16 (0.65)	8,020 (0.28)	12,087 (0.21)	907 (0.63)	43,375 (0.25)	4,152 (0.62)	--	--
2000	11 (1.02)	9,348 (0.19)	13,511 (0.30)	473 (0.43)	45,810 (0.19)	1,713 (0.56)	--	--
2001	16 (0.84)	21,660 (0.23)	12,764 (0.26)	117 (0.32)	43,026 (0.25)	796 (0.50)	--	--
2002	7 (0.80)	26,053 (0.20)	9,740 (0.22)	173 (0.90)	59,877 (0.23)	2,254 (0.64)	--	--
2003	350 (0.66)	28,023 (0.15)	8,827(0.22)	280 (0.75)	52,893 (0.17)	179 (0.61)	3	
2004	31(0.51)	28,762 (0.19)	11,290 (0.23)	1,118 (0.98)	86,698 (0.38)	841 (0.86)	--	--
2005	157(0.19)	23,171(0.19)	11,556 (0.21)	961(0.97)	71,673(0.26)	958(0.81)	--	--
2006	90(0.53)	21,515(0.28)	13,204(0.25)	125(0.58)	96,900(0.37)	1,091(0.53)	--	--
2007	73(0.53)	17,025(0.25)	16,733(0.24)	30(0.34)	98,623(0.17)	1,018(0.44)	--	--
2008	364(0.90)	18,788(0.31)	10,884(0.22)	77(0.36)	74,077(0.21)	418(0.44)	--	--
2009	469(0.95)	18,142(0.39)	5,011(0.23)	55(0.44)	79,366(0.19)	532(0.60)	--	--
2010	201(0.54)	20,320(0.32)	11,557(0.47)	78(0.49)	80,351(0.25)	1,746(0.82)	--	--
2011	4,08(0.96)	18,525(0.32)	10,348(0.59)	513(0.72)	63,986(0.23)	437(0.69)		
2012	1,921(0.7)	39,695(0.25)	9,065(0.23)	37(0.29)	62,837(0.27)	619(0.62)		

Aleutian Islands Surveys

Year	Dover Sole	Rex Sole	longhead dab	Sakhalin sole	starry flounder	butter sole	English sole
1991	174 (0.45)	1,694 (0.18)	--	--	142 (0.85)	86 (0.73)	47 (0.80)
1994	438 (0.41)	4,306 (0.15)	--	--	134 (0.69)	505 (0.98)	83 (0.81)
1997	386 (0.34)	6,378 (0.16)	--	--	459 (0.90)	346 (0.98)	12 (0.72)
2000	630 (0.38)	6,526 (0.18)	--	--	590 (0.71)	310 (0.99)	95 (0.97)
2002	575 (0.28)	7,381 (0.15)	--	--	671 (0.72)	127 (0.83)	47 (0.94)
2004	870 (0.28)	13,717 (0.18)	--	--	123 (0.72)	235 (0.93)	35 (1.00)
2006	2,155 (0.57)	14,230 (0.19)			17 (0.97)	13(0.98)	25 (0.84)
2010	2,853 (0.43)	9,762 (0.14)	--	--	127 (0.14)	180 (0.69)	15 4(0.67)
2012	1,214 (0.24)	1,4102(0.24)	--	--	209 (0.6)	134 (0.1)	26 (0.73)

http://www.afsc.noaa.gov/REFM/Docs/2012/BSAIoflat.pdf

Non Target Species Monitoring

The AFSC monitors the catch of non-target species in groundfish fisheries in the Eastern Bering Sea (EBS), Gulf of Alaska (GOA) and Aleutian Islands (AI) ecosystems. There are three categories of non-target species: 1) forage species (gunnels, stichaeids, sandfish, smelts, lanternfish, sand lance), 2) species associated with Habitat Areas of Particular Concern-HAPC species (seapens/whips, sponges, anemones, corals, tunicates), and 3) non-specified species (grenadiers, crabs, starfish, jellyfish, unidentified invertebrates, benthic invertebrates, echinoderms, other fish, birds, shrimp). Stock assessments have been developed for all groups in the other species (sculpins, unidentified sharks, salmon sharks, dogfish, sleeper sharks, skates, octopus, squid) category, so AFSC does not include trends for \other species" in the Ecosystem SAFE (see AFSC stock assessment website at http://www.afsc.noaa.gov/refm/stocks/assessments.htm).

Total catch of nontarget species is estimated from observer species composition samples taken at sea during fishing operations, scaled up to reflect the total catch by both observed and unobserved hauls and vessels operating in all FMP areas. From 1997-2002, these estimates were made at the AFSC using data from the observer program and the NMFS Alaska Regional Office. Catch since 2003 has been estimated using the Alaska Region's new Catch Accounting system. These methods should be comparable. This sampling and estimation process does result in uncertainty in catches, which is greater when observer coverage is lower and for species encountered rarely in the catch. Until 2008, observer sample recording protocols prevented estimation of variance in catch; however, the AFSC is developing methods to estimate variance for 2008 on which will be presented in future SAFE reports.

Non Specified, HAPC, Forage species

In all three ecosystems, non-specified catch comprised the majority of nontarget catch during 1997-2011. Non-specified catches are similar in the EBS and GOA, but are an order of magnitude lower in the AI. Catches of HAPC biota are highest in the EBS, intermediate in the AI and lowest in the GOA. The catch of forage fish is highest in the GOA, low in the EBS and very low in the AI.

In the EBS, the catch of non-specified species appears to have decreased overall since the late 1990s. Scyphozoan jellyfish, grenadiers and sea stars comprise the majority of the non-specified catches in the EBS. The 2008-2009 and 2010-2011 increase in non-specified catch was driven by jellyfish. Grenadiers (including the Giant grenadier) are caught in the flatfish, sablefish, and cod fisheries. Jellyfish are caught in the pollock fishery and sea stars are caught primarily in flatfish fisheries. HAPC biota catch has generally decreased since 2004. Benthic urochordata, caught mainly by the flatfish fishery, comprised the majority of HAPC biota catches in the EBS in all years except 2009-2011, when sponges and sea anemones increased in importance. The catch of forage species in the EBS increased in 2006 and 2007 and was comprised mainly of eulachon that was caught primarily in the pollock fishery; however, forage catch decreased in 2008-2010. The forage catch increased again in 2011, primarily due to capelin and eulachon.

In the AI, the catch of non-specified species shows little trend over time, although the highest catches were recorded in 2009-2010. The non-specified catch dropped in 2010-2011, primarily due to a reduction in the catch of giant grenadiers. Grenadiers comprise the majority of AI nonspecified species catch and are taken in flatfish and sablefish fisheries. HAPC catch has been similarly variable over time in the AI, and is driven primarily by sponges caught in the trawl fisheries for Atka mackerel, rockfish and cod. Forage fish catches in the AI are minimal, amounting to less than 1 ton per year, with the exception of 2000 when the catch estimate was 4 tons, driven by (perhaps anomalous) sandfish catch in the Atka mackerel fishery.

The catch of non-specified species in the GOA has been generally consistent aside from a peak in 1998 and lows in 2009 and 2010. Grenadiers comprise the majority of non-specified catch and they are caught primarily in the sablefish fishery. Sea anemones comprise the majority of the variable but generally low HAPC biota catch in the GOA and they are caught primarily in the flatfish fishery. The catch of forage species has undergone large variations, peaking in 2005 and 2008 and decreasing in 2006-2007 and 2009-2010. The catch of forage species increased in 2010-2011, primarily due to eulachon and other osmerids. The main species of forage fish caught are eulachon and they are primarily caught in the pollock fishery.

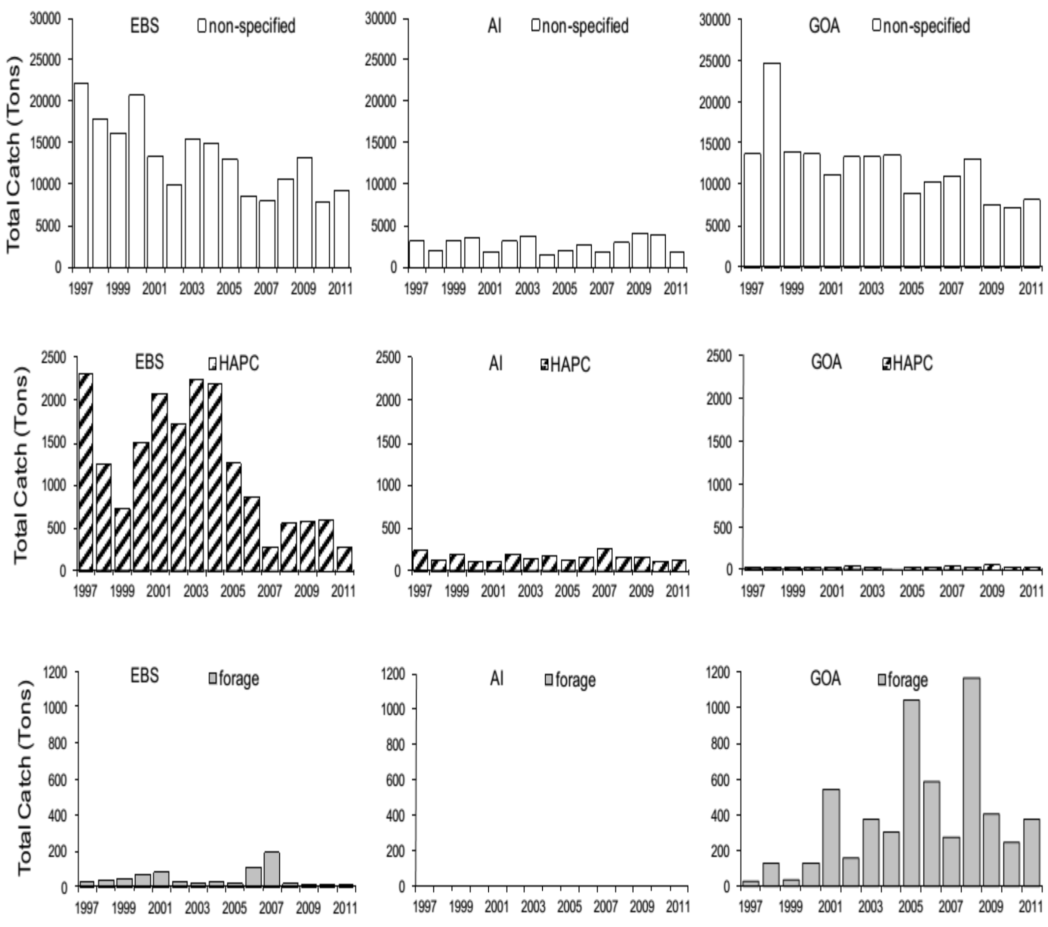


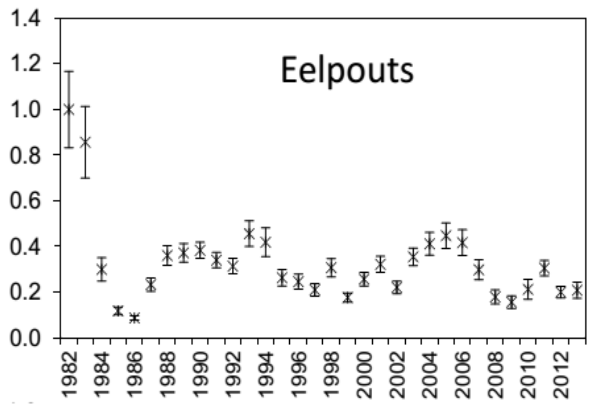
Figure 13.8. Total catch of non-target species (tons) in the EBS, AI, and GOA groundfish fisheries.

Factors causing observed trends: The catch of nontarget species may change if fisheries change, if ecosystems change, or both. Because nontarget species catch is unregulated and unintended, if there have been no large-scale changes in fishery management in a particular ecosystem, then large scale signals in the nontarget catch may indicate ecosystem changes. Catch trends may be driven by changes in biomass or changes in distribution (overlap with the fishery) or both.

Implications: Catch of non-specified species is highest in the non-target category and has remained stable or possibly recently declined in all three ecosystems. Overall, the catch of HAPC and forage species in all three ecosystems is very low compared with the catch of target and non-specified species. HAPC species may have become less available to the EBS fisheries (or the fisheries avoided them more effectively) during the late 2000s. Forage fish may be more available to fisheries in the GOA during the 2000s.

Miscellaneous Species

BSAI index of miscellaneous species. “Miscellaneous" species fall into three groups: eelpouts (Zoarcidae), poachers (Agonidae) and sea stars (Asteroidea). The three dominant species comprising the eelpout group are marbled eelpout (Lycodes raridens), wattled eelpout (L. palearis) and shortfin eelpout (L. brevipes). The biomass of poachers is dominated by a single species, the sturgeon poacher (Podothecus acipenserinus) and to a lesser extent the sawback poacher (Sarritor frenatus). The composition of sea stars in shelf trawl catches are dominated by the purple-orange sea star (Asterias amurensis), which is found primarily in the inner/middle shelf regions, and the common mud star (Ctenodiscus crispatus), which is primarily an inhabitant of the outer shelf. Relative CPUE was calculated and plotted for each species or species group by year for 1982-2013. Relative CPUE was calculated by setting the largest biomass in the time series to a value of 1 and scaling other annual values proportionally. The standard error (1) was weighted proportionally to the CPUE to produce a relative standard error.



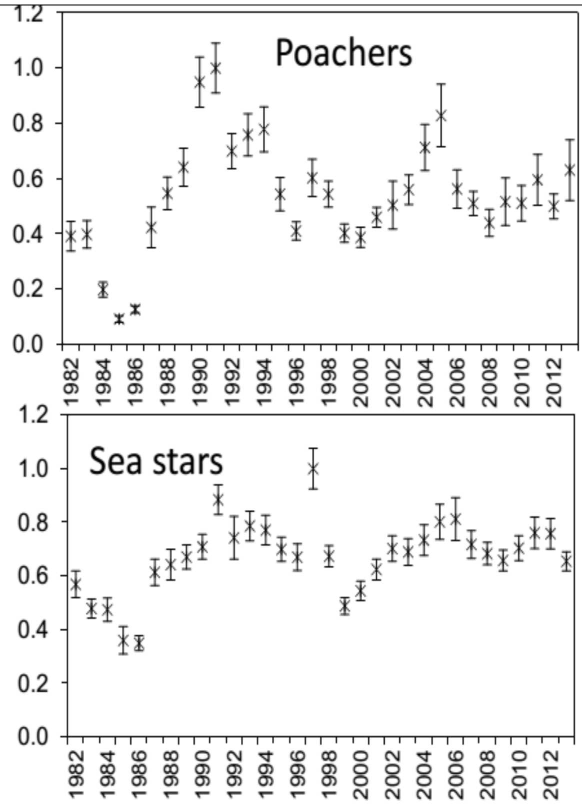


Figure 13.9. AFSC eastern Bering sea bottom trawl survey relative CPUE for miscellaneous species during May to August time period from 1982-2013.

GOA Miscellaneous species index. RACE bottom trawl surveys in the Gulf of Alaska (GOA) are designed primarily to assess populations of commercially important fish and invertebrates. However many other species are identified, weighed and counted during the course of these surveys, and these data may provide a measure of relative abundance for some of these species. For each species group, the catches for each year were scaled to the largest catch over the time series (which was arbitrarily scaled to a value of 100). The standard error (+/- 1) was weighted proportionally to the CPUE to get a relative standard error. The percentage of positive catches in the survey bottom trawl hauls was also calculated.

Status and trends: Jellyfish mean catch per unit effort (CPUE) is typically higher in the central and eastern GOA than in other areas. The frequency of occurrence in trawl catches is generally high across all areas, but has been variable. Jellyfish catches in the western GOA have been uniformly low. Echinoderm catches have been highest in the central GOA and they are consistently captured in about 50% of bottom trawl hauls in all areas. Eelpout CPUE has been variable, with peak abundances occurring in 1993, 2001 and 2009 in the western GOA, 2003 and 2011 in the central GOA and peak catches since 1999 in the eastern GOA. Poacher CPUE's have been in decline since the peak in 1993. Poachers have been uniformly in low abundance in the eastern GOA and have been variable, but somewhat higher in the central GOA.

Factors influencing observed trends: Many of these species are not sampled well by the gear or occur in areas that are not well sampled by the survey (hard, rough areas, mid-water etc.) and are therefore encountered in small numbers which may or may not reflect their true abundance in the GOA. The fishing gear used aboard the Japanese vessels that participated in all GOA surveys prior to 1990 was very different from the gear used by all vessels since. This gear difference almost certainly affected the catch rates for some of these species groups.

Implications: GOA survey results provide limited information about abundance or abundance trends for these species due to problems in catchability. Therefore, the indices presented are likely of limited value to fisheries management.

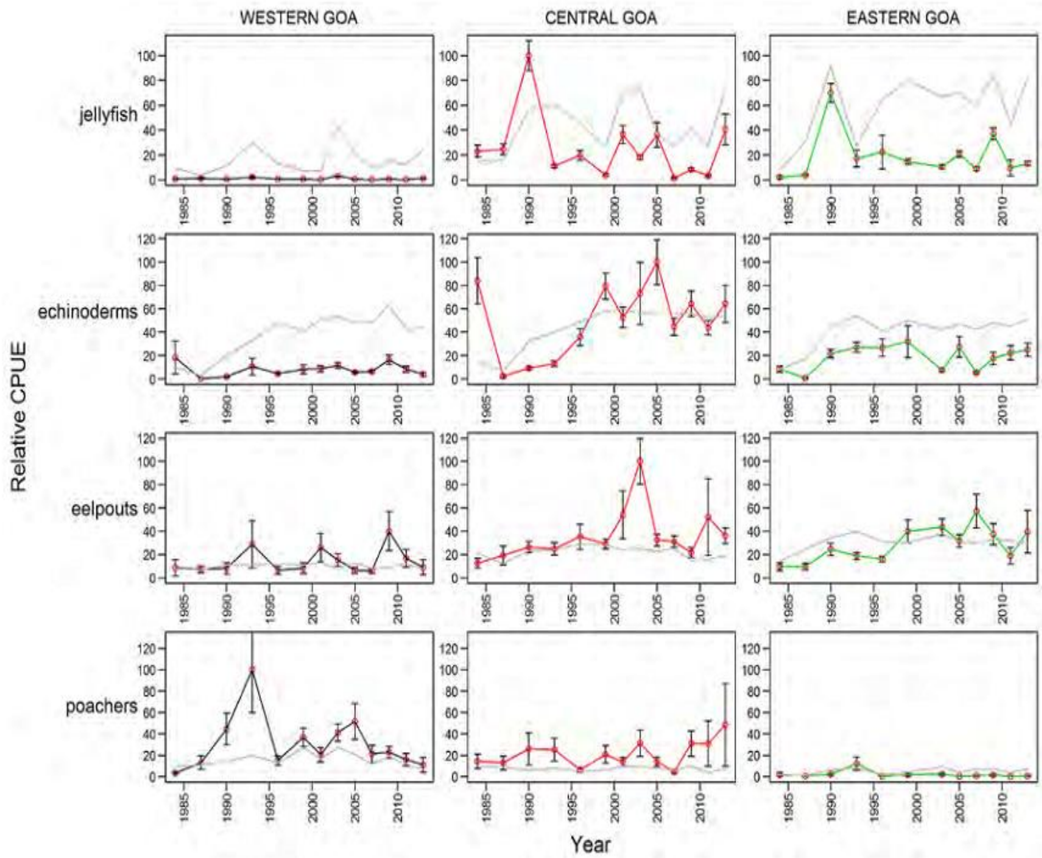


Figure 80: Relative mean CPUE of miscellaneous species by area from RACE bottom trawl surveys in the Gulf of Alaska from 1984 through 2013. Error bars represent standard errors. The gray lines represent the percentage of non-zero catches.

Table 13.10. Relative mean CPUE of miscellaneous species by area from RACE bottom trawl surveys in the Gulf of Alaska from 1984 through 2013. Error bars represent standard errors. The gray lines represent the percentage of non-zero catches.

From 2013 Ecosystem SAFE.

Clause:

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

Eco 31.2

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	Evidence	
13.3	**Rating determination** The role of the *flatfish in the food-web is well described, assessed and considered in the management systems as given in the FMPs and SAFE Ecosystem Considerations appendix. Management measures are in place to avoid severe adverse impacts on dependent predators (halibut, salmon shark, toothed whales, SSL).* As seen in the previous clauses, **13.1, 13.1.2**, the NPFMC, NMFS and other institutions (universities, PICES, NPRB) have studied Alaskan flatfish species and their place in the ecosystem at all life stages. This research is reported in the individual species SAFEs, in the Ecosystem Considerations annual report and in peer reviewed articles or NOAA Technical Memoranda. Trophic interactions of the various flatfish species are described as follows: <u>Alaska plaice</u>- Alaska plaice predate on polychaetes and amphipods and are prey for Pacific cod, Pacific halibut and yellowfin sole. <u>Arrowtooth flounder</u>- In the Bering Sea Aleutian Islands, arrowtooth flounder predate on juvenile pollock (47%), adult pollock (19%) and euphausiids (9%). Predators include Pacific cod, pollock, skates and Pacific sleeper sharks. Arrowtooth flounder are very important as a large, aggressive and abundant predator of other groundfish species. In the Gulf of Alaska, arrowtooth flounder are an important part of the diet of Steller sea lions.	

	Relative to the predator needs in space and time, harvesting of arrowtooth flounder selects few fish 5-15 cm and therefore has minimal overlap with removals from predation. Flathead sole- Flathead sole predate on pollock, polychaetes, brittle stars and crustaceans. They are prey for adult pollock and Pacific cod. The flathead sole fishery is not likely to diminish the amount of flathead sole available as prey due to its low selectivity for fish less than 30 cm. Greenland turbot- Greenland turbot predate on euphausiids, polychaetes and small fish (e.g. pollock) as they mature. In the North Pacific, juveniles are prey for Pacific cod and Pacific halibut. Greenland turbot have undergone dramatic declines in the abundance of immature fish on the EBS shelf region compared to observations during the late 1970's. It may be that the high level of abundance during this period was unusual and the current level is typical for Greenland turbot life history pattern. Without further information on where different life-stages are currently residing, the plausibility of this scenario is speculation. Several major predators on the shelf were at relatively low stock sizes during the late 1970's (e.g., Pacific cod, Pacific halibut) and these increased to peak levels during the mid 1980's. Perhaps this shift in abundance has reduced the survival of juvenile Greenland turbot in the EBS shelf. Alternatively, the shift in recruitment patterns for Greenland turbot may be due to the documented environmental regime that occurred during the late 1970's. That is, perhaps the critical life history stages are subject to different oceanographic conditions that affect the abundance of juvenile Greenland turbot on the EBS shelf. Northern and Southern rock sole- Juveniles consume polychaetes and small crustaceans. Relative to the predator needs in space and time, the rock sole target fishery is not very selective for fish 5-15 cm and therefore has minimal overlap with removals from predation. The target fishery is not perceived to have an effect on the amount of large size target fish in the population due to the history of very light exploitation (3%) over the past 30 years. It is unknown what effect the fishery has had on rock sole maturity-at-age and fecundity. Analysis of the benthic disturbance from the rock sole fishery is available in the Essential Fish Habitat Environmental Impact Statement. Rex sole- The rex sole's diet consists of benthos invertebrates such as crustaceans, worms, shrimps and crabs. Important predators on rex sole include longnosed skate and arrowtooth flounder.	

	Yellowfin sole- Adults feed upon infauna and epifauna such as clams, polychaete worms, amphipods, other marine worms and tunicates. Relative to the predator needs in space and time, the yellowfin sole target fishery has a low selectivity for fish 7-25 cm and therefore has minimal overlap with removals from predation. The target fishery is not perceived to have an effect on the amount of large size target fish in the population due to its history of light exploitation (6%) over the past 30 years. The BSAI and GOA flatfish stocks are above target reference point (except BSAI Greenland turbot), that should allow for enough flatfish availability in upper trophic levels. **Evidence** http://www.afsc.noaa.gov/refm/stocks/assessments.htm	

Clause:

13.4 Pollution, waste, catch by lost or abandoned gear are minimized, through measures including, to the extent practicable, the development and use of selective, environmentally safe and cost effective fishing gear and techniques.

FAO CCRF 7.2.2

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

FAO CCRF 8.7.1

Evidence adequacy rating:

☑High **☐ Medium** **☐ Low**

☑ Full Conformity **☐ Minor Non-conformity** **☐ Major Non-conformity**

☐ Critical Non-conformity

Clause:	**Evidence**	
13.4	**Rating determination** *Pollution, waste, catch by lost or abandoned gear are minimized, through measures including, to the extent practicable, the development and use of selective,*	

environmentally safe and cost effective fishing gear and techniques.

The Environmental Protection Agency (EPA) and Alaska Department of Environmental Conservation (ADEC) regulations are in place that required used gear to be landed in ports for disposal. Other types of pollution (oil, chemicals, waste, harmful substances and garbage) are controlled under MARPOL and implemented under USCG, EPA or ADEC regulations. The ADEC Division of Spill Prevention and Response (SPAR) prevents spills of oil and hazardous substances, prepares for when a spill occurs and responds rapidly to protect human health and the environment. Their regulations are in many cases more stringent and broader in nature. All of these agencies have regulations that require individuals or industry to comply with their standards and expeditiously report any infractions to those regulations.

The Coast Guard's Marine Environmental Protection program develops and enforces regulations to avert the introduction of invasive species into the maritime environment, stop unauthorized ocean dumping, and prevent oil and chemical spills. This program is complemented by the Marine Safety program's pollution prevention activities.

Trawl sweeps modifications implemented in the BSAI fishery allow for a very significant decrease in habitat interaction and crab mortality and interaction. These measures are due for implementation in the GOA in 2014. Longline gear is regulated to avoid seabird bycatch using streamer lines, sink baited lines, circle hooks, line shooters, night settings etc… Avoiding seabird bycatch increases the number of baited hooks present in the water and therefore improves CPUEs. Gillnets for groundfish have been prohibited to prevent ghost fishing and bycatch of non-target species.

Evidence

http://www.fakr.noaa.gov/npfmc/bycatch-controls/CrabBycatch.html
http://www.imo.org/about/conventions/listofconventions/pages/international-convention-for-the-prevention-of-pollution-from-ships-(marpol)
http://www.uscg.mil/top/missions/marineenvironmentalprotection.asp
http://www.epa.gov/lawsregs/topics/water.html#oceans
http://dec.alaska.gov/spar/

Evidence adequacy rating:

☑High **☐ Medium** **☐ Low**

☑ Full Conformity **☐ Minor Non-conformity** **☐ Major Non-conformity**

☐ Critical Non-conformity

Clause:	Evidence	
13.4.1	**Rating determination** *Alaska enforces laws and regulations based on the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating there to (MARPOL 73/78).* **The information supplied above in Clause 13.4** describes the various state and federal agencies who implement regulations that meet or surpass the MARPOL regulations. Members of the Alaska fishing industry sit on the MARPOL advisory committee.	

Clause:

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

Eco 31.3

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

FAO CCRF 8.4.7 Other 12.11

Evidence adequacy rating:

☑High **☐ Medium** **☐ Low**

☑ Full Conformity **☐ Minor Non-conformity** **☐ Major Non-conformity**

☐ Critical Non-conformity

Clause:	Evidence	
13.5	**Rating determination** *There is knowledge of flatfish species essential habitats and potential fishery impacts on them. Impacts on essential habitats and on habitats that are highly vulnerable to damage by the fishing gear involved are avoided, minimized or mitigated. In assessing fishery impacts, the full spatial range of the relevant habitat is considered.*	

	The HCD works in coordination with industries, stakeholder groups, government agencies, and private citizens to avoid, minimize, or offset the adverse effects of human activities on Essential Fish Habitat (EFH) and living marine resources in Alaska. This work includes conducting and/or reviewing environmental analyses for a large variety of activities ranging from commercial fishing to coastal development to large transportation and energy projects. HCD identifies technically and economically feasible alternatives and offers realistic recommendations for the conservation of valuable living marine resources. HCD focuses on activities in habitats used by federally managed fish species located offshore, nearshore, in estuaries, and in freshwater areas important to anadromous salmon. **<u>Flatfish EFH</u>** EFH in Alaska is identified in the FMPs developed for both the BSAI and the GOA. EFH descriptions are comprised of text and maps (Maps are shown in **section 3.1** the Background section). **Alaska Plaice (BSAI)** **Eggs/Larvae/Juveniles:** Eggs and larvae are pelagic. EFH for late juvenile Alaska plaice 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 softer substrates consisting of sand and mud. **Adults:** Summer distribution of adults is generally confined to depths less than 110 m, with larger fish in deeper waters and smaller juveniles in shallower coastal waters. **Arrowtooth flounder (BSAI and GOA)** **Larvae/Juveniles:** Planktonic larvae for at least 2 to 3 months until metamorphosis occurs, juveniles usually inhabit shallow areas until about 10 cm in length. Juveniles occupy continental shelf waters until age 4, at which point their range expands onto the continental slope. **Adults:** Adults migrate seasonally from shelf margins in the winter to the outer shelf in April/May with the onset of warmer waters temperatures. Arrowtooth flounder are very important as a large, aggressive and abundant predator of other groundfish species. In the Gulf of Alaska, arrowtooth flounder are an important part of the diet of Steller sea lions. **Flathead sole (BSAI and GOA)** **Eggs:** EFH for flathead sole eggs is the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and slope (200 to 3,000 m) throughout the BSAI in the spring. **Larvae/Juveniles:** Planktonic larvae that migrate within the water column, than settle	

into nursery areas once they reach 40 to 50mm in size. Juveniles usually inhabit shallow areas (<100 m), preferring muddy habitats.

Adults: Adult flathead sole overwinter near the shelf margins before migrating to the mid and outer continental shelf in April or May each year for feeding.

Greenland turbot (BSAI)

Eggs/Larvae/Juveniles: The eggs, larvae, and post-larvae are all found free-floating in deep water. Metamorphosis is completed at a length of 6-8.5 cm; the young may be found then in the shallower regions inhabited by this flatfish. Juveniles inhabit shallow continental shelf waters (<200 m) for the first 3-4 years and move out to the deeper waters of the continental slope (200-1,000 m).

Adult: EFH for late adult Greenland turbot is the general distribution area for this life stage, located in the lower and middle portion of the water column along the outer shelf (100 to 200 m), upper slope (200 to 500 m), and lower slope (500 to 1,000 m) throughout the BSAI wherever there are softer substrates consisting of mud and sandy mud.

Kamchatka flounder (BSAI)

Essential fish habitat for Kamchatka flounder late juveniles and adults is shown above to be soft substrates along the Bering Sea shelf and among the Aleutian chain.

Northern rock sole (BSAI and GOA) and Southern rock sole (GOA)

Eggs: Adhesive eggs are laid on the bottom and hatch in 6-25 days, depending upon temperature.

Larvae/Juveniles: The larvae develop in the upper water column consuming small zooplankton. Metamorphosis occurs at about 15 mm, and small juveniles can be very abundant in shallow, near-shore waters where they consume polychaetes and small crustaceans.

Adults: Adults are bottom dwellers and occupy separate winter and summer feeding ground along the continental shelf.

Rex sole (GOA)

Eggs/Larvae/Juveniles: Rex sole larvae progressively move cross-shelf toward shore as they grow from April to September, and larvae presumably settled in coastal nursery areas in the autumn.

Adults: EFH for adult rex sole 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 GOA wherever there are substrates consisting of gravel, sand, and mud.

Habitat Effects

Fishing's effects on the habitat of Alaskan flatfish in the BSAI and the GOA do not appear to have impaired any stock's ability to sustain itself at or near the MSY level. The fisheries appear to have minimal effects on the distribution of the adults of each species.
For further information, see clause 9.1.
http://www.fakr.noaa.gov/habitat/efh.htm
http://www.fakr.noaa.gov/habitat/default.htm
http://www.fakr.noaa.gov/habitat/efh/review.htm

The NPFMC has, over the years, spent a lot of time in the NEPA process of fixed gear quotas and allocations (for example Halibut/sablefish IFQs and sablefish pot restrictions as well Pacific cod allocations). The NPFMC archives hold these records. The competitiveness of the fixed gear and the value of the resource have led to technological refinements to address economic and environmental issues. The development and use of selective, environmentally safe and cost effective gear, methods and techniques is common practice for the Greenland turbot longline fishery. The gear as well as all the other plethora of management and operational control measures currently allowed for the fishery in question are in line with the management goals, conservation and optimum utilization of this resource.

Trawl gear modification

The issues of primary concern with respect to the effects of fishing on benthic habitat using non pelagic bottom trawl gear are the potential for damage or removal of fragile biota within each area that are used by fish as habitat and the potential reduction of habitat complexity, benthic biodiversity, and habitat suitability. Based on the information available to date, the predominant direct effects caused by nonpelagic trawling include smoothing of sediments, moving and turning of rocks and boulders, resuspension and mixing of sediments, removal of seagrasses, damage to corals, and damage or removal of epibenthic organisms. Trawls affect the seafloor through contact of the doors and sweeps, footropes and footrope gear, and the net sweeping along the seafloor. Ninety percent of the area impacted by flatfish trawling is due to contact between the seafloor and the sweeps.

The RACE Division has actively collaborated with the BS flatfish fishing industry to develop fishing gear changes that reduce effects of flatfish trawling on the seafloor habitats of the EBS shelf. These conservation engineering efforts originally focused on modification to flatfish trawl gear to reduce impacts to benthic habitat.

	Consultation processes and impact assessments have resulted in amendment 94 to the FMP in BSAI. This amendment requires participants using nonpelagic trawl gear in the directed fishery for flatfish in the Bering Sea subarea to modify the trawl gear to raise portions of the gear off the ocean bottom, and this requirement went into effect on January 2011. The gear modification consists in elevating devices to be placed on the trawl sweeps to lift the sweep off the seafloor. In 2012, an amendment to the Fishery Management Plan for the GOA Management Plan has been proposed to require trawl sweep modification in the flatfish fishery in the Central GOA, and those modified trawl sweep requirements should be in place by 2014. **For further information, see clause 8.4.2 and related. See also previous clause dealing with time, and area closures applied for habitat protection, bycatch reduction and species conservation.** http://www.fakr.noaa.gov/frules/75fr61642.pdf http://www.fakr.noaa.gov/regs/679b27.pdf http://www.fakr.noaa.gov/npfmc/PDFdocuments/bycatch/GOATrawlSweeps211.pdf http://www.fakr.noaa.gov/npfmc/PDFdocuments/conservation_issues/trawlmods112.pdf http://www.fakr.noaa.gov/npfmc/conservation-issues/gear-mods.html http://www.fakr.noaa.gov/npfmc/bycatch-controls/bsai-goa-halibut-bycatch.html http://www.fakr.noaa.gov/npfmc/bycatch-controls/GOA-crab-bycatch.html http://www.fakr.noaa.gov/habitat/efh/review/efh_5yr_review_sumrpt.pdf http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/GOA/GOAfmp613.pdf	
Evidence adequacy rating: ☑**High** ☐ **Medium** ☐ **Low**		
☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity** ☐ **Critical Non-conformity**		
Clause:	**Evidence**	
13.5.1	**Rating determination** *Assessment and scientific evaluation are carried out on the implications of habitat disturbance impact on the fisheries and ecosystems prior to the introduction on a commercial scale of new gear, methods and operations.* The NPFMC already has fully mature fisheries and, unless a new gear can be found to conform to all existing laws and regulations it is not likely to be considered. Significant proposed changes to management go through the NEPA process. Nevertheless, the NPFMC and the industry are always looking at gear modifications, methods or	

	operations that will reduce bycatch or minimize gear impact on the bottom habitat. The NPFMC has a structure of "Test Fisheries" that usually employs a research set aside of quota to test the new equipment, operation or methods. These Test Fishery operations are a full-fledged scientific evaluation, incorporating NMFS, NPFMC staff and industry to develop a plan, which the SSC must sign off on, a reasonable expectation of success and a full monitoring and assessment of the research project on completion. Often the project is more fully vetted through other scientific staff if the proposer seeks additional funds, such as NPRB who uses a very competitive open bid process. If the modification is accepted for commercial use after stringent field testing, the NMFS and the NPFMC will continue to collect data on the operation to see if the expected results appear. The Ecosystem chapter and the various fishing effects described in the BSAI and the GOA SAFE documents is the best understanding of habitat disturbances to date. Because the current ecosystem indices (i.e. FIB, species richness and Shannon-Wiener diversity index) all indicate fairly stable ecosystems, this may be applied as a form of baseline fishery impact. Fishing's effects on the habitat of flatfish in the BSAI and the GOA do not appear to have impaired any stock's ability to sustain itself at or near the MSY level. 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. http://www.iphc.int/sa/bycatch/halexcl.pdf http://www.fakr.noaa.gov/habitat/efh/review.htm http://www.st.nmfs.noaa.gov/st5/abstracts/The_Effectiveness_of_a_Halibut_Excluder_Device_and_Consideration_of_Tradeoffs_in_its_Application.html

Clause:

13.6 Research shall be promoted on the environmental and social impacts of fishing gear and, in particular, on the impact of such gear on biodiversity and coastal fishing communities.

FAO CCRF 8.4.8, 7.6.4

Evidence adequacy rating:

☑**High** ☐ **Medium** ☐ **Low**

☑ **Full Conformity** ☐ **Minor Non-conformity** ☐ **Major Non-conformity**

☐ **Critical Non-conformity**

Clause:	**Evidence**

13.6	**Rating determination** *The NEPA assessment analysis fully evaluates any proposed changes to existing FMP rules and policies as to their impact on biodiversity and coastal fishing communities.* The NPFMC, the SSC, the AP and the NPRB all annually produce a list of research priorities that focus on timely and important management concerns. This list helps NMFS, NPRB and other research funding agencies focus their tight research funds to resolve topical fishery management issues. In addition, the NPFMC and NPRB seek individual, community, NGO and fishing industry regulatory or policy proposals and research proposals. This broad group of potential requesters of research or regulatory proposers assures the NPFMC that proposals will include those who are concerned that industrial fisheries such as flatfish may cause ecosystem or environmental concerns. Because rural coastal Alaskan communities are often concerned with potential impacts from industrial fisheries, they often go to the NPFMC and BOF with their concern over potential or perceived social impacts. The NEPA assessment analysis, fully described under fundamental clause 2's supporting clauses, will fully evaluate any proposed changes to existing FMP rules and policies as to their impact on biodiversity and coastal fishing communities. But the MSA also assures that any proposed change will evaluate biodiversity and coastal fishing communities because of the EFH requirements of the MSA and because National Standard 8 requires the NPFMC to minimize adverse economic impacts on coastal fishing communities. Additionally, the NPFMC's management objectives require that proposed changes promote sustainable fisheries and communities and increase Alaskan Native Consultation. Lastly, AFSC has developed the Economic and Social Sciences Research Program within their REFM division; it provides economic and socio-cultural information that assists NMFS in meeting its stewardship programs. Since coastal community members are important affected stakeholders, the AFSC's Economic and Social Sciences Research (ESSR) Program has been preparing the implementation of the Alaska Community Survey, an annual voluntary data collection program initially focused on Alaska communities for feasibility reasons, in order to improve the socio-economic data available for consideration in North Pacific fisheries management. **Please see also Clauses 2.5, 2.6 and 4.3 for further details.** **Evidence** http://www.nmfs.noaa.gov/sfa/magact http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/BSAI/BSAIfmp613.pdf http://www.afsc.noaa.gov/REFM/Socioeconomics/Default.php	

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 flatfish complex commercial fisheries as they are not an enhanced species/fisheries.

8. External Peer Review

Summary and Recommendation Peer Reviewer A

Summary

The NPFMC has a stellar reputation for precautionary management, and most of the flatfish stocks appear to be very lightly exploited (with the exception of Greenland turbot), so the main issue with evaluating an entire species complex comes down to management of weak stocks, fishery effects on essential fish habitat, and the assessment of stock status on more minor species in the complex. The main challenge is therefore an assessment of a multispecies target fishery and associated bycatch levels and how potential changes in fishery operations (e.g. use of halibut excluders, development of market for minor species) may change impacts on other species in the complex or in the wider ecosystem, and how the management system is structured to monitor and manage those effects in the future.

The report characterises the stock-specific management and time series very well. Ample information is provided about the NPFMC tier system and its application to flatfish. However, the fishery complex itself; the catch assemblage and how it changes with target or season or area, is not characterised (only partially under section 3.5). I think this is because the certification clauses are focussed on single species target fisheries with some “ecosystem” effects, rather than a multispecies target and therefore there are important fishery dynamics that are not yet assessed in the report.

My comments on specific aspects of the report are in the sections below. My main recommendation is that report text needs to be developed to characterise “the fishery”, i.e. total species composition depending on main targets in the BSAI and GOA (these numerical summaries are in the SAFE chapters already, and similar to Table 30 for GOA rex sole, but need to be tied together and described for the report reader). I would add this as a section 3.6 instead of “Incidental catch in the Alaska flatfish complex fishery”. Then conduct an evaluation of what limits the catch for each of the targets (e.g., Is it target species TAC, PSC, TAC of Greenland turbot, or Alaska plaice). And finally, then evaluate how the management system would detect and manage fishery changes resulting from a change in that constraint. Using this information to score section 8 and section 13 would then round out the evaluation. Specific comments on each criterion in the table below.

Overall comments about the report

As I mention above, there are several aspects of report structure which caused me confusion and should be addressed. There is no rationale given for which species are included in the application. Why not all the species in the complex? The flatfish complex fishery is not characterised. The approach appears to be that species that are managed with separate TACS are treated as fisheries. But it is clear that these species are harvested together in different proportions depending on the timing and location of fishing. The report is not clear in how to evaluate this as a complex, as the certification criteria are clearly aimed at a single species target stock fishery. The criteria and assessment units are therefore framed as target species, but the other species in the application are not listed as bycatch within those target fisheries when bycatch is discussed. Is this report merely 12 species all seeking certification at the same time?

Conversely, if the application is to evaluate the species complex as a whole, then where is the description of the complex fishery and how it interacts with the various flatfish species (both those with separate TACS and those with combined TACs)? Which species are targeted as a complex and what is bycatch from that complex? This is not just semantics. Am I to assume that the constrained Greenland turbot quota has no impact on the other species harvested in the Bering Sea? Then there are the 16 “Other flatfish” species in the BSAI and 6 other flatfish species in the GOA shallow water complex - which are not mentioned at all - even under the ecosystem effects section. Several of these other flatfish species are also managed at tier 5, so it is confusing as to why some tier 5 species are in the application and some are not (e.g. Starry flounder and Rex sole in the Bering Sea).

Further, the proposed units of assessment in Section 4 combines BSAI and GOA stocks for the species in common while the report splits them, as does the NPFMC. This again blurs what is meant by the complex, the target, or the region. The rationale for this aggregation is not given and Section 4 seems a bit late in the document to specify – unless the first three sections are supposed to generate the rationale for the units? That purpose is not apparent. After the introductory boilerplate about the program, the first section is Species biology.

One other general report feature is that the document navigation only goes to broad headings, and the individual sub-sections (such as “Incidental catch in the Alaska flatfish complex fishery”) do not show up anywhere as identified headings. Further, the order (and number) of stocks addressed in a given section varies (e.g. in the incidental catch section only 4 stocks are summarised). With 12 stocks, I spent most of my time thumbing back and forth trying to find information. Better document navigation and table of contents would allow a more consistent document structure.

I found the stock assessment section provided a lot of detail that was not necessary. The criteria do not ask for a technical review of the stock assessments themselves, rather the focus is on whether the management system is receiving adequate advice on stock status relative to its reference points and control rules. Therefore, I think including stock assessment details are not necessary and that any technical review of the performance of the assessments requires direct review of the assessment itself, not a summary.

Full Summary of comments

SECTION	
A	**Fisheries Management System**
1. There must be a structured and legally mandated management system based upon and respecting International, National and local fishery laws and considering other coastal resource users, for the responsible utilization of the stock under consideration and conservation of the marine environment.	
Insert comments here. Plenty of supporting information is provided to describe the management system in place and its authority. Assessment Team: no response needed.	
2. Management organizations must participate in coastal area management related institutional frameworks, 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 the avoidance of conflict among users.	
Insert comments here. The NPFMC and the State of Alaska, and other states from the region participate in management of the fishery resources with the NMFS. Assessment Team: no response needed.	
3. Management objectives must be implemented through management rules and actions formulated in a plan or other framework.	
Insert comments here. Extensive fishery management plans exist and are described for the Bering Sea and the Gulf of Alaska. Assessment Team: no response needed.	
B	**Science and Stock Assessment Activities**
4. There must be effective fishery data (dependent and independent) collection and analysis systems for stock management purposes.	
Insert comments here. Data are collected from the fishing vessels, fish processors, through an observer program, through scientific surveys and through research conducted by State agencies, federal agencies, and universities. Although no management agency ever has all the information is needs to manage, the NPFMC has one of the most comprehensive data collection and analysis infrastructures in the world. Assessment Team: no response needed.	
5. There must be regular stock assessment activities appropriate for the fishery resource, its range, the species biology and the ecosystem and undertaken in accordance with acknowledged scientific standards to support optimum utilization of fishery resources.	
Insert comments here. Stock assessments activities for all the species in the application, incorporating new biological data as they become available and updating the status of the ecosystem on potential effects of fishing are typically conducted on alternating years as new survey data become available for each area, and so	

occur annually.

Assessment Team: no response needed.

C	**The Precautionary Approach**

6. The current state of the stock must be defined in relation to reference points or relevant proxies or verifiable substitutes allowing for effective management objectives and target. Remedial actions must be available and taken where reference point or other suitable proxies are approached or exceeded.

Insert comments here.

For the tier levels with reference points, the reference points or proxies are well defined, as are actions to be taken when the reference points are exceeded, typically through prescribed harvest control rules. However, for some species in the application, i.e. Kamchatka flounder or rex sole in tier 5), the F_{OFL} is based on F_{OFL} =M, which although a conservative approach for most life histories (Clark 1991), should be shown at least through simulation to be robust to the life histories exhibited in the flatfish complex. For example, the age at 50% maturity for yellowfin sole or Kamchatka flounder of 10 years is relatively old, especially for flatfishes, and values of M used for these stocks appears to be under detailed review but may currently be too high (meaning that F_{OFL} may be too high). If already done, this work should be summarised here.

I see in the SAFE chapters that harvest was set using the tier 5 method because estimates of $F_{40\%}$ were not reliable, but that stock status could be determined as not overfished because there was a model estimate of $B_{100\%}$. The details and caveats of this assertion are not explained. These stocks appear to be lightly exploited, but the point here is that stock status relative to established reference points is not known for some stocks and they are managed under tier 5. When the assessment models are sufficiently robust to provide management advice relative to reference points and the tier levels are changed to tier 3, then the criteria are met. Therefore I don't support a high conformity score for 6.

Assessment Team Response: Peer reviewer comments taken.
Current knowledge of natural mortality and their application in relation to overfishing concerns for the species in questions has been supplied below. The assessment team has looked at past performance as well as likely future developments and given that eventual certification would last for 5 years with yearly surveillance assessments, the tier 5s presented above are likely to be upgraded to tier 3 assessments within the certification period. Evidence is provided below.

The natural mortality rate of Kamchatka flounder was evaluated from 4 separate methods for the latest (Dec 2012) assessment and was re-estimated at a lower value (0.13) than in 2011 (0.2).
In the draft 2013 SAFE report Kamchatka flounder are managed as a Tier 3 stock using a statistical age-structured model as the primary assessment tool. Details of the model and last year's full assessment can be found at http://www.afsc.noaa.gov/REFM/docs/2012/BSAIkamchatka.pdf. For the 2013 update, the assessment model is not re-run (due to temporary federal government shutdown) but instead, the projection model is run with updated catch information only. This projection model run incorporates the most recent catch information and provides estimates of 2014 and 2015 ABC and OFL without re-estimating the stock assessment model parameters and biological reference points. This update does not incorporate the 2013 EBS shelf survey information.
Projected 2014 female spawning biomass is estimated at 50,400 t, above the B40% level of 46,100 t, and is projected to remain above B40% if fishing continues at that level. The stock was not being subjected to overfishing last year, is currently not overfished, nor is it approaching a condition of being overfished (http://www.afsc.noaa.gov/refm/stocks/plan_team/BSAIkamchatka.pdf).

As in the 2005 SAFE report, natural mortality (M) for GOA rex sole was fixed at 0.17 yr^{-1} for both sexes in all age classes. This value was based on maximum observed age of 27 years for rex sole (Turnock et al., 2005, 2005 SAFE). In the latest SAFE (Dec 2011) the authors developed harvest recommendations for the GOA rex sole stock using a Tier 5 approach (FOFL=M, FABC=0.75·M) applied to estimates of adult biomass from a Tier 3-type age-structured assessment model. Although it is not possible to use a Tier 3 approach to making harvest recommendations for rex sole because estimates of F35% and F40% are not considered reliable, the SSC has decided that it is possible to use a Tier 3 approach for determining overfished status because the estimate of $B35\%=0.35\cdot B100\%$ (i.e., 35% of the unfished spawning stock biomass) is considered reliable (it does not depend on the fishery selectivity), as is the estimate of current (2013) spawning stock biomass. Because the estimated spawning stock biomass for 2013 (52,807 t) is greater than B35% (19,434 t), the stock is not considered overfished. Because the 2012 catch was less than the 2012 ABC (i.e., 2,425 t < 9,612 t), overfishing is not occurring (http://www.afsc.noaa.gov/refm/stocks/plan_team/GOArex.pdf).

Natural mortality (M) for BSAI Yellowfin sole, a tier 1a species, was initially estimated by a least squares analysis where catch-at-age data were fitted to Japanese pair trawl effort data while varying the catchability coefficient (q) and M simultaneously. The best fit to the data (the point where the residual variance was minimized) occurred at a M value of 0.12 (Bakkala and Wespestad 1984). This was also the value which provided the best fit to the observable population characteristics when M was profiled over a range of values in the stock assessment model using data up to 1992 (Wilderbuer 1992). Since then, natural mortality has been estimated as a free parameter in some of the stock assessment model runs which have been evaluated for the past five years. A natural mortality value of 0.12 is used for both sexes in the base model presented in the December 2012 SAFE assessment. The 2012 SAFE report for this species reported no overfishing or overfished status with the stock continuing to be well above BMSY and the annual harvest below the ABC level.

Overall, the assessment team acknowledges the comments of the peer reviewer in relation to potential overfishing risks but does not endorse them based on the information provided above. The Kamchatka flounder and Rex sole have been shown to be above target reference point. The score of clauses under section 6 is therefore still considered high. However, given the points raised and the new stock assessment information available, changes will be made to this assessment report to characterize and update more precisely stock status informations about BSAI Kamchatka flounder and GOA rex sole.

> The goal here should be to have regularly updated, integrated age or length-based stock assessment models for any certified stock. In addition, for some species in the complex, assessment models are brand new, and there is evidence presented that a stock assessment is in development for Kamchatka flounder. This is welcome and great progress, but I do not place a lot of weight on a stock assessment that has only been used for management advice once or that may be accepted in a future version, especially given the dramatic changes observed in the Greenland turbot assessment. Biological data for many of the flatfish species is limited, dated, or uncertain (maturity for arrowtooth flounder, natural mortality for several species, or even the catch and discard histories given lack of speciation records for some species in earlier years when observers were not present).
>
> The Greenland Turbot assessment is troublesome as it is likely to change fishery behaviour in the short term, influencing other stocks, and also raises questions about the potential for large changes in other assessments as biological or catch history data are updated or re-evaluated. It appears that recent strong recruitment may keep Greenland turbot out of the overfished category, but it seems to be simply luck that recent year classes were strong. However, it does provide a good test case for the certification evaluation in how the reduction in TAC for one species in a complex is monitored and managed.

Assessment team response: Recent strong year classes are certainly the saving grace for Greenland turbot stock in the BSAI. This parameter as well as harvest specifications, Alaska as well as Russian catches were also evaluated thoroughly to understand if the stock was suffering from overfishing or not. Overall, within the chosen stock assessment model both in 2012 and 2013, the total catches were well within limits and the stock is not considered overfished nor approaching an overfished condition (http://www.afsc.noaa.gov/refm/stocks/plan_team/BSAIturbot.pdf).

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

Insert comments here.
The tier system used by the NPFMC incorporates uncertainty in assessment methodology in developing reference points and in setting harvest control rules by utilizing more conservative harvest rates for stocks with lower information availability. In addition, even for stocks with estimates of F_{msy} or B_{msy}, a more conservative approach to using $F_{40\%}$ or $B_{40\%}$ can be used.

Assessment Team: no response needed.

D	Management Measures

8. Management must 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.

Insert comments here.
Harvest control rules are in place with prescribed management actions depending on the stock status estimated. With the exception of Greenland turbot, flatfish stocks appear to be lightly exploited and so harvest control rules to constrain target catch are typically not reached, although some recent instances do exist and PSC catch has been controlling in some areas.

The flatfish fisheries in Alaska, and in other parts of the world, have always struggled with bycatch and discard. The section under 8.4 describes the NPFMC's attempts to craft a system to improve retention through IR/IU, GRS, and although not discussed in detail, the new Bering Sea Flatfish Harvest Specifications Flexibility action. Changes such as these can create problems for managers because past fishery data no longer predicts future fishery behaviour.

Discard rates in the BSAI in 2013, after the revisions to the GRS by NMFS, appear to have increased again to well over the 10-20% noted in table 8.2, to near 50% for Alaska plaice and also high in arrowtooth flounder (Table 8.6). In addition, attainment of the Alaska plaice TAC in 2013 caused a spatial shift in the fishery to avoid further catch. I note that discard rates in these fisheries should be relative to the species summarized, not the complex as a whole, as a large TAC (e.g. yellowfin sole) with a low discard rate can mask high levels of discard for other species. The most recent fishery performance regarding retention should be included in other report sections referring to the improved retention for the Bering Sea (e.g., 8.4.1, 9.3, 9.5). A good characterisation of the Bering Sea flatfish harvest specifications flexibility changes should be included in the report because it is complex and could have unseen implications for future fishery dynamics. This actually highlights another aspect of multispecies fisheries and bycatch; i.e., that these are long standing problems that are still being worked out. Although managers are trying new approaches, they don't always work out as intended and performance may not be predictable. The process is evolving.

Assessment Team response: the comments of the peer reviewer are acknowledged. The assessment team is aware of the large discard rates of Alaska plaice in 2013. The BSAI Alaskan plaice fishery was closed in May of 2013 due to the initial total allowable catch (ITAC) having been reached. Vessels fishing flatfish in the BSAI were prohibited from retaining Alaska plaice and forced to move their operations away from areas with high Alaska plaice catches. Discarding catches is not ideal, especially when such large amounts are discarded, but it is prudent to remind that the flatfish fisheries in Alaska are managed in-season to achieve the TACs without exceeding the ABC or OFL. All catch taken in directed fisheries or caught incidentally in other fisheries, whether retained or discarded, accrues towards the TAC. This is accounted by the observer program and accrued towards the NMFS catch accounting system. Recommended ABC for 2013 was 55,200 t while the catch estimated on the latest draft 2013 SAFE report up to the week of October 24th was for 23,000 tonnes (catch plus discards) http://www.afsc.noaa.gov/refm/stocks/plan_team/BSAIplaice.pdf.

While the assessment team fully agrees with the comment *"I note that discard rates in these fisheries should be relative to the species summarized, not the complex as a whole, as a large TAC (e.g. yellowfin sole) with a low discard rate can mask high levels of discard for other species"* the team would like to point out that these vessels target and have quotas for multiple flatfish species, meaning that discards of a given species always sum up towards the TAC of that species, and while performance in decreasing discards is extremely important, not overshooting TAC and Allowable Biological Catch (ABC) is paramount.

The overall discard for a species may be produced either during direct catches of the target species or by targeting other flatfish species. As pointed out above, Alaska plaice recommended ABC for 2013 was 55,200 t while the catch estimated on the latest draft 2013 SAFE report up to the week of October 24th was for 23,000 tonnes (retained and discards).

The most recent fishery performance regarding retention has been included/referenced in other report sections referring to the improved retention for the Bering Sea (e.g., 8.4.1, 9.3, 9.5).

In June 2012, the Council initiated this analysis to change the harvest and accounting methodology for flathead sole, rock sole, and yellowfin sole, in order to allow increased flexibility in targeting these species. This issue was originally brought to the Council in testimony by industry, in December 2010. The Council reviewed several iterations of a discussion paper evaluating different approaches to increase flexibility in the specifications process, including the use of nonspecified reserves, and other measures.
The discussion paper also identified legal, practical, and policy implications of such measures. In investigating approaches to achieve increased flexibility in how flatfish may be harvested in the BSAI, the discussion paper identified certain basic assumptions, with which the Council agreed:

- Ensure that the OFL and ABC for a target stock are not exceeded.
- Ensure that the 2 million mt optimum yield cap is not exceeded.
- Be consistent with the management goals established under the Amendment 80 Program.
- Provide a transparent process for determining allocations before the start of the fishing year, preferably in the harvest specifications process.

Under the approach proposed in this analysis, no change is envisioned to the current process for establishing individual overfishing levels (OFLs), ABCs, or TACs for each of the three species through the harvest specification process. The proposed approach would not alter the way that stock assessments are conducted for the individual species, nor the recommendations for OFL and ABC made by the Plan Team and the Council's Scientific and Statistical Committee.
The approach also assumes that, to the extent possible, the Council's intention is to be consistent with the existing Amendment 80 Program. The various sectors that harvest the three flatfish species would continue to be managed, either through hard caps or through NMFS' inseason management, in such a way as to prevent allocations or catch limits from being exceeded.
The Bering Sea Flatfish Harvest Specifications Flexibility Council motion, which shall be implemented by NMFS in 2015, will allocate the ABC surplus (i.e., the difference between acceptable biological catch and total allowable catch) for flathead sole, rock sole, and yellowfin sole, among the Amendment 80 cooperatives and CDQ groups, using the same formulas that are used in the annual harvest specifications process. These entities would be able to exchange their quota share of one of the three species (flathead sole, rock sole, and/or yellowfin sole) for an equivalent amount of their allocation of the ABC surplus for another (flathead sole, rock sole, and/or yellowfin sole). The approach is intended to increase the opportunity for maximizing the harvest of these species, while ensuring that the overall 2 million mt optimum yield and ABCs for each individual species are not exceeded. Flatfish TACs are consistently underharvested, due to various economic, regulatory, and environmental constraints. Under the Magnuson-Stevens Act and the Council's BSAI FMP, there is a need to promote conservation while providing for optimum yield for the BSAI groundfish fishery.

Environmental impacts
To the extent that the Flatfish Flexibility option will allow the Amendment 80 sector to fully harvest their flatfish allocations, there may be an increase in incidental catch associated with an increase in effort. All groundfish species, however, are already managed under sustainable annual catch limits. Slight changes in fishing patterns that affect groundfish target or incidental catch species would continue to be accounted for in future stock assessments.

In terms of PSC, the sector is also capped in its use of prohibited species, as there are specific PSC limits for the sector's use of halibut and crab. While the flexibility afforded in these alternatives may result in some seasonal changes in fishing patterns, as fishermen react to changing incidental catch and environmental conditions, it is likely that the fleet will continue to be concerned about minimizing halibut PSC encounters, and will use their increased flexibility to actively target fisheries with lower halibut encounters. Halibut has long been a constraint for these fisheries, and the cooperatives report annually to the Council on their efforts to avoid halibut PSC. In 2012, the red king crab PSC limit was reduced, and as the limit threatened to be constraining, fishermen were successful in avoiding red king crab PSC. The threat of exceeding PSC hard caps, and thus ending fishing opportunities, will continue to be a primary incentive for PSC avoidance in this fleet; the flatfish flexibility regulation provide additional flexibility to enable the fleet to manage themselves effectively within multiple hard caps.

The stock assessment for BSAI flathead sole notes that it may be possible in the near future to consider developing species-specific components for ABC and OFL for this complex. In the fishery, the term "flathead sole" will generally refer to a complex of two species, flathead sole and Bering flounder, both Hippoglossoides species (Stockhausen et al. 2012). The two species are very similar morphologically, but differ in characteristics and spatial distribution. Bering flounder typically represents less than 3% of the combined biomass of the two species in annual groundfish surveys.

Entities with exclusive catch and use privileges (e.g., cooperatives and CDQ groups) are prohibited from exceeding their allocations by regulation, so additional uncertainty would be limited to exceeding the apportionments for the incidental catch allowance, the BSAI trawl limited access sector, or an Amendment 80 limited access sector if it existed. If necessary, under this approach, the agency may set a more conservative ICA for these species. The ICA can be reallocated to Amendment 80 cooperatives, however, so this should not substantially affect the attainment of optimum yield.

No enforcement or safety issues have been identified as a result of implementing this alternative.

The approved motion will amend the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area and Federal regulations related to the Bering Sea / Aleutian Islands.
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/SPECS/BSFlatfishFlexPR413.pdf

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

Insert comments here.
The NPFMC addresses this criterion through harvest control rules based on stock status reference points and ecosystem considerations including and evaluation of essential fish habitat. Alaska also benefits from active conservation engineering programs in collaboration with industry which seek to maintain harvest efficiency while reducing the impacts of fish on fragile benthic species (e.g. raising trawl sweeps), and through gear selectivity research (e.g. halibut excluders). This type of work has been extremely valuable in Alaska and is not a routine component of fisheries management in globally. The role of industry in making this work possible cannot be understated.

Assessment Team: no response needed.

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

No comment.

E	**Implementation, Monitoring and Control**

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

No comment.

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

No comment.

F	**Serious Impacts of the Fishery on the Ecosystem**

13. Considerations of fishery interactions and effects on the ecosystem must 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 must be appropriately assessesd and effectively addressed.

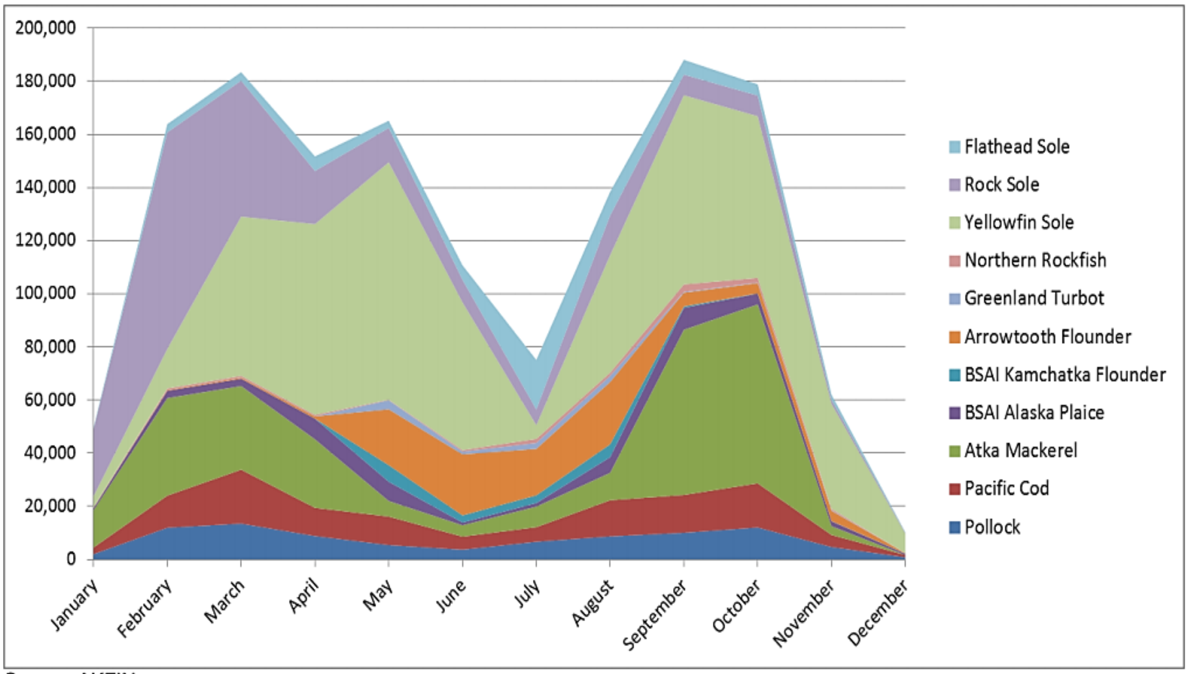
Insert comments here.
The NPFMC has a great history of monitoring, characterising and acting to minimize the effects of fisheries on the ecosystem. The Ecosystem SAFE documents and ecosystem effects on the stock sections of stock assessments have set the standard internationally for considering the effects of fishing on the wider ecosystem and on essential fish habitat.

However, the summary for this section (focussing on 13.1.2) does not provide the information needed for review. Because fisheries are not defined (see general comments), there is a moving base line. The incidental catch section only provides data for four target species (BSAI flathead sole, BSAI northern Rock sole, BSAI yellowfin sole, and GOA rex sole).

Assessment Team response. Clause 13.1.2 has been improved by providing more bycatch information. The clause starts with species specific catches of Prohibited Species Catch (PSC) species for which there is a quota, that if reached closes the fishery. In the case of flatfish, both in the BSAI and the GOA, halibut PSC is the determining factor in fore closing flatfish fishing, often before the flatfish TACs are reached. Then, further bycatch information has been provided for the species in question. However, of note is the fact that because this is a multispecies fishery, several species are targeted at once and bycatch is accounted to the species that make up the larger percentage (by weight) of a given haul. This is why availability of specific bycatch information (i.e. 1) non-prohibited species and 2) non-FMP species) is not available for all species.

The flatfish fisheries are multispecies fisheries, in which incidental catch species are often an important component of the catch. The figure below summarizes the catch composition in the yellowfin sole target fishery, which is the most important flatfish fishery by volume, for the combined years 2008 through 2012, in the BSAI. While catch composition varies by month, the primary incidental catch species in the yellowfin sole fishery, by volume, are Pacific cod, Alaska plaice, pollock, and rock sole. Flathead sole, arrowtooth flounder, and other flatfish are also caught incidentally, along with very small amounts of other species.

Figure 5 BSAI groundfish total catch by Amendment 80 vessels, summed for 2008 through 2012, by month.



Source: AKFIN.

http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/SPECS/BSFlatfishFlexPR413.pdf

Sharks are then added for the GOA or BSAI "fisheries" as a whole.

I don't see that there are any skates caught in the Bering Sea.

Assessment Team Response. Sharks and skates catches are available in the data mentioned above in section 13.1.2.

Where are the other "fisheries", and if they are all "incidental", then where are they listed as non-target catch from the target fisheries? And if there is just a BSAI fishery and a GOA fishery, then why are there all these other tables of "target fisheries"? And why is there GOA bycatch data section 3.5? Just rex sole? The tables jump around in units from tons, to %, to specific tables for different PCS groups. Much of this is due to copy and pasting tables from different reports, but makes it difficult (and I maintain impossible) to actually evaluate what the fishery or fisheries actually are, what is bycatch and what is target (even in a multispecies sense), how they all add up to the total catch for a species, and how these have changed through time. Some of these tables are in the SAFE documents, but need to be put together and characterised. I can't agree with the conclusion in 13.1.2 based on what is presented.

Assessment Team Response. The section has been added bycatch information starting with PSC catches to non-prohibited species and non-FMP species. The comments provided above apply, in that this is a multi species fishery.

13.2.1 is about "stocks other than the stock under consideration". In a species assemblage scenario, this needs clarification. To me, this implies that here we consider other managed stocks, such as the "Other flatfish". I am not sure where else those fit in the review as other criteria are about the stocks in the application, so I will put them here. I would also include here all the species in the "ecosystem", though there does not seem to be any distinction in the criteria between application stocks, other stocks in the complex, other managed stocks, or stocks considered under ecosystem effects. Again, these tables are in the cited stock assessment documents, but not mentioned in the report and need to be there.

Assessment Team Response. Information about associated stocks has been provided accordingly. Part of this analysis was carried out during the validation activities for this fishery.

Further, the numbers for bycatch are astounding. I realize these are huge areas and associated with very large TACs, but for example, 2012 BSAI yellowfin sole fishery alone had more than 76,000 tons of miscellaneous fish and often reports more than a million tons of sea stars? The BSAI northern rock sole fishery reported more than 63,000 tons of sponges, 300,000 tons of sypho jellies, 17,000 tons of misc fish (I assume tons as it is the same format table labelled as tons for BSAI yellowfin and tables in the original cited document also do not report units). And note that the Misc fish row does not appear to link to the "other fish species" table in the assessment document for a given year (Table 4.23). I am hoping that there is a units error in the stock assessment table 4.24, but the 62,438 tons of bycatch fish species in 2011 is in the same order of magnitude as the 40,108 tons of misc fish reported in the following table for the same year. The criteria are clear for this section and several NPFMC reviews found no significant effects of fisheries on the ecosystem, especially in light of the many actions, closures, and gear modifications to minimize potential fishery impacts. Therefore I am not disagreeing with the conformance rating, but felt I needed to comment on the absolute value of incidental catch regardless of the geographic scale at which it occurs.

Assessment Team Response. The assessment team agrees with the comments of the peer reviewer. Further information about these non target species has been provided. The units t (tonnes) are correct, these two target species, being the most abundant, have also the large majority of the bycatch associated to the flatfish fisheries in the BSAI. The numbers for starfish are indeed large, although they are all released and generally suffer from very low mortality rates. CPUE data for some of these species are provided below together with more specific species information and abundance trends.

BSAI index of miscellaneous species. "Miscellaneous" species fall into three groups: eelpouts (Zoarcidae), poachers (Agonidae) and sea stars (Asteroidea). The three dominant species comprising the eelpout group are marbled eelpout (*Lycodes raridens*), wattled eelpout (*L. palearis*) and shortn eelpout (*L. brevipes*). The biomass of poachers is dominated by a single species, the sturgeon poacher (*Podothecus acipenserinus*) and to a lesser extent the sawback poacher (*Sarritor frenatus*). The composition of sea stars in shelf trawl catches are dominated by the purple-orange sea star (*Asterias amurensis*), which is found primarily in the inner/middle shelf regions, and the common mud star (*Ctenodiscus crispatus*), which is primarily an inhabitant of the outer shelf. Relative CPUE was calculated and plotted for each species or species group by year for 1982-2013. Relative CPUE was calculated by setting the largest biomass in the time series to a value of 1 and scaling other annual values proportionally. The standard error (1) was weighted proportionally to the CPUE to produce a relative standard error.

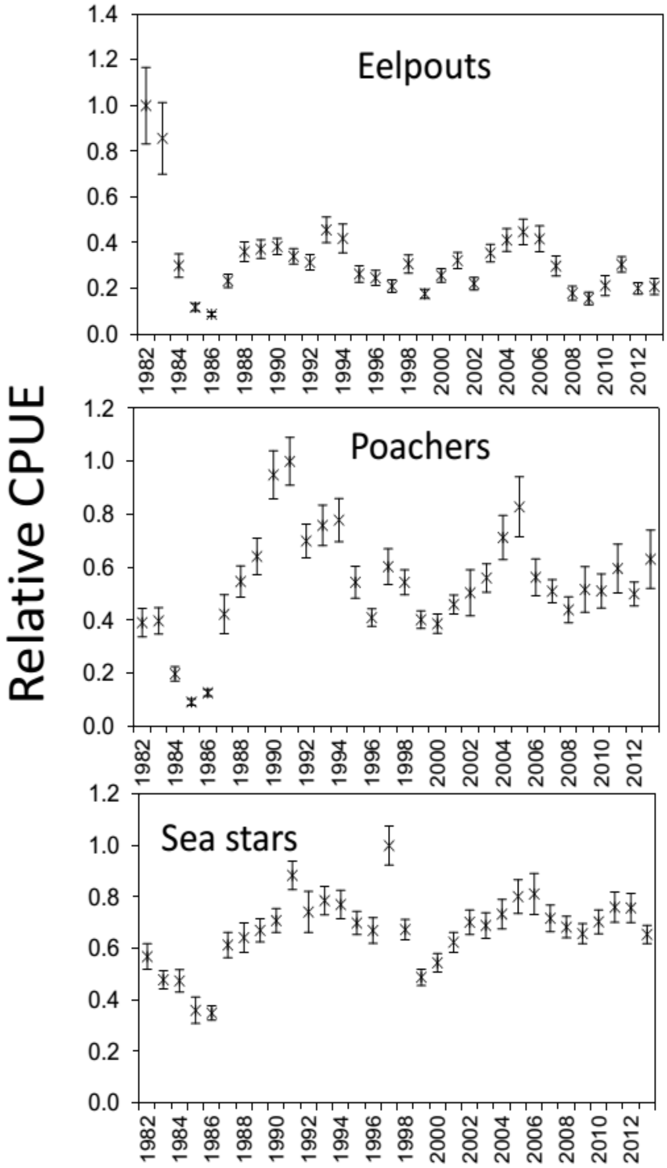


Figure 75: AFSC eastern Bering Sea bottom trawl survey relative CPUE for miscellaneous species during the May to August time period from 1982-2013.

GOA Miscellaneous species index. RACE bottom trawl surveys in the Gulf of Alaska (GOA) are designed primarily to assess populations of commercially important fish and invertebrates. However many other species are identified, weighed and counted during the course of these surveys, and these data may provide a measure of relative abundance for some of these species. For each species group, the catches for each year were scaled to the largest catch over the time series (which was arbitrarily scaled to a value of 100). The standard error (+/- 1) was weighted proportionally to the CPUE to get a relative standard error. The percentage of positive catches in the survey bottom trawl hauls was also calculated.

Status and trends: Jellyfish mean catch per unit effort (CPUE) is typically higher in the central and eastern GOA than in other areas. The frequency of occurrence in trawl catches is generally high across all areas, but has been variable. Jellyfish catches in the western GOA have been uniformly low. Echinoderm catches have been highest in the central GOA and they are consistently captured in about 50% of bottom trawl hauls in all areas. Eelpout CPUE has been variable, with peak abundances occurring in 1993, 2001 and 2009 in the western GOA, 2003 and 2011 in the central GOA and peak catches since 1999 in the eastern GOA. Poacher CPUE's have been in decline since the peak in 1993. Poachers have been uniformly in low abundance in the eastern GOA and have been variable, but somewhat higher in the central GOA.

Factors influencing observed trends: Many of these species are not sampled well by the gear or occur in areas that are not well sampled by the survey (hard, rough areas, mid-water etc.) and are therefore encountered in small numbers which may or may not reflect their true abundance in the GOA. The fishing gear used aboard the Japanese vessels that participated in all GOA surveys prior to 1990 was very different from the gear used by all vessels since. This gear difference almost certainly affected the catch rates for some of these species groups.
Implications: GOA survey results provide limited information about abundance or abundance trends for these species due to problems in catchability. Therefore, the indices presented are likely of limited value to fisheries management.

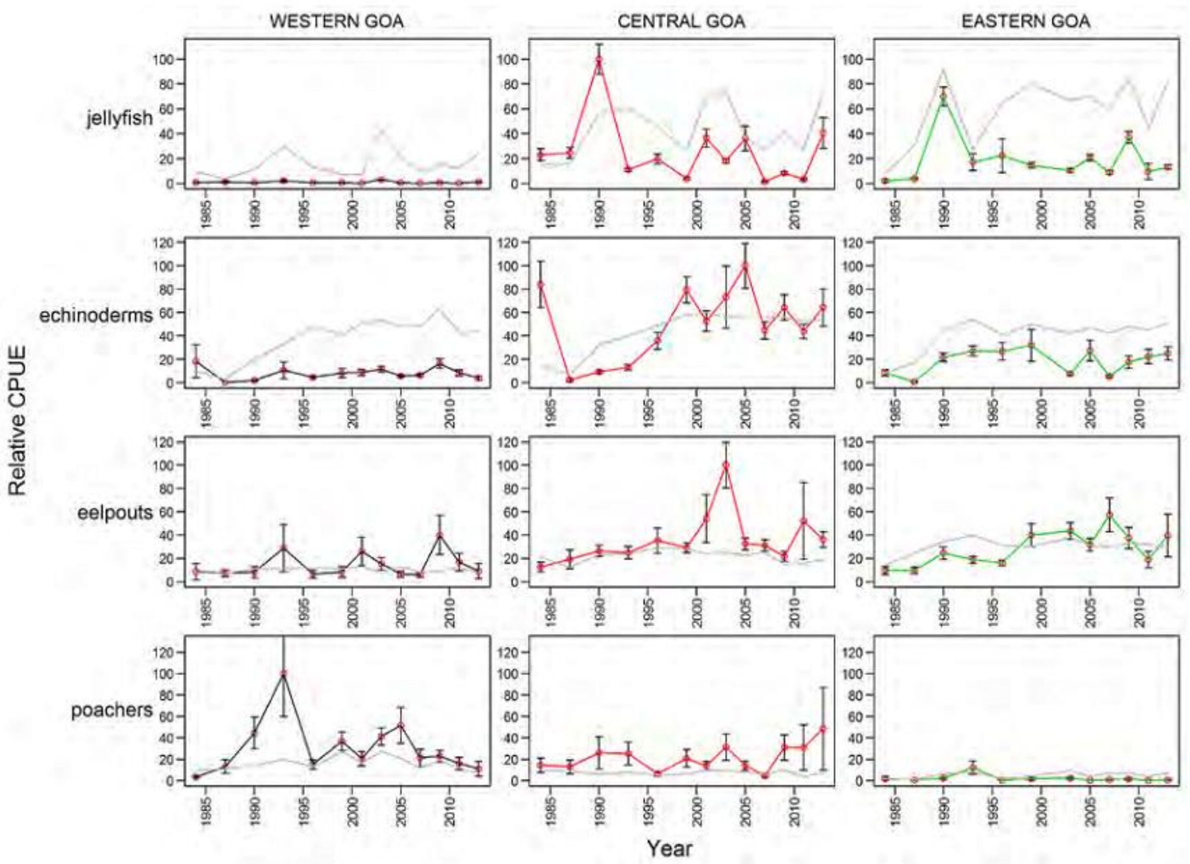


Figure 80: Relative mean CPUE of miscellaneous species by area from RACE bottom trawl surveys in the Gulf of Alaska from 1984 through 2013. Error bars represent standard errors. The gray lines represent the percentage of non-zero catches.

Summary and Recommendation Peer Reviewer B

The information presented in sections 1, 2 and 3 and elsewhere in the report provide sufficient information to support a broad understanding of the general history, development and main management entities and management systems in use by the fishery.

I generally agree with the recommendations and ratings of the assessment team but note two sections (4. and 7.) where additional evidence is required and for others where some discussion or changes are required.

The document is reasonably well written although the background material, in particular, is needlessly repetitious and reflects a excessively cut-and-paste style. The ratings section is better written although still repetitious. Some of this results from the repetition in the clauses.

I do find the tone of the document overly positive. The Alaska Flatfish fishery is not without its difficulties but the document tends to focus on the achievements and not the weaknessses. In particular the document tends to assume that because a process is place, that all the criteria are met without more investigation into how well the process works. In this respect, I note:

- Partial observer programs are fraught with problems, but there is little discussion of the potential for bias.
- The document, and therefore I assume the management of fisheries in Alaska pays little or no attention to the assessment of minor fish species that are not prohibited, or of commercial value. I refer to such species as sculpins and poachers.
- The document keeps repeating that methodology that is in place to ensure that the logic for choosing a TAC is precautionary, but less time demonstrating that catches are kept within the TACs.
- In section 13.1.4, the document notes that *Habitat interaction is not considered significant due to the development of trawl sweep modification, already implemented in the BSAI Region and to be implemented in the GOA in 2014.* This change is oversold. The footrope still does damage. The problem has not gone away (see my comment in 13.1.4).

I have elaborated on these issues within the appropriate sections below and conclude with some editorial suggestions.

Full Summary of comments

SECTION	
A	**Fisheries Management System**

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

The assigned rating is consistent with the evidence presented here and in other sections of the document but note the comments below.

- Section 1.2 Part 1: P. 134. The authors note "*Although many species occur over a broader range than the GOA management area, with only a few exceptions (e.g., sablefish), stocks of common species in this region are believed to be different from those in the adjacent BSAI*."

  This seems a little strongly worded. It should be remembered that the assumption that stocks conform to national or statistical boundaries is also very convenient. I did not see in the document any discussion of tagging studies, which refuted movement unlike, as the authors point out has been demonstrated for sablefish. It may not that sablefish is an exception; rather extensive tagging has been done on sablefish. If just as much tagging had been done on these flatfish species, then movement across boundaries might have been shown as is now have observed for sablefish, Pacific halibut, and spiny dogfish.

Assessment Team Response. Some information on tagging studies and populations migraton was provided in clause 1.2.1. Overall, flatfish tagging studies in Alaska are not common.

- Page 158-159: Part 1. It appears that 1.3.1. is High/Full Conformity but p. 159 says "Not Applicable". The latter seems appropriate.

Assessment Team Response. Clause 1.3.1. in N/A. The error has been corrected.

- The document notes that: *The U.S. and Russia have signed an Agreement on Mutual Fisheries Relations (first signed in 1988) for conservation, management and optimal utilization of shared fisheries resources between both nations. The agreement is not specific to flatfish alone, but does call for cooperation, shared science, conservation and management of fisheries resources*. This agreement is mentioned on numerous places in the text as evidence to support High/FC for various clauses. However, on P. 121 in the "Summary of Consultation Meetings" *it states Information exchange with Russia: very limited*. This issue is never discussed in the ratings section. Some comment is required. As it stands it is an example of this assessment paying attention to whether processes appear to be in place but not whether they work.

Assessment Team Response. The peer reviewer makes a very good point, but the agreement in this section is only used to supplement Not Applicable clauses that refer to shared, straddling and highly migratory stocks, not High Conformity clauses. The Agreement is mostly active towards high seas fisheries management and policing, anadromous species as well as pollock and Pacific cod management. As pointed out the Agreement is not specific to flatfish, partly because the Russian fisheries are relatively small, and is used in these clauses not to supply evidence of conformance, but to supply additional information on a related topic.

2. Management organizations must participate in coastal area management related institutional frameworks, 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 the avoidance of conflict among users.

The assigned rating is consistent with the evidence presented here and in other sections of the document.

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

The assigned rating is consistent with the evidence presented here and in other sections of the document.

B	**Science and Stock Assessment Activities**

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

This section provides inadequate support for the ratings and conclusions.

<u>Fishery Dependent Data</u>

The document does not provide a sufficient basis to assess the extent to which the Flatfish Fishery satisfies the various clauses in this section and elsewhere that relate to catch monitoring. Furthermore, the document is excessive in its positive statements regarding the monitoring program and gives the appearance of "selling" rather than reviewing the monitoring.

- *All fishery removals and mortality of the target stock(s) are considered by management. For both the BSAI and the GOA flatfish complex stocks (see BSAI and GOA individual flatfish species SAFEs), the management organizations collect the necessary information on removals and mortality (including natural mortality) of the target stock, as well as data on bycatch and discards. Strictly enforced daily landing reports, at sea and shore-based fishery enforcement, fishery observers and an extensive mandatory and voluntary logbook program verify and ground-truth total mortality estimates. Detailed tables and other descriptions of a given stock removals are generally provided within the various SAFE reports as well as throughout other documents (e.g. Economic SAFE).*

There is no question the Program is extensive and costly and that more improvements are planned, however, the document does not ever comment on the possibly significant biases that result from "observer effects" within a partial coverage model. Even industry speakers ridicule partial coverage programs at conferences. If there are sufficient incentives and opportunity, harvesters are more than capable of corrupting discard information well below the radar screen of catch expansion formulae based on observer data. Even the document notes the efforts in place to improve the monitoring that in turn implies dissatisfaction with the past, and therefore with the data that are currently being used for assessments.

I recommend this issue be explored and more support be provided to indicate that discard estimates are reliable, or the assessments have adequately coped with the possibility. One means would be to provide a summary table of the proportion of catch and effort in these fisheries that was actually observed within the most recent year possible. For example, I understand that vessels >125ft have 100% coverage, but what % of all catches do they represent? If vessels 65-125 ft. have 30% coverage, what proportion of the overall quota is represented by the other 70% of their tows? This at least would provide an indication of the potential scale of unobserved catch and therefore the bias. My apologies if this table exists but I did not find it. I would be curious what other agencies or researchers think of the biases in the estimates? For example, is the International Pacific Halibut Commission as convinced about the estimates of halibut discards in this fishery? One might also review the full assessment to see if assessment staff conduct sensitivity runs to explore the impact of biased estimates of discarding.

Assessment Team Response. Peer review comments taken; some of the information below has been added to clause 4.2 on the observer to provide the requested clarifications.

The information provided by the Fisheries Monitoring and Analysis Division (FMA) division of the AFSC has had a key role in the groundfish management regime. For example, it would not be possible to monitor total allowable catches (TACs) in terms of total catch without observer data from the FMA. Similarly, the PSC limits, which have been a key factor in controlling the catch of prohibited species, could not be used without such data. In recent years, the reliance on observer data for individual vessel accounting is of particular importance in the management of the CDQ program, AFA pollock, BSAI crab, and Amendment 80 fisheries. In addition, much of the information that is used to assess the status of groundfish stocks, to monitor the interactions between the groundfish fishery and marine mammals and sea birds, and to analyze fishery management actions is provided by the FMA.

Data from mandatory fishing industry reports and the North Pacific Observer Program are the two sources of information used to estimate total catch in the Federal groundfish fisheries off Alaska. Each of these data sources are confidential under the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (2007) and therefore can be shared only with authorized persons or in summary form for public dissemination. 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.

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.

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.

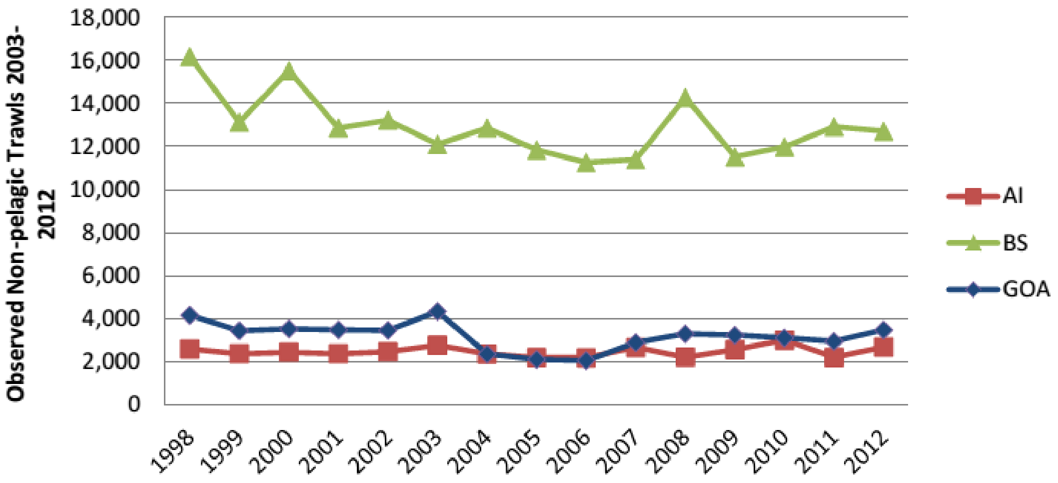


Figure 98: Gulf of Alaska, Bering Sea, and Aleutian Islands observed number of bottom trawl tows, 1990-2012.

Figure xx. Gulf of Alaska, Bering Sea, and Aleutian Islands observed number of bottom trawl tows, 1990-2012 (include coverage up to 2013 when the new observer program has been implemented). http://www.afsc.noaa.gov/REFM/stocks/plan_team/ecosystem.pdf

The new Observer 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, and (2) a partial coverage category.

Full Observer Coverage
All:

- catcher/processor (with limited exceptions)
- mothership
- catcher vessel while participating in AFA or CDQ pollock fisheries
- catcher vessel while participating in CDQ groundfish fisheries (except: sablefish; and pot or jig gear catcher vessels)
- catcher vessel while participating in the Central Gulf of Alaska Rockfish Program
- inshore processor when receiving or processing Bering Sea pollock

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. As can be seen below, 6 out of 37 Catcher Processor vessels in the GOA flatfish trawl fishery are subject to 100% coverage starting 2013, and 29 out of 32 vessels in the BSAI flatfish trawl fishery are subject to 100% coverage (but note that Amendment 80, of which 28 vessels qualify, carries two observers on board).

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.

Determining the Trip Target

Determining the trip target is a three-step process that is implemented in the catch accounting system: (1) if 95% or more of the retained catch is pollock, then a pollock target is assigned; (2) if the sum of all flatfish is greater than the amount of any other species, then flatfish is assigned as the trip target; 3) if neither pollock nor flatfish is determined as the target, then the groundfish species that has the highest proportion of the retained catch is assigned as the target.

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

Table 3.-- 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 individuals 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 2-5 Number of deliveries made in each stratum, by observation status, whether a delivery was made to a tender vessel (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	Offoad 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/draft2014adp.pdf

With respect to the comments on catch monitoring, the document develops an overly positive tone in two ways. First, it makes incorrect statements:

- *p. 120: Strictly enforced daily landing reports, at sea and shore-based fishery enforcement, fishery observers and an extensive mandatory and voluntary logbook program verify and ground-truth total mortality estimates.*

How can a voluntary logbook program verify and ground truth total mortality estimates? At best one can explore the plausibility of unobserved discards, but not validate them.

Assessment team response. We aknowledge the peer reviewer comments and would like to point out that the statement was intended for the entire system of monitoring and enforcement, not just the voluntary logbook program. As it can be seen from table 3 provided above, in 2008 67% of the discarded catch alone was estimated using only observer data, 27% using observer and industry data (e.g. catch reports), and only 6% is estimated using industry data alone. Although the data is general for the groundfish fisheries, and not the most recent, it provides an idea of the overall percentage of discard data that is estimated using observer and industry data.

- In part 2, "*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 sets the international benchmark standard*.

This is over the top and simply untrue! 100% observer or 100% EM sets the standard. 30% observer coverage is not a worldwide benchmark standard.

Assessment Team Response. Point taken, the statement has been modified to… the BSAI and GOA groundfish observer program is considered adequate for data collections needs.

- 6.1.5. P. 102. The level of discarding is closely monitored with at-sea observers and measures (retention requirements) are taken to reduce discarding.

The use of "closely" implies the writer's bias but lacks support. I would argue that 30% coverage does not, by definition, support "closely," especially if there are incentives and opportunity for non-observed vessels to fish differently and misreport. But this issue is never discussed in the document. The document should be more careful in its use of positive adjectives.

Assessment Team Response. Point taken, the statement has been modified to … The level of discarding is monitored with at-sea observers and measures (retention requirements) are taken to reduce discarding. Previous information has been added to satisfy this request.

Secondly, the document emphasizes in a repetitious manner the attributes of the program that, while useful, do not get at the main issue of observer bias. It is admirable that all vessels have to take an observer at some point or that they are assigned randomly, but this does nothing to solve the "observer effect". By repeating these attributes and ignoring the underlying concern, the document gives the appearance of bias. For example

- Vessels fishing for groundfish in federal waters are required to carry observers, at their own expense, for at least a portion of their fishing time.

Whether it is at taxpayers' or their own expense does not relate to the quality of the monitoring but it does, incorrectly suggest sympathy.

Catch monitoring in these fisheries may be working well or at least be adequate, but I suggest the authors struggle more with the issue of observer effect in partially monitored programs. Presence of programs does not mean they work. I also recommend that the tone of the document is overly and incorrectly positive about the catch monitoring.

Assessment Team Response. The issue of observer bias has been expanded in the report. The report was never meant to suggest sympathy, but instead to objectively document attributes of the program. The assessment team would also like to point out that the issue of the observer effect was one of the issues that prompted the restructuring of the observer program, which has now been implemented. This has been modified accordingly throughout the report.

Fishery Independent data

- I would find the assessment summaries more convincing if the actual survey biomass trends were shown. These data are the closest piece of information that provides an intuitive ground truth that the analyses and advice are reasonable. There is an abundant, even excessive presentation on the complex stock assessment models and what the models indicate; but I would suggest that it would help to have the actual survey trend shown for all stocks. It is unreasonable to ask peer reviewers to consider 400+ pages of documents, 9 assessments in detail, and potentially all the cited documents. Therefore this report should make use of simple opportunities to convey the situation.

The Assessment Team Agrees with the comments and has provided survey biomass graphs for the species in questions. Wherever possible, the fits between observed and the model predicted biomass have been provided.

2012 BSAI and 2011 GOA SAFE reports

From BSAI Flathead sole:

b) survey biomass

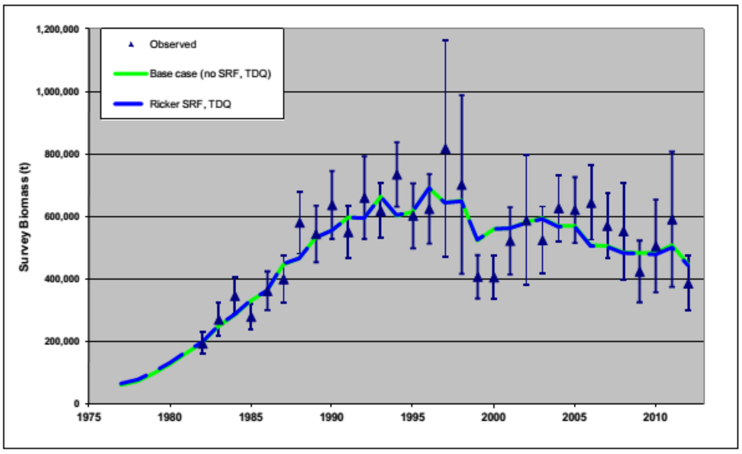


Figure 9.16. Comparison of model fits to data for the base and Ricker SRF, TDQ models. Upper: fits to fishery catches (triangles); lower: fits to survey biomass (triangles) for the two alternative models (lines). 95% confidence intervals are also shown for observed survey biomass.

BSAI Alaska Plaice

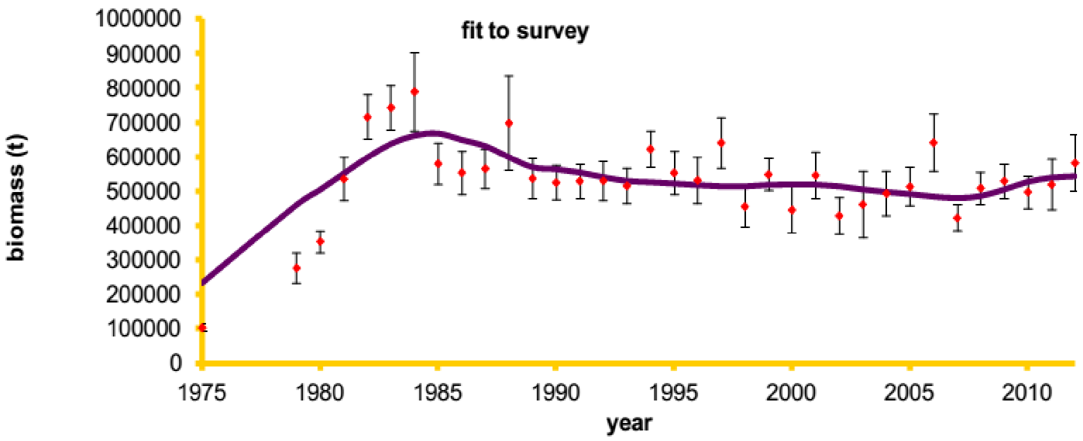
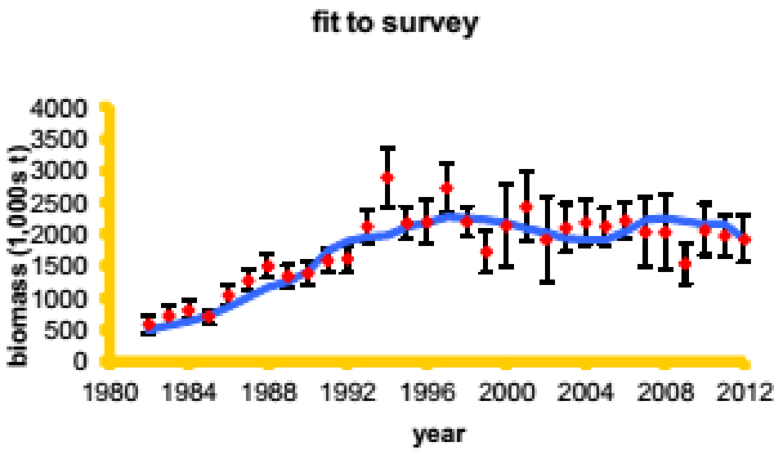
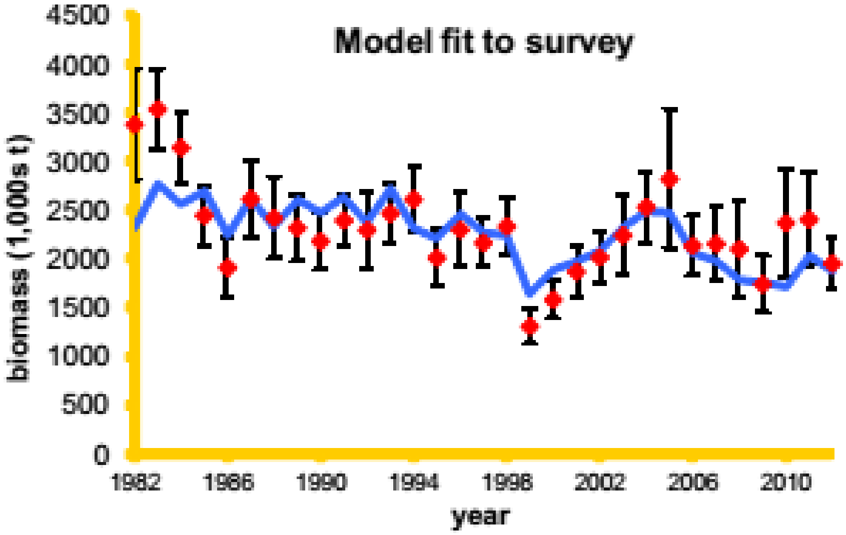


Figure 10.9--Observed (data points) and predicted (solid line) survey biomass of Alaska plaice.

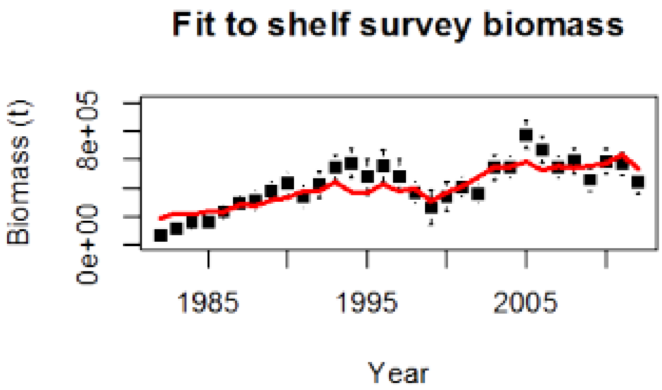
Northern Rock Sole



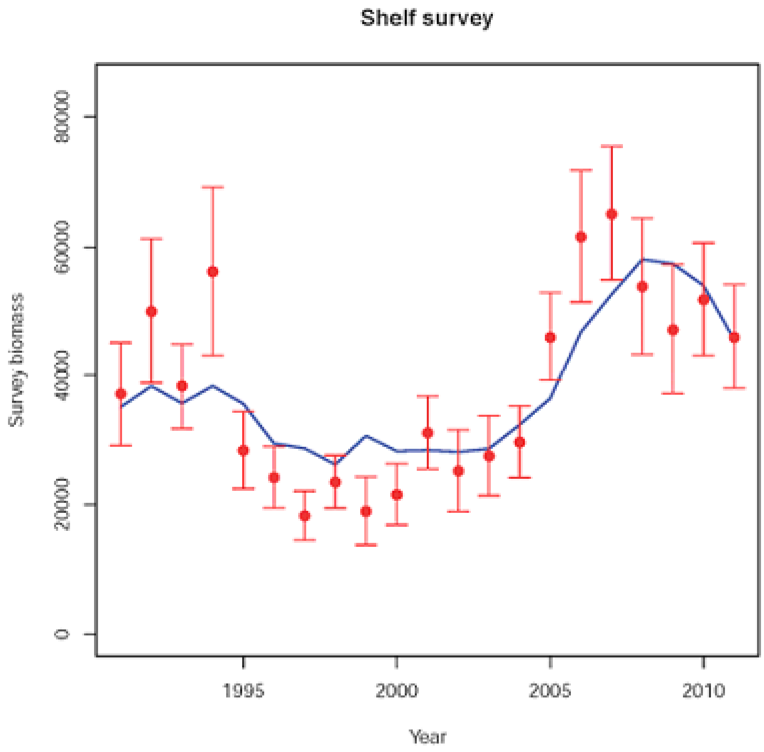
BSAI Yellowfin sole



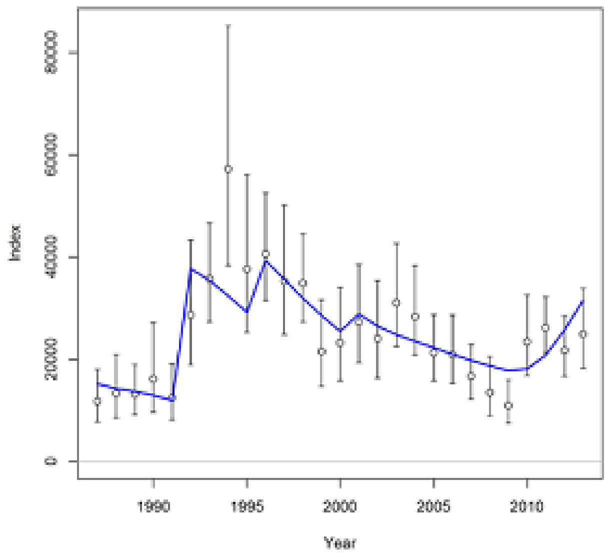
BSAI Arrowtooth flounder



BSAI Kamchatka flounder

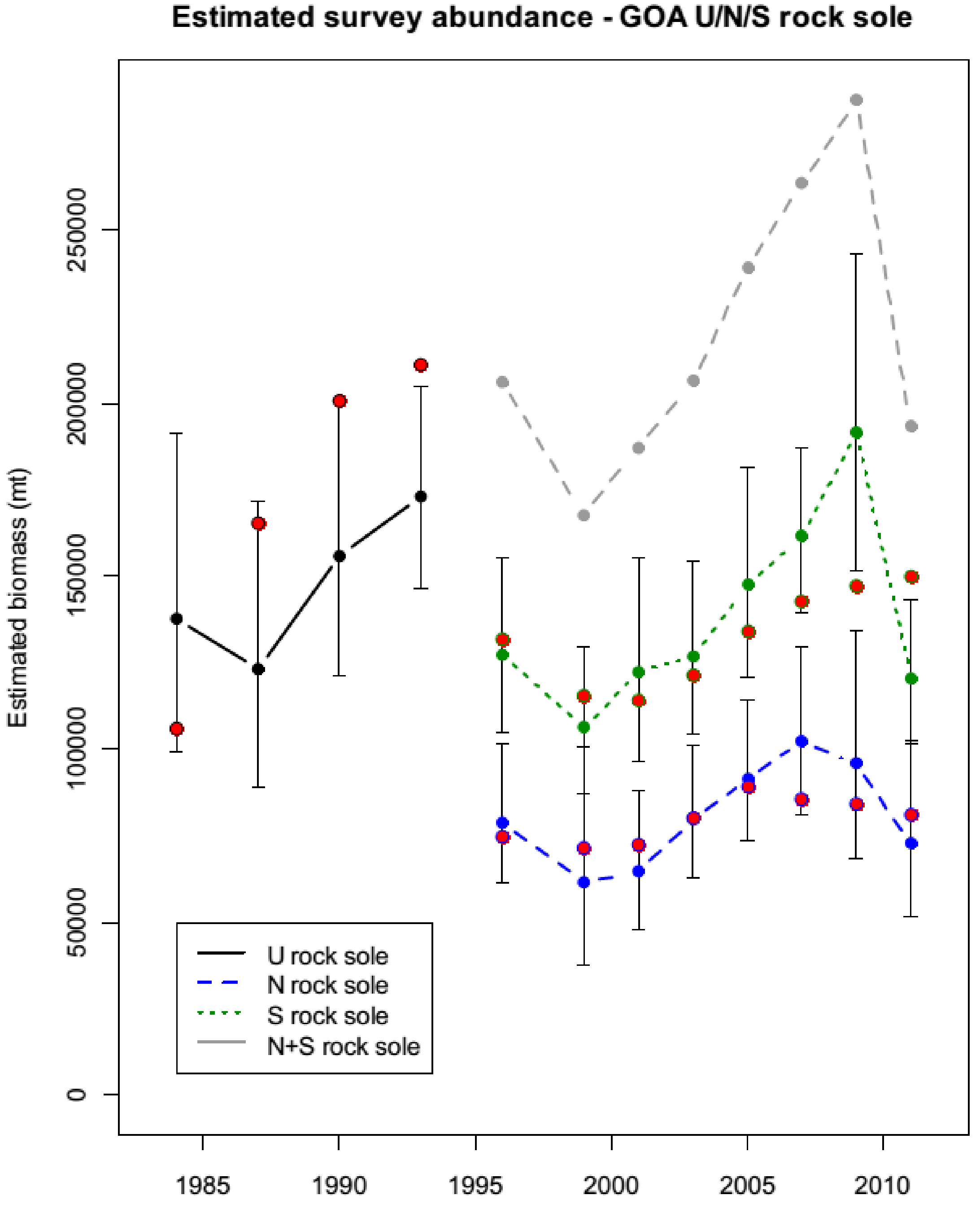


BSAI Greenland Turbot



GOA Northern and Southern Rock Sole

Figure 4A.14 – Estimates of biomass from the NMFS GOA bottom trawl survey (black filled circles – U rock sole, blue filled circles – N rock sole, green filled circles – S rock sole, red filled circles – model estimates)



GOA Flathead Sole

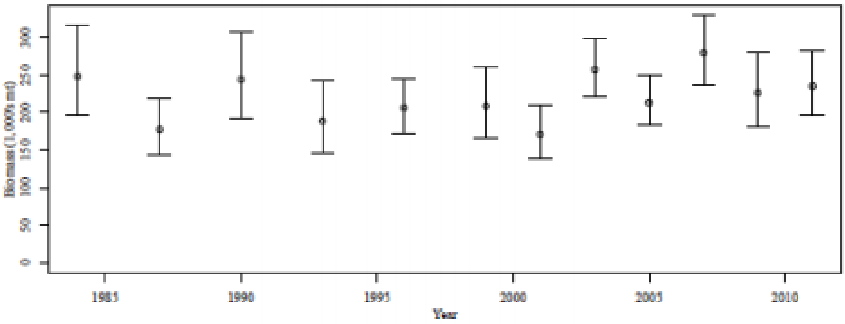


Figure 8.4. GOA survey biomass for flathead sole. Error bars represent 95% lognormal confidence intervals. The GOA survey did not include the eastern gulf in 2001. The value shown here for 2001 has been corrected to account for this (see text).

GOA Rex Sole

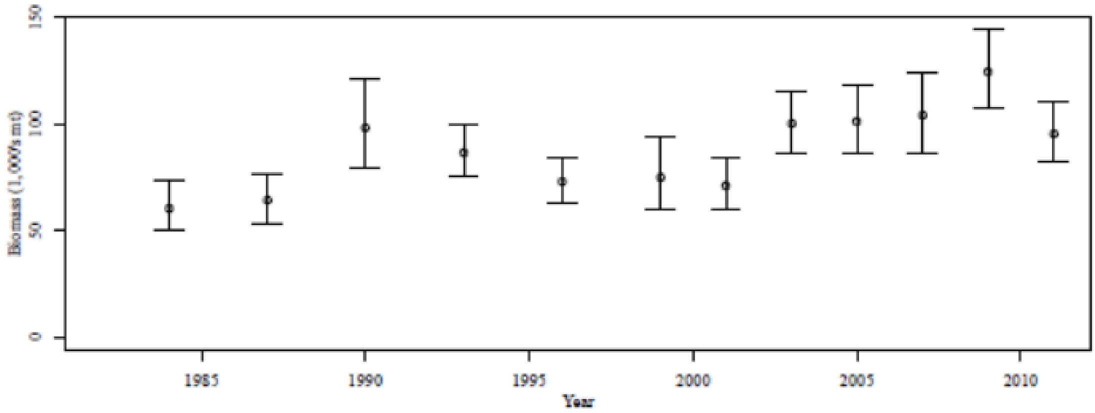


Figure 6.4. GOA survey biomass for rex sole. Error bars represent 95% lognormal confidence intervals. The 2001 GOA survey did not survey the Eastern Gulf. The value shown here for 2001 has been corrected to account for this (see text).

GOA Arrowtooth flounder

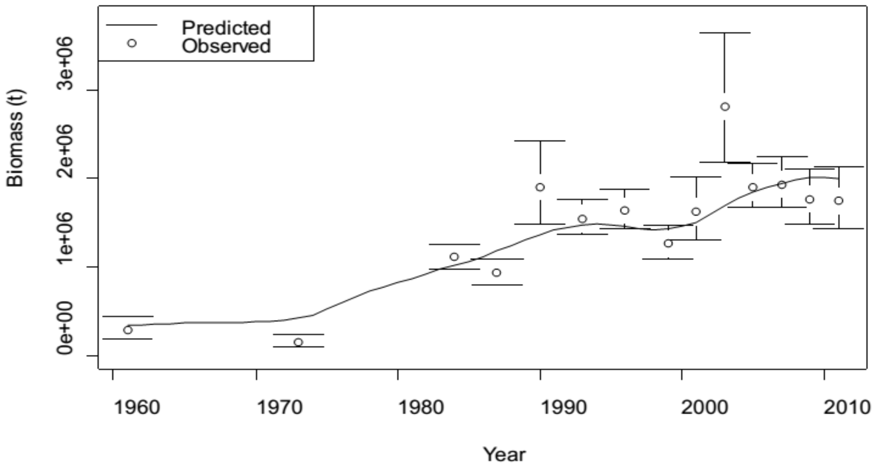


Figure 7.13. Fit to survey biomass estimates with approximate 95% log-normal confidence intervals for the observed survey biomass estimates 1961 to 2011.

- Further to the above comment, I note that some of the assessments fix a value to survey catchability (with error). This effectively fixes (scales) the population size no matter what additional information is included in the model. I suggest that this makes it even more important to include survey trends in the assessment summaries.

The Assessment team has provided the graphs from the various SAFE reports.

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

The assigned rating is consistent with the evidence presented here and in other sections of the document but note following comments:

- P. 91. Kamchatka flounder: *The seven year moving average for biomass is chosen for the ABC and OFL calculations for 2013 since it has the most resilience to the trawl survey variability and gives estimates which are close to the other moving averages*. I am sure it does smooth out noise, but it also removes the ability of the assessment to respond to short-term nosedives. If the survey were input with a representative variance term, it would be in a better position to incorporate recent trends. Is this worth a comment?

Assessment Team Response. Additional information has been provided.

- The authors could note that researchers involved with the Alaska Flatfish fisheries regularly attend the Western Groundfish Conference. This conference is held every two years with participants coming from government agencies, universities, industry and ENGOs from California to Alaska, including BC. The conference has been held very two years since 1981 (http://www.westerngc.org).

Assessment Team Response. Additional discussion has been provided under clause 5.3.

C	The Precautionary Approach

6. The current state of the stock must be defined in relation to reference points or relevant proxies or verifiable substitutes allowing for effective management objectives and target. Remedial actions must be available and taken where reference point or other suitable proxies are approached or exceeded.

The assigned rating is consistent with the evidence presented here and in other sections of the document but note the following comments:

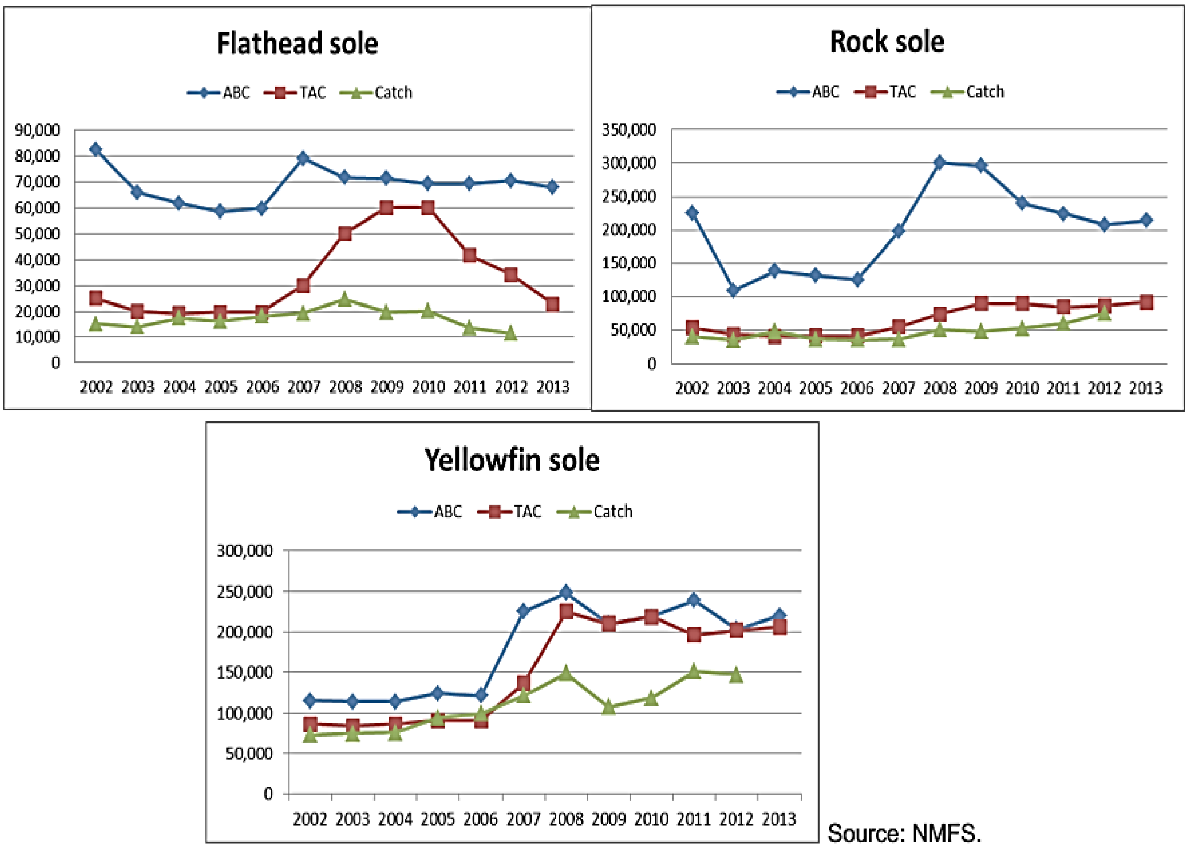
- There are many tables and considerable text provided to indicate that harvest control options are chosen with attention to the Precautionary Approach. However, what it usually lacking are graphs and tables that show the **actual** harvests relative to the OFL, ABC and TAC. In other words the document is very convincing regarding policies and procedures but is weak on providing evidence that the Precautionary approach is actually being delivered.

  Note the caption for **Table 5.2**. *Principal results of the 2012 BSAI arrowtooth flounder stock assessment, based on the authors' (of the SAFE report) preferred model, and compared with the results of the 2011 model. Biomass and catch figures in tons. From the 2012 BSAI groundfish SAFE report, arrowtooth flounder section.* **Actually catch is not shown.** I recommend more effort to provide tables/figure which show whether TACs were exceeded or not.

- One figure that attempts to show catch versus TAC, Figure 7.2, actually obscures the issue by lumping everything together. There has to be 9 panels. One figure that does indicate catch by species is GOA Rex Sole p. 100.

Assessment Team response. Catch against TAC or ABC is always well below the set limits. Data for the stocks under assessment have been provided, as available. Catches are consistently below TAC/ABC levels.

Figure 3 ABC, TAC, and total catch for flathead sole, rock sole, and yellowfin sole, 2002 through 2013.



Source: NMFS.

http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/SPECS/BSFlatfishFlexPR413.pdf

Total catch reported for BSAI arrowtooth flounder through October 15, 2012 is 21,189 t (well below the 2012 ABC of 149,683 t).

The 2011 and 2012 BSAI Kamchatka Flounder catch were similar at 9,935 and 9,466 t, respectively (through October 20, 2012). The 2012 catch was 51% of the ABC and 38% of the OFL.

The 2012 catch for BSAI Alaska Plaice is estimated at 17,000 t (ABC=53400 t) based on the accumulated catch through September and the continued high weekly catch rates as of the end of September.

BSAI Greenland Turbot 2012 SAFE

Table 5.1 Catch estimates of Greenland turbot by gear type (t; including discards) and ABC and TAC values since implementation of the MFCMA.

Year	Trawl	Longline & Pot	Total	ABC	TAC
1977	29,722	439	30,161	40,000	
1978	39,560	2,629	42,189	40,000	
1979	38,401	3,008	41,409	90,000	
1980	48,689	3,863	52,552	76,000	
1981	53,298	4,023	57,321	59,800	
1982	52,090	31.8	52,122	60,000	
1983	47,529	28.8	47,558	65,000	
1984	23,107	12.6	23,120	47,500	
1985	14,690	40.6	14,731	44,200	
1986	9,864	0.4	9,864	35,000	33,000
1987	9,551	34	9,585	20,000	20,000
1988	6,827	281	7,108	14,100	11,200
1989	8,293	529	8,822	20,300	6,800
1990	12,119	577	12,696	7,000	7,000
1991	6,245	1,617	7,863	7,000	7,000
1992	749	3,003	3,752	7,000	7,000
1993	1,145	7,323	8,467	7,000	7,000
1994	6,426	3,845	10,272	7,000	7,000
1995	3,978	4,215	8,194	7,000	7,000
1996	1,653	4,902	6,555	7,000	7,000
1997	1,209	5,989	7,199	9,000	9,000
1998	1,830	7,319	9,149	15,000	15,000
1999	1,799	4,057	5,857	9,000	9,000
2000	1,946	5,027	6,973	9,300	9,300
2001	2,149	3,163	5,312	8,400	8,400
2002	1,033	2,605	3,638	8,000	8,000
2003	908	2,605	3,513	4,000	4,000
2004	675	1,544	2,220	3,500	3,500
2005	729	1,831	2,559	3,500	3,500
2006	360	1,605	1,965	2,740	2,740
2007	429	1,400	1,829	2,440	2,440
2008	1,935	806	2,741	2,540	2,540
2009	3,080	1,417	4,196	7,380	7,380
2010	1,978	2,160	4,138	6,120	6,120
2011	1,618	2,019	3,636	6,140	5,060
2012*	2,591	1,314	3,905	9,660	8,660

*Catch estimated as of October 2012

GOA Rex Sole 2011 SAFE

Table 6.2a. Time series of recent reference points (ABC, OFL), TACs, total catch and retention rates for rex sole.

Year	ABC (t)	TAC (t)	OFL (t)	Total Catch (t)	% Retained
1995	11,210	9,690	13,091	4,021	90%
1996	11,210	9,690	13,091	5,874	95%
1997	9,150	9,150	11,920	3,294	92%
1998	9,150	9,150	11,920	2,669	97%
1999	9,150	9,150	11,920	3,060	96%
2000	9,440	9,440	12,300	3,591	97%
2001	9,440	9,440	12,300	2,940	95%
2002	9,470	9,470	12,320	2,941	95%
2003	9,470	9,470	12,320	3,485	95%
2004	12,650	12,650	16,480	1,464	93%
2005	12,650	12,650	16,480	2,176	91%
2006	9,200	9,200	12,000	3,294	95%
2007	9,100	9,100	11,900	2,852	98%
2008	9,132	9,132	11,933	2,703	97%
2009	8,996	8,996	11,756	4,753	99%
2010	9,729	9,729	12,714	3,636	98%
2011	9,565	9,565	12,499	2,594	97%

GOA Flathead sole 2011 SAFE

Table 8.2a. Time series of recent reference points (ABC, OFL, TAC), total catch and retention rates for GOA flathead sole. The 2011 catch is through Sept. 24, 2011.

Year	Author ABC (t)	ABC (t)	TAC (t)	OFL (t)	Total Catch (t)	% Retained
1995	--	28,790	9,740	31,557	2,181	
1996	--	52,270	9,740	31,557	3,107	
1997	--	26,110	9,040	34,010	2,446	
1998	--	26,110	9,040	34,010	1,742	
1999	--	26,010	9,040	34,010	900	
2000	--	26,270	9,060	34,210	1,547	
2001	--	26,270	9,060	34,210	1,911	
2002	22,684	22,690	9,280	29,530	2,145	
2003	41,402	41,390	11,150	51,560	2,425	88
2004	51,721	51,270	10,880	64,750	2,390	80
2005	36,247	45,100	10,390	56,500	2,530	87
2006	37,820	37,820	9,077	47,003	3,134	89
2007	39,110	39,110	9,148	48,658	3,163	89
2008	44,735	44,735	11,054	55,787	3,419	90
2009	46,464	46,464	11,181	57,911	3,658	96
2010	47,422	47,422	10,411	59,295	3,842	95
2011	49,133	49,133	10,587	61,412	2,339	97

GOA Arrowtooth Flounder 2011

Table 7.1. Catch, ABC, OFL and TAC for arrowtooth flounder in the Gulf of Alaska from 1964 to 17 September, 2011. Arrowtooth flounder ABC was separated from Flatfish ABC after 1990.

Year	Catch(t)	ABC	OFL	TAC
1964	514			
1965	514			
1966	2,469			
1967	2,276			
1968	1,697			
1969	1,315			
1970	1,886			
1971	1,185			
1972	4,477			
1973	10,007			
1974	4,883			
1975	2,776			
1976	3,045			
1977	9,449			
1978	8,409			
1979	7,579			
1980	7,848			
1981	7,433			
1982	4,639			
1983	6,331			
1984	3,457			
1985	1,539			
1986	1,221			
1987	4,963			
1988	5,138			
1989	2,584			
1990	7,706	343,300		
1991	10,034	340,100		20,000
1992	15,970	303,889	427,220	25,000
1993	15,559	321,287	451,690	30,000
1994	23,560	236,240	275,930	30,000
1995	18,428	198,130	231,420	35,000
1996	22,583	198,130	231,420	35,000
1997	16,319	197,840	280,800	35,000
1998	12,975	208,337	295,970	35,000
1999	16,207	217,106	308,875	35,000
2000	24,252	145,361	173,915	35,000
2001	19,964	148,151	173,546	38,000
2002	21,231	146,264	171,057	38,000
2003	29,994	155,139	181,394	38,000
2004	15,304	194,900	228,134	38,000
2005	19,770	194,900	228,134	38,000
2006	27,653	177,800	207,700	38,000
2007	25,494	184,008	214,828	43,000
2008	29,293	226,470	266,914	43,000
2009	24,937	221,512	261,022	43,000
2010	24,268	215,882	254,271	43,000
2011	23,211	213,150	251,068	43,000

GOA Shallow water flatfish (Northern and Southern Rock sole)

Species/Assemblage	Year	Biomass	OFL[1]	ABC[1]	TAC[1]	Catch[2]
Shallow water flatfish	2007	365,766	62,418	51,450	19,972	8,788
	2008	436,591	74,364	60,989	22,256	7,390
	2009	436,591	74,364	60,989	22,256	8,483
	2010	398,961	67,768	56,242	20,062	5,534
	2011	398,961	67,768	56,242	20,062	3,974
	2012	329,217	55,943	45,802	37,029	2,261
	2013	433,869	55,680	45,484		
	2014	408,469	51,580	42,084		

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

The assigned rating is not consistent with the evidence presented here and in other sections of the document.

- The omission of a discussion of minor fish species is striking. These include non-commercial and non-prohibited species such as poachers and sculpins. The number of fish species captured in surveys and trawl fisheries probably exceeds 200 species. I suggest the document include survey trends for all species for which the survey provides a credible relative time series. Secondly, I did not come across an assessment plan for these species. Are the survey (or even commercial CPUE) trends of such species screened on a regular basis and, if declining, assigned dedicated work? It will be a lot easier to implement recovery actions and avoid species-at-risk legislation if caught early. Perhaps I missed the material related to this issue or more information could be obtained. At least the surveys provide the basis to monitor these species.

Assessment Team Response. A discussion of this is provided under clause 13 (ecosystem effects of fisheries).

Description of index: The AFSC monitors the catch of non-target species in groundfish fisheries in the Eastern Bering Sea (EBS), Gulf of Alaska (GOA) and Aleutian Islands (AI) ecosystems. There are three categories of non-target species: 1) forage species (gunnels, stichaeids, sandfish, smelts, lanternfish, sand lance), 2) species associated with Habitat Areas of Particular Concern-HAPC species (seapens/whips, sponges, anemones, corals, tunicates), and 3) non-specified species (grenadiers, crabs, starfish, jellyfish, unidentified invertebrates, benthic invertebrates, echinoderms, other fish, birds, shrimp). Stock assessments have been developed for all groups in the other species (sculpins, unidentified sharks, salmon sharks, dogfish, sleeper sharks, skates, octopus, squid) category, so AFSC does not include trends for \other species" in the Ecosystem SAFE (see AFSC stock assessment website at http://www.afsc.noaa.gov/refm/stocks/assessments.htm).

Total catch of nontarget species is estimated from observer species composition samples taken at sea during fishing operations, scaled up to reflect the total catch by both observed and unobserved hauls and vessels operating in all FMP areas. From 1997-2002, these estimates were made at the AFSC using data from the observer program and the NMFS Alaska Regional Office. Catch since 2003 has been estimated using the Alaska Region's new Catch Accounting system. These methods should be comparable. This sampling and estimation process does result in uncertainty in catches, which is greater when observer coverage is lower and for species encountered rarely in the catch. Until 2008, observer sample recording protocols prevented estimation of variance in catch; however, the AFSC is developing methods to estimate variance for 2008 on which will be presented in future SAFE reports.

Status and trends: In all three ecosystems, non-specified catch comprised the majority of nontarget catch during 1997-2011 (Figure 104). Non-specified catches are similar in the EBS and GOA, but are an order of magnitude lower in the AI. Catches of HAPC biota are highest in the EBS, intermediate in the AI and lowest in the GOA. The catch of forage fish is highest in the GOA, low in the EBS and very low in the AI.

In the EBS, the catch of non-specified species appears to have decreased overall since the late 1990s. Scyphozoan jellyfish, grenadiers and sea stars comprise the majority of the non-specified catches in the EBS. The 2008-2009 and 2010-2011 increase in non-specified catch was driven by jellyfish. Grenadiers (including the Giant grenadier) are caught in the flatfish, sablefish, and cod fisheries. Jellyfish are caught in the pollock fishery and sea stars are caught primarily in flatfish fisheries. HAPC biota catch has generally decreased since 2004. Benthic urochordata, caught mainly by the flatfish fishery, comprised the majority of HAPC biota catches in the EBS in all years except 2009-2011, when sponges and sea anemones increased in importance. The catch of forage species in the EBS increased in 2006 and 2007 and was comprised mainly of eulachon that was caught primarily in the pollock fishery; however, forage catch decreased in 2008-2010. The forage catch increased again in 2011, primarily due to capelin and eulachon.

In the AI, the catch of non-specified species shows little trend over time, although the highest catches were recorded in 2009-2010. The non-specified catch dropped in 2010-2011, primarily due to a reduction in the catch of giant grenadiers. Grenadiers comprise the majority of AI nonspecified species catch and are taken in flatfish and sablefish fisheries. HAPC catch has been similarly variable over time in the AI, and is driven primarily by sponges caught in the trawl fisheries for Atka mackerel, rockfish and cod. Forage fish catches in the AI are minimal, amounting to less than 1 ton per year, with the exception of 2000 when the catch estimate was 4 tons, driven by (perhaps anomalous) sandfish catch in the Atka mackerel fishery.

The catch of non-specified species in the GOA has been generally consistent aside from a peak in 1998 and lows in 2009 and 2010. Grenadiers comprise the majority of non-specified catch and they are caught primarily in the sablefish fishery. Sea anemones comprise the majority of the variable but generally low HAPC biota catch in the GOA and they are caught primarily in the flatfish fishery. The catch of forage species has undergone large variations, peaking in 2005 and 2008 and decreasing in 2006-2007 and 2009-2010. The catch of forage species increased in 2010-2011, primarily due to eulachon and other osmerids. The main species of forage fish caught are eulachon and they are primarily caught in the pollock fishery.

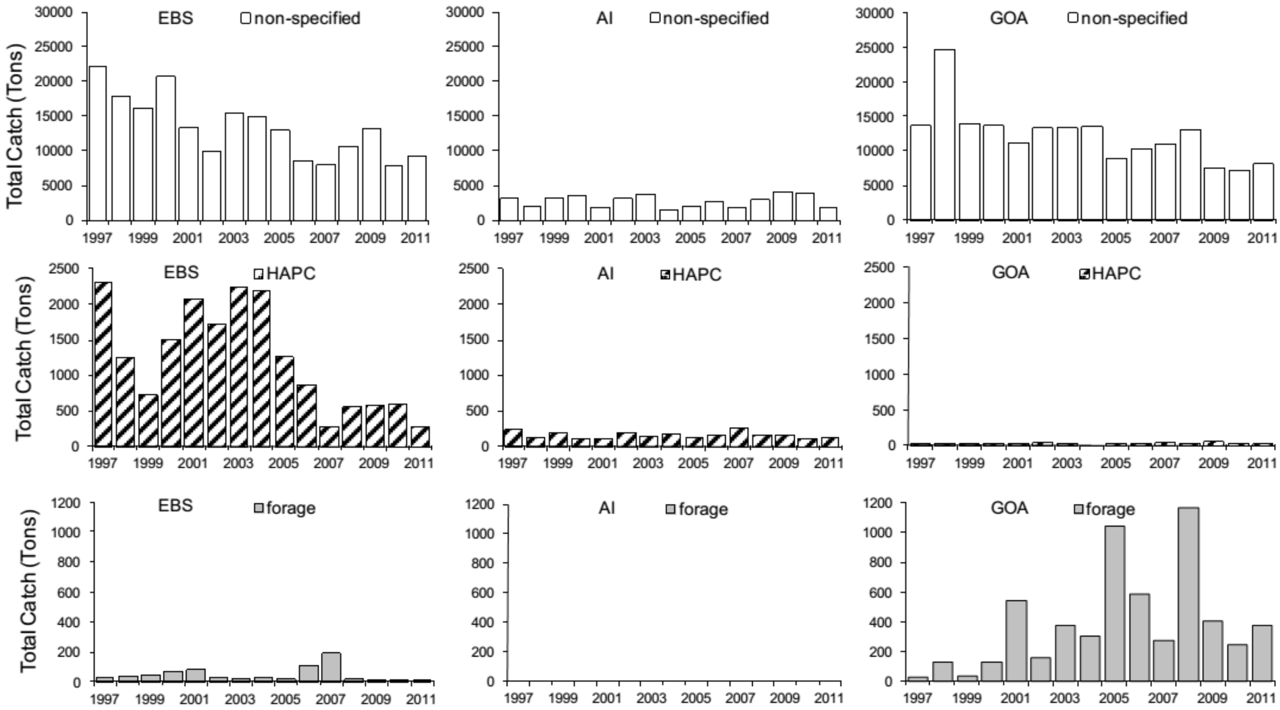


Figure 104: Total catch of non-target species (tons) in the EBS, AI, and GOA groundfish fisheries.

Factors causing observed trends: The catch of nontarget species may change if fisheries change, if ecosystems change, or both. Because nontarget species catch is unregulated and unintended, if there have been no large-scale changes in fishery management in a particular ecosystem, then largescale signals in the nontarget catch at may indicate ecosystem changes. Catch trends may be driven by changes in biomass or changes in distribution (overlap with the fishery) or both.

Implications: Catch of non-specified species is highest in the non-target category and has remained stable or possibly recently declined in all three ecosystems. Overall, the catch of HAPC and forage species in all three ecosystems is very low compared with the catch of target and non-specified species. HAPC species may have become less available to the

EBS fisheries (or the fisheries avoided them more effectively) during the late 2000s. Forage fish may be more available to fisheries in the GOA during the 2000s.

D	**Management Measures**

8. Management must 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.

The assigned rating is consistent with the evidence presented here and in other sections of the document.

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

The assigned rating is consistent with the evidence presented here and in other sections of the document.

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

The assigned rating is consistent with the evidence presented here and in other sections of the document.

E	**Implementation, Monitoring and Control**

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

The assigned rating is consistent with the evidence presented here and in other sections of the document.

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

The assigned rating is consistent with the evidence presented here and in other sections of the document.

F	**Serious Impacts of the Fishery on the Ecosystem**

13. Considerations of fishery interactions and effects on the ecosystem must 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 must be appropriately assessed and effectively addressed.

The assigned rating is consistent with the evidence presented here and in other sections of the document but note the following comments:

- 13.1.1. P. 184. I do not understand this section. The intent appears to be to show that the Flatfish fisheries do not have adverse impacts on other species, such as those with PSC's. It would seem more logical to start at a high level showing the total catch by all flatfish fisheries of items like halibut rather than one target species at a time.

Assessment Team Response. This has been provided.

- 13.1.4 *Habitat interaction is not considered significant due to the development of trawl sweep modification, already implemented in the BSAI Region and to be implemented in the GOA in 2014.* This is being oversold. The footrope still does damage; the problem has not gone away. Removing the impact from sweeps simply reduces the width of contact of the trawl to that of the footrope and doors. Given that some trawl grounds may be fished intensively, even with sweep impacts removed, over time the entire trawl ground can still be affected by the footrope.
  For all the bottom trawl closure and efforts to protect sensitive habitat and gear changes, there is long way to go. For example, at least one jurisdiction with observers has introduced a process wherein individual tow locations with know coral bycatch are eliminated from the available commercial footprint as coral catches are encountered in the fishery.

Assessment Team. Additional information about habitat interaction on the BSAI and GOA has been provided and the statement has been modified accordingly. While we agree with the peer reviewer that the foot rope effects remain, the fact remains that the modification are an improvement in decreasing habitat interactions by trawl gear by as much as 90% in the sweeps area as well as decreasing mortality of crab and other sessile organisms. Moreover, to our current knowledge, such modifications have only been implemented in Alaska to date, and in no other country.

- Are the units wrong in Part 1: Table 26? 1 million t of starfish? 88,000 t of hermit crabs? These bycatch tables are confusing.
  - Data shown sometimes in % sometimes in t;
  - Sometimes bycatch species are highlighted, sometimes not.
  - Sometimes other commercial species, sometimes not.

Assessment Team Response. No mistake, tables are presented in different units in the various SAFE reports. The comments provided in response to peer reviewer A, apply here too. This is a multispecies fishery, target fisheries are based on the species most abundant in a given haul. In this respect, some of the target species part of this assessment are accounted as bycatch in other larger species datasets. The same is true for other non target species.

Editorial Comments

I sympathize with the authors in attempting to redact so much information without leaving the document with a very "cut-and-paste" style. Part of the problem is that if the material for only one species is read in isolation, the material seems reasonably presented. However, when read sequentially, the material is not only repetitious but the reader cannot help but notice that items included for one species are omitted for the next. I offer the following observations and suggestions for consideration:

- Because the document attempts to summarize the background biology and assessments, there is considerable repetition. For example the explanation of the assessments models (SSM etc.) are repeated word-for-word about 10 times. Perhaps it could be done once and then cited. This would allow a more meaningful definition of each; the current explanations are a little superficial. Within each species, only the exceptions require noting. The Precautionary rules could be summarized once (i.e., OFL, ABC, TAC etc.)

- The work needs a serious editorial check. There are numerous examples of the first person syntax being cut and pasted. These inadvertently make the document appear biased.
  - P. 59. "...catchability remained the same, but **we** tightened the prior on q_{shelf}..."

- P. 67. “**We** implemented the model using automatic differentiation...”
- P. 70. “...**we** fixed overall survey catchability in the model to a value of 1...”

- Management sections around Part 1: p. 39-42 are repetitious.

- For the final edit, the background biology sections for species should be standardized. For example:
  - Sexual dimorphism in growth is reported for one species but no comment is provided for the next species. Presumably it is present in all flatfish.
  - If the predators for both juveniles and adults are discussed for one species, then the reader expects predators of both juveniles and adults to be covered in next species.

- I have highlighted a few typos in green in the two parts of the main document.

9. Non-Conformance and Corrective Actions

Non conformances are categorized as minor, major and critical non conformances. Where the Assessment Team concludes that the available evidence does not meet the 'high' confidence rating for a specific clause of the Conformance Criteria, and, on further clarification with fishery management organizations, the outcome remains unchanged, then a non conformance may be raised against that particular clause.

Low Confidence Rating (Critical Non-Conformance level)
Information/evidence is completely absent or contradictive to demonstrating compliance of an element of a fishery to the given requirements of a supporting clause. In these cases, a **low confidence rating, equivalent to a critical non-conformance** is assigned. Alternatively, any non-conformance assigned to any Section A to F, above the designated maximum permitted of 1 major non-conformance or 3 minor non-conformances will also result in the assignment of a critical non-conformance (at Section level). A critical non-conformance will essentially stop the assessment (not allowing for certification) unless the applicant is able to provide information/evidence that demonstrates a better state of the fishery than previously assessed. The Validation Report activities are designed to determine if critical non-conformances within the Applicant Management System are likely before proceeding with the assessment. Notwithstanding this, the option of assigning critical non-conformances remains available to the Assessment Team if there is merit for this decision to be taken.

Medium Confidence Rating (at Major Non-Conformance level).
Information/evidence is limited that demonstrates compliance of an element of the fishery to the given requirements of a supporting clause. In these cases a **major improvement is needed to achieve high conformance** and for a **medium confidence rating at this level, a "major non-conformance"** is assigned.

Medium Confidence Rating (at Minor Non-Conformance level)
Information/evidence is broadly available that demonstrates conformity to a clause although there are some gaps in information/performance that if available would clarify aspects of conformity and allow the Assessment Team to assign a higher level of confidence. In these cases a **minor improvement is needed to achieve high conformance** and for a **medium confidence rating at this level, a "minor non-conformance"** is assigned.

High Level of Confidence
Where the Assessment Team agrees that sufficient information/evidence is available to demonstrate conformance/performance to a given supporting clause, **a high level of confidence** is assigned. Sufficient evidence is that which allows, through expert opinion of the collective team, substantiation that a given element of a fishery, complies fully with the FAO-Based Responsible Fisheries Management Conformance Criteria.

Overall Score: No non conformances have been identified for this fishery.

10. Recommendation and Determination

Assessment Team Recommendation

The Assessment Team recommends that the management system of the applicant fishery, the U.S. Alaska Flatfish complex commercial fisheries, is certified against the FAO-Based Responsible Fisheries Management Certification Program.

Peer Review Team Recommendation

The Peer Review Team recommends that the management system of the applicant fishery, the U.S. Alaska Flatfish commercial fisheries, is certified against the FAO-Based Responsible Fisheries Management Certification Program.

Certification Committee Determination

The appointed members of the SAI Global/Global Trust Certification Committee met on the 5th December 2013. After a detailed discussion about the assessment, the fishery, its management and performance, the Certification Committee determined that the management system of the applicant fishery, the U.S. Alaska Flatfish fisheries against the FAO-Based Responsible Fisheries Management Certification Program.

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Appendix 1

Alaska Flatfish complex Assessors

Based on the Technical expertise required to carry out the above fishery assessment, Global Trust Certification Ltd. confirmed the Assessment Team members for this fishery as follows.

Jeff Fargo (Assessor)

Jeff Fargo holds a BSc from Simon Fraser University in British Columbia, Canada. He worked as a research biologist for Fisheries and Oceans Canada at the Pacific Biological Station in Nanaimo, Canada from 1978 until his retirement in 2011. He was head of the Groundfish Research Section from 2001 until his retirement. During that tenure he was responsible for directing research and stock assessment activities for groundfish species in the Pacific Region and management of the Section budget and program organisation. He was editor of the Canadian Stock Assessment Secretariat Annual Groundfish Stock Assessment Document for 10 years and has over 70 publications dealing with flatfish research and stock assessment. He has presented his research results at International Symposia and collaborated with research scientists in Europe and North America.

R.J. (Bob) Allain (Assessor)

Bob Allain is the President of OceanIQ Management Services Inc. for the last 5 years and has a previous professional background in the management of groundfish and other fisheries through his previous employer, Fisheries and Oceans Canada. From 2001-2008 he held the position of Regional Director, Fisheries and Aquaculture Management, Gulf Region in Moncton, NB where he was responsible for the integrated management of the region’s commercial, aboriginal and recreational fisheries including allocation, licensing and enforcement. In this time, Integrated Fisheries Management plans for reporting, surveillance and resource conservation and management of the major fisheries of the southern Gulf of St. Lawrence were developed. During his career, he has successfully led several Canadian delegations at international technical meetings (NAFO) on surveillance and control; administration and coordinated operations of the Atlantic Fisheries Licence Appeal Board; development of the framework for a successful Atlantic Fisheries workshop in regard to aquaculture, fish habitat management and fisheries development issues; and the administration and coordinated operations of the Department's fisheries management programs and services in respect of conservation and protection, fishermen's vessel insurance services, industry/client relations, licensing, resource allocation, personnel, financial and systems management, and federal-provincial agreements.

Dr. Geraldine Criquet (Assessor)

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 Cerbere---Banyuls (France). Geraldine has joined Global Trust Certification in August 2012 as a Fisheries Assessment Officer and is involved in FAO RFM and MSC fisheries assessments.

Erica Fruh (Assessor)

Erica Fruh has been involved in commercial fisheries management for over 15 years. She earned her BSc in Marine Biology from Auburn University, and her MSc in Marine Resource Management from Oregon State University. Her MSc project focused on bycatch in trawl and longline fisheries. Previous experience includes fishery biologist roles with the Oregon Department of Fish and Wildlife, the Pacific States Marine Fisheries Commission and NOAA Fisheries. She has worked with most fishing gear types used along the U.S. west coast, spending numerous days at sea participating in tagging studies, population monitoring, bycatch monitoring and fishing mortality studies. She worked as a commercial fisheries observer in the U.S. west coast groundfish trawl fishery, the Oregon pink shrimp fishery and the seine sardine fishery. She spent 10 years contributing to the National Marine Fisheries Service U.S. west coast groundfish bottom trawl survey gathering data for stock assessments, and leading projects on marine debris, seabird sightings and age structure collection. She serves on the Board of Directors for the Newport Fishermen's Wives organization to promote safety at sea.

Vito Ciccia Romito (Lead Assessor)

Vito 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 focused 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, BSAI King and snow crab and Pacific cod fisheries, as well as the Icelandic cod, saithe, haddock and redfish fisheries. Vito is also a lead, third party IRCA approved auditor.

Appendix 2

Based on the technical expertise required to carry out the above fishery assessment, Global Trust Certification Ltd., is pleased to confirm the Peer Review members for the fishery as follows.

Rick Stanley

Rick Stanley received a M.Sc. in Zoology from the University of British Columbia in 1977. Following work on overseas fisheries projects in Indonesia (1978) and El Salvador (1979), he worked for the Department of Fisheries and Oceans Canada (DFO) as a research biologist at the Pacific Biological Station in Nanaimo Canada until August 2013. During those years with DFO, he was senior author or co-author of 19 peer-reviewed stock assessments on British Columbia populations of various species of rockfishes (Sebastes spp.). He also served on the working groups and review committees of assessment on many other species of groundfish and invertebrates. In addition to stock assessment activity, he has published primary papers on the general biology of rockfishes including papers on ageing, parasites and reproductive biology, as well acoustic biomass estimation. An additional focus of Mr. Stanley's work at DFO was the development of fishery catch monitoring programs and bottom trawl surveys for groundfish. Following his retirement from DFO in August 2013, Mr. Stanley began work as a self-employed fisheries consultant.

Dr. Steven Parker

Steven Parker is a fisheries scientist at the National Institute of Water and Atmospheric Research in Nelson, New Zealand. He received a PhD in Zoology for the University of Maine at Orono in 1995, and worked for the Oregon Department of Fish and Wildlife for a decade focusing on rockfish biology and ecology, bycatch reduction technologies and trawl gear development for the West Coast flatfish fisheries, the Pacific hake fishery observation programme, and served as the State of Oregon's Representative on the North Pacific Fisheries Management Council's Science and Statistical Committee. Since 2008, Steven has been involved in the Fish Stock Assessment working group for the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), which assesses and manages fisheries in the Southern Ocean. His work there focuses on toothfish migration and ecology, the effects of fishing on fragile benthic habitats, tagging and telemetry, and biological inputs into stock assessment.

Appendix 3

FAO-Based Responsible Fisheries Management Certification

Summary of the Certification of Alaska Flatfish fisheries

The key Alaska Flatfish commercial fisheries (species specified below) are awarded certification to the FAO-Based 'Responsible Fisheries Management' Program.

Certification Determination

On the 05th December 2013 a positive Certification determination was awarded for the *fishery management of the U.S. Alaska Flatfish commercial fisheries,* against the FAO-based Responsible Fisheries Management (RFM) Certification Program (Conformance Criteria version 1.2)[1]. The assessment was performed at the request of the Alaska Seafood Marketing Institute (ASMI). This document provides a concise summary of the assessment information and certification decision.

The Full Assessment and Certification Report will be made available for download at the ASMI's website (http://certification.alaskaseafood.org/flatfish-certification) after the 31st January 2014.

The Unit of Certification is the Alaska flatfish complex distributed in the Bering Sea/Aleutian Islands (BSAI) and the Gulf of Alaska (GOA) and specifically includes BSAI Alaska plaice (*Pleuronectes quadrituberculatus*), BSAI/GOA arrowtooth flounder (*Atheresthes stomias*), BSAI/GOA flathead sole (*Hippoglossoides elassodon*), BSAI Greenland turbot (*Reinhardtius hippoglossoides*), BSAI Kamchatcka flounder (*Atheresthes evermanni*), BSAI/GOA northern rock sole (*Lepidopsetta polyxystra*), GOA rex sole (*Glyptocephalus zachirus*), GOA southern rock sole (*Lepidopsetta bilineata*) and BSAI yellowfin sole (*Limanda aspera*). These are the species of focus in the Assessment and Certification Report. The Alaskan flatfish complex commercial fisheries employ Alaska flatfish trawl gear and longline gear (Greenland Turbot only) within Alaska's jurisdiction (200 nautical miles EEZ). These fisheries are principally managed by two federal agencies, the National Marine Fisheries Service (NMFS) and the North Pacific Fishery Management Council (NPFMC).

The resulting certification communication for the Alaska Flatfish commercial fisheries is:

***'Certified Responsible Fisheries Management'*.**

Following a 12 month assessment process, a Global Trust Certification Committee, composed of fishery, certification and accreditation experts, unanimously agreed with the Assessment Team's findings that the applicant Alaska Flatfish commercial fisheries are responsibly managed. The assessment and certification considered the effectiveness of management system and organizations, the robustness and effectiveness of fishery management plans, stock assessment

[1] Version 1.2 (Sept 2011), as derived by the United Nations Food and Agriculture Organization (FAO) Code of Conduct for Responsible Fisheries (1995), the FAO Guidelines for the Eco-Labeling of Fish and Fishery Products from Marine Capture Fisheries (2005) as amended/extended in 2009, and the FAO Fisheries Circular No. 917 by John. F. Caddy (1996).

activities, stock health and the application of precautionary harvest rates and management actions, monitoring and enforcement activities and the ecosystem effects of the fishery.

Background to the FAO Based Responsible Fisheries Management (RFM) Certification

This Certification delivers high confidence that reliable management systems are in place to properly assess and respond to any current and evolving issues and allow the fishery to continue on the path of responsible management. These management systems are certified as consistent with those recommended by the FAO Code of Conduct for Responsible Fisheries (1995) and FAO Guidelines for the Eco-Labeling of Fish and Fishery Products from Marine Capture Fisheries (2005) and amended/extended in 2009.

This Certification demonstrates responsible management for the sustainable use of the fisheries and is a realistic and tangible communication for this standard and process. The FAO-Based RFM Certificate lasts for five years and it involves annual surveillance assessments of the fishery. This Certification means that the Alaska Flatfish commercial fisheries have met the criteria for certification of responsibly managed fisheries at the point in time of the assessment. Annual surveillance assessments and a full re-assessment every 5 years will be used to verify that fishery management continues to perform responsibly.

Towards the end of the assessment, after numerous clarifications were sought, the report documents the rationales in which the Alaska Flatfish commercial fisheries achieved high conformity against all of the FAO-Based RFM Conformance Criteria. The assessment findings have been documented in a 500 + page Full Assessment and Certification Report.

The assessment was conducted by Global Trust Certification according to the International Standards Organization (ISO) Guide 65:1996 procedures for FAO-based Responsible Fisheries Management Certification. ISO Guide 65 is the international general requirements for bodies operating product and process certification systems. The ISO Guide 65 assessment, certification and decision process is governed by the accreditation bodies of the International Accreditation Forum (IAF). Global Trust Certification is accredited by the Irish National Accreditation Board (INAB) who is a member of the IAF.

Details of the Assessment

ASMI, on behalf of the Alaska Flatfish commercial fisheries, submitted an application to Global Trust Certification for a formal assessment of these fisheries to the requirements of the FAO-Based Responsible Fisheries Management (RFM) Certification Program.

After the initial site visits and the Validation Assessment, an expert Assessment Team was formed to undertake the full assessment. The Assessment Team was composed of independent assessors (Table 1) with expert competency in fisheries management and operations, stock assessment, and on the ecosystem effects of the fishery. The Assessment Team's report was peer-reviewed by two additional independent experts (Table 2) before submission to a formal Global Trust Certification Committee (Table 3) for an independent certification decision. The level of conformance of each fishery was scored against each clause of the FAO-Based Conformance Criteria (version 1.2).

Conformance ratings were assigned through consensus scoring by the assessment team, based on objective evidence derived and measured from the fishery and verified through on site meetings and consultations.

A. The Fisheries Management System

Fundamental 1

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

No. Supporting clauses	**17**
Supporting clauses applicable	**9**
Supporting clauses not applicable	**8**
Overall level of conformity	**HIGH**
Non Conformances	**0**

Summarized evidence:

The structure and function of the management system governing the flatfish fisheries in Alaska.

The primary layer of governance for the Alaska Flatfish fisheries is dictated by the Magnuson Stevens Act (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 OFL/ABC/TAC/ACL.

The federal Fishery Management Plans (FMPs), more specifically, 1) the GOA Groundfish FMP, and 2) the BSAI Groundfish FMP govern the management of the Flatfish federal fisheries. In federal waters (3-200 nm), the Alaska Flatfish fisheries are managed by the NPFMC and the NMFS Alaska Region. The Council submits their recommendations/plans to the NMFS for review, approval, and implementation. The 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. The US Coast Guard (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. Current management measures consider the whole stocks biological units (i.e. structure and composition contributing to its resilience over their entire area of distribution, the area through which the species migrate during their life cycle and other biological characteristics of the stock).

All of the species within the Alaska flatfish complex are managed as separate stocks between the BSAI and the GOA, even if they occur in both areas. The Aleutian Island chain serves as a barrier between the two water bodies, and there is thought to be little mixing of flatfish stocks. None of the species considered here are known to complete large migrations, other than short range spawning or age related movements. These smaller migrations are thought not to be on a basin-wide scale.

A. The Fisheries Management System

Fundamental 2

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

No. Supporting clauses	**16**
Supporting clauses applicable	**15**
Supporting clauses not applicable	**1**
Overall level of conformity	**HIGH**
Non Conformances	**0**

Summarized evidence

Participation in coastal zone institutional frameworks, decision making processes and activities:

The NMFS and the NPFMC 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 various proposed scenarios, before the path of action is decided. This occurs whenever resources under their management may be affected by other developments and each time they create, renew or amend regulations. The NEPA processes provide public information and opportunity for public involvement that are robust and inclusive at both the state and federal levels. Fisheries are relevant to the NEPA process in two ways. First, each significant NPFMC fisheries package must go through the NEPA review process. Second, any project that could impact fisheries (i.e., oil and gas, mining, coastal construction projects, etc.,) that is either on federal lands, in federal waters, receives federal funds or requires a federal permit, must go through the NEPA process. In this manner, both fisheries and non-fisheries projects that have a potential to impact fisheries have a built in process by which concerns of the NPFMC, NMFS, state agiencies, industry, other stakeholders or the public can be accounted for.

The NEPA process consists of an evaluation of the environmental effects of a federal undertaking including its alternatives. There are three levels of analysis: categorical exclusion determination; preparation of an environmental assessment/finding of no significant impact (EA/FONSI); and preparation of an environmental impact statement (EIS).

The state is a cooperating agency in the NEPA process for federal actions, giving the State of Alaska a 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.

Overall, the NEPA process, existing agencies and processes (e.g. ADFG, the Alaska Department of Environmental Conservation, the Department of Natural Resources (DNR), US Fish and Wildlife Service, the Alaska National Interest Lands Conservation Act, the DNR's Office of Project Management and Permitting and Bureau of Ocean Energy Management), 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.

The NPFMC system was designed so that fisheries management decisions were made at the regional level to allow input from affected stakeholders assuring that the rights of coastal communities and their historic access to the fishery is included in the decision process. Council meetings are open, and public testimony - both written and oral - is taken on each and every issue prior to deliberations and final decisions. Public comments are also taken at all Advisory Panel and Scientific and Statistical Committee meetings. Each Council decision is made by recorded vote in public forum after public comment. Final decisions then go to NMFS for a second review, public comment, and final approval. Decisions must conform to the MSA, the NEPA, Endangered Species Act, Marine Mammal Protection Act, and other applicable law including several executive orders. The Council meets five times each year, usually in February, April, June, October and December, with three of the meetings held in Anchorage, one in a fishing community in Alaska and one either in Portland or Seattle. Most Council meetings take seven days, with the AP and SSC usually following the same agenda and meeting two days earlier

The Alaska BOF and the NPFMC have signed a joint protocol agreement to help coordinate compatible and sustainable management of fisheries within each organization's jurisdiction. A committee was formed, the Joint Protocol Committee, which includes three members from each group. The entire board and council meet jointly once a year to consider proposals, committee recommendations, the analyses, and other topics of mutual concern. The joint meeting is typically held in Anchorage in February, depending upon council and board meeting schedules.

The Community Development Quota (CDQ) Program began in December of 1992 with the goal of promoting fisheries related economic development in western Alaska. The CDQ Program allocates a percentage of all BSAI quotas for groundfish, prohibited species, halibut and crab to eligible communities. The Program allocates 10.7% of the flatfish complex (yellowfin sole, northern rock sole, arrowtooth flounder, Greenland turbot, and flathead sole) BSAI TAC to eligible communities. The purpose of the program is to (i) provide eligible western Alaska villages with the opportunity to participate and invest in fisheries in the BSAI Management Area; (ii) to support economic development in western Alaska; (iii) to alleviate poverty and provide economic and social benefits for residents of western Alaska; and (iv) to achieve sustainable and diversified local economies in western Alaska. There are 65 communities within a fifty-mile radius of the BS coastline who participate in the program. It was latest granted perpetuity status during the 1996 reauthorization of the MSA.

A. The Fisheries Management System

Fundamental 3

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

No. Supporting clauses	**6**
Supporting clauses applicable	**6**
Supporting clauses not applicable	**0**
Overall level of conformity	**HIGH**
Non Conformances	**0**

Summarized evidence:

Fishery management plans and their objectives:

Under the MSA, the NPFMC is authorized to prepare and submit to the Secretary of Commerce for approval, disapproval or partial approval, a Fishery Management Plan (FMP) and any necessary amendments, for each fishery under its authority that requires conservation and management. The GOA and BSAI Groundfish FMPs, under which Flatfish in the federal waters of Alaska is managed, define nine management and policy objectives that are reviewed annually. These are 1) Prevent Overfishing, 2) Promote Sustainable Fisheries and Communities, 3) Preserve Food Webs, 4) Manage Incidental Catch and Reduce Bycatch and Waste, 5) Avoid Impacts to Seabirds and Marine Mammals, 6) Reduce and Avoid Impacts to Habitat, 7) Promote Equitable and Efficient Use of Fishery Resources, 8) Increase Alaska Native Consultation, 9) 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 Groundfish 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 requirements, retention and utilisation requirements, recordkeeping and reporting requirements, and observer requirements.

B. Science and Stock Assessment Activities

Fundamental 4

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

No. Supporting clauses	**14**
Supporting clauses applicable	**9**
Supporting clauses not applicable	**5**
Overall level of conformity	**HIGH**
Non Conformances	**0**

Summarized evidence:

Data collection, aggregation and use:

The annual age-based assessment used to determine stock status and harvest recommendations for BSAI and GOA Flatfish uses data collected from commercial landings and transhipment reports, port and at-sea observers; as well as sex, length and age data from fishery independent surveys in the EBS, the AI and the GOA. The Resource Assessment and Conservation Division (RACE) of the Alaskan Fisheries Science Center (AFSC) are 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, in many cases covering 100% of the fleet activity (e.g. in the EBS, but significantly less in the GOA) is also 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. For all operations under Federal jurisdiction, all US vessels catching Flatfish within the US EEZ, land based and stationary floating processor and factory (motherships) receiving catches of Flatfish are legally obliged to maintain accurate records of all transactions. Landing data are routinely cross checked for overall accuracy, and verified during US Coast Guard boardings.

The Fisheries Monitoring and Analysis Division (FMA) of the NMFS monitor 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.

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.

Data gathered under the auspices of the North Pacific Groundfish Observer Programme (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. As well as providing demographic data for scientific purposes, the observer programme is also used extensively in- 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 licence.

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 are required to carry observers, at their own expense, for at least a portion of their fishing time. These changes will increase the statistical reliability of data collected by the program, address cost inequality among fishery participants, and expand observer coverage to previously unobserved fisheries.

The NOAA biennial GOA groundfish survey data is used for the assessment for Flatfish 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 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 minutes 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 and the AI survey area. For each survey year, on average 825 stations are surveyed by three boats in the GOA, and 420 stations are surveyed by two boats in the AI.

In terms of socio-economic data collection, the Regulatory Flexibility Act (RFA) requires agencies (NPFMC) 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. Economic analyses are also required to varying degrees under the MSA, the NEPA, the Endangered Species Act, and other applicable laws.

NOAA's Resource Ecology and Fisheries Management (REFM) Division produces an annual Economic Status Report of the Groundfish fisheries in Alaska. The figures and tables in the report provide estimates of total groundfish catch, groundfish discards and discard rates, prohibited species catch (PSC) and PSC rates, the ex-vessel value of the groundfish catch, the ex-vessel value of the catch in other Alaska fisheries, the gross product value of the resulting groundfish seafood products, the number and sizes of vessels that participated in the groundfish fisheries off Alaska, vessel activity, and employment on at-sea processors. The report contains analysis and comment of the performance of a range of indices for different sectors of the North Pacific fisheries relate changes in value, price, and quantity, across species, product and gear types, to aggregate changes in the market.

B. Science and Stock Assessment Activities

Fundamental 5

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

No. Supporting clauses	**11**
Supporting clauses applicable	**10**
Supporting clauses not applicable	**1**
Overall level of conformity	**HIGH**
Non Conformances	**0**

Summarized evidence:

Stock assessment activities:

The Resource Assessment and Conservation Engineering (RACE) Division comprises scientists from a wide range of disciplines whose function is to conduct quantitative fishery surveys and related ecological and oceanographic research to describe the distribution and abundance of commercially important fish and crab stocks in the region, and to investigate ways to reduce bycatch, bycatch mortality and the effects of fishing on habitat. Information derived from both regular surveys and associated research are analysed by AFSC stock assessment scientists and supplied to fishery management agencies and to the commercial fishing industry. The Resource Ecology and Fisheries Management (REFM) Division conducts research and data collection to support an ecosystem approach to management of fish and crab resources. More than twenty-five groundfish and crab stock assessments are developed annually and used to set catch quotas. In addition, economic and ecosystem assessments are provided to the Council on an annual basis. The Fisheries Monitoring and Analysis Division (FMA) monitors groundfish fishing activities and conducts research associated with sampling commercial fishery catches and estimation of catch and bycatch mortality, and analysis of fishery-dependent data.

The 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 EBS survey is conducted annually, while the GOA and the AI surveys are conducted biannually, alternating with each other.
Stock Assessment and Fishery Evaluation (SAFE) Reports are produced annually for flatfish in the BSAI and GOA Regions. These reports contain all the details of the assessments including data collected and used, and stock assessment models trialled.

The adequacy and appropriateness of the stock assessments are ensured by extensive peer review. For BSAI and GOA groundfish assessments, the review process begins with an internal review of assessments by the AFSC. Following that review, assessments are reviewed annually by the groundfish plan teams who provide comments to the assessment authors on revisions to the assessment as well as to make recommendations to the SSC regarding OFL and ABC levels for each stock. The majority of the plan team members have expertise in stock assessment and fisheries biology with some additional members bringing in expertise in fishery management, in-season catch accounting, seabirds, marine mammals, and economics. The assessments as well as the plan team recommendations are then subsequently reviewed by the SSC who make the final OFL and ABC recommendations to the Council. The SSC may modify the recommendations from the Plan Team based upon additional considerations. The Council sets TAC at or below the ABC recommendations of the SSC.

The AFSC periodically requests a more comprehensive review of groundfish stock assessments by the Center of Independent Experts (CIE). These reviews are intended to lay a broader groundwork for improving the stock assessments outside the annual assessment cycle. The most recent CIE reviews of flatfish species SAFEs have been those for BSAI yellowfin sole- 2012; GOA southern rock sole – 2012; GOA northern rock sole – 2012; and GOA rex sole- 2012.

C. The Precautionary Approach

Fundamental 6

The current state of the stock shall be defined in relation to reference points or relevant proxies or verifiable substitutes allowing for effective management objectives and targets. Remedial actions shall be available and taken where reference point or other suitable proxies are approached or exceeded.

No. Supporting clauses	**5**
Supporting clauses applicable	**5**
Supporting clauses not applicable	**0**
Overall level of conformity	**HIGH**
Non Conformances	**0**

Summarized evidence:

Status determination criteria for Flatfish stocks, reference points and relative biomass:

The BSAI and GOA groundfish fishery management plans management plans define a series of target and limit reference points for Flatfish and other groundfish covered by these plans. 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, Acceptable Biological Catch (ABC) and the fishing mortality rate (F_{ABC}) used to set ABC, the determination of each being dependent on the knowledge base for each stock. The overall objectives of the management plans are to prevent overfishing and to optimize the yield form the fishery through the promotion of conservative harvest levels while considering differing levels of uncertainty. 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.

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 Bmsy or the biomass $B_{X\%}$ corresponding to the percentage of the equilibrium spawning biomass that would be obtained in the absence of fishing.

BSAI Alaska plaice spawning stock biomass in 2013 was considered stable and well above target reference points. BSAI arrowtooth flounder spawning stock biomass in 2013 was considered stable and well above target reference points. In 2013, BSAI flathead sole B40% was estimated at 128,286 t. The year 2013 spawning stock biomass was estimated at 243,334 t; thus the stock appeared stable and well above its biomass target reference point. BSAI Northern Rock sole spawning stock biomass in 2013 was considered on the rise and well above target reference points. In 2013 the BSAI Alaska plaice spawning stock biomass was considered to be at about target reference point level. Projected 2014 Kamchatka flounder female spawning biomass is estimated at 50,400 t, above the B40% level of 46,100 t, and is projected to remain above B40% if fishing continues at that level.

The 2012 status of the Greenland Turbot stock is B21%, much lower than last year's projected status for 2012 of B89% and the 2008 estimate of B52%. The change in status was mostly due to fixing the input error and improvements in the shapes of the selectivity curves chosen in 2012. The 2013 recommended ABC is only 26% of the projected 2013 ABC from last year's model. However, the projected 2013 estimated total biomass in this year's model is higher than projected from the 2011 Reference model. This is due to strong 2008 and an especially large 2009 year classes observed in both the survey and fisheries size composition data. These two year classes are expected to be larger than any other recruitment event since the 1970's and will begin to have an increasing influence on spawning stock biomass starting in 2014.

BSAI Units	Tier	Year	B_{MSY} (t)	$B_{35\%}$ (t)	$B_{40\%}$ (t)	$B_{100\%}$ (t)	F_{OFL}	F_{ABC}	OFL (t)
Alaska plaice	3	2013		133,000	152,000	380,000	0.19	0.158	55,800
arrowtooth flounder	3	2013		215,667	246,476	616,191	0.21	0.17	131,985
flathead sole	3	2013		112,250	128,286	320,714	0.348	0.285	81,535
Greenland turbot	3b	2013		41,726	47,686	119,217	0.14	0.12	2,539
Kamchatka flounder	5	2013					0.13	0.098	16,300
northern rock sole	1	2013	260,000			694,500	0.164	0.146	241,000
yellowfin sole	1	2013	353, 000			966,900	0.112	0.105	220,000

Spawning biomass for arrowtooth flounder in the Gulf of Alaska is estimated for 2013 as 1,274,290 tonnes. This is much higher than the B40% reference point calculated at 482,231 t and B35% calculated at 421,953 t. The 2012 B40 spawning biomass for flathead sole in the GOA is estimated at 41,547 t while the projected spawning biomass is at 106,377 t, therefore stable and well above target reference point. The spawning biomass of both Northern and Southern rock sole in the Gulf of Alaska is considered to be above their target reference points of B40. SB_{40} for Northern rock sole in 2013 is estimated at 20,100 t while the spawning biomass is estimated at 42,700 t. SB_{40} for Southern rock sole in 2013 is estimated at 45,100 t while the spawning biomass is estimated at 82,800 t. GOA Rex sole estimated spawning stock biomass for 2013 (52,807 t) is greater than B35% (19,434 t). For this reason the stock is not considered overfished. Because the 2012 catch was less than the 2012 ABC (i.e. 2,425 t < 9,612 t), overfishing is not occurring.

GOA Units	Tier	Year	B_{MSY} (t)	$B_{35\%}$ (t)	$B_{40\%}$ (t)	$B_{100\%}$ (t)	F_{OFL}	F_{ABC}	OFL (t)
arrowtooth flounder	3	2013		421,953	482,231	1,205,580	0.207	0.174	247,196
flathead	3	2013		36,354	41,547	103,868	0.593	0.45	61,036

sole									
northern rock sole	3a	2013		16,600	19,000	47,500	0.180	0.152	11,400
rex sole	5	2013					0.17	0.128	12,492
southern rock sole	3a	2013		43,000	49,200	123,000	0.230	0.193	21,900

Limit reference points ($B_{17.5\%}$) are established. The management approach also stipulates that if the stock shows a decline in biomass beyond limit reference point e.g. $B_{17.5\%}$ then the fishery maybe subjected to closure and formal rebuilding. None of the flatfish complex stocks are close to, at or below the limit reference point.

C. The Precautionary Approach

Fundamental 7

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

No. Supporting clauses	**6**
Supporting clauses applicable	**3**
Supporting clauses not applicable	**3**
Overall level of conformity	**HIGH**
Non Conformances	**0**

Summarized evidence:

The FAO Guidelines for the Precautionary Approach (PA) are satisfied:

The precautionary approach is applied widely to conservation, management and exploitation of living aquatic resources in order to protect them and preserve the aquatic environment. The MSA, as amended, sets out ten national standards for fishery conservation and management. The BSAI and GOA Groundfish FMPs are consistent with MSA requirements in applying the Precautionary Approach to fisheries. The FAO Guidelines for the Precautionary Approach (PA) (FAO 1995) advocate a comprehensive management process that includes data collection, monitoring, research, enforcement, and review, prior identification of desirable (target) and undesirable (limit) outcomes, and measures in place to avoid and correct undesirable outcomes, the action to be taken when specified deviations from operational targets are observed and an effective management plan. Lastly, the FAO guidelines advocate that the absence of adequate scientific information should not be used as a reason for postponing or failing to take measures to conserve target species, associated or dependent species as well as non-target species and their environment. The overall management for the Flatfish in Alaska comprises all the elements as specified above in the FAO guidelines for the PA.

Absence of adequate scientific information is not used as a reason for postponing or failing to take conservation and management measures. The BSAI and GOA Flatfish stocks are managed under a tier system rule based on stock knowledge. Status determination criteria for groundfish stocks are annually calculated using a six-tier system that accommodates varying levels of uncertainty of information. The six-tier system incorporates new scientific information and provides a mechanism to continually improve the status determination criteria as new information becomes available. The higher the tier (i.e. 4, 5 or 6), the more conservative the determination of OFL/ABC and ACL are. This is because more conservative determinations are at the higher tier levels where less stock information is available. This system is intrinsically precautionary in nature and the results involve catches always lower than the overfishing level (equivalent to MSY). Stock assessment results indicate that the BSAI and GOA Flatfish stocks biomasses are generally well above B40 and that the stocks are neither overfished nor undergoing overfishing. Greenland Turbot in the BSAI is the exception, currently being between target and limit reference point, but projected to increase in the upcoming years, starting in 2014.

Another limit reference point used in managing groundfish in the BSAI and GOA is the optimum yield (OY). The sum of the TACs of all groundfish species (except Pacific halibut) is required to fall within a given range. The upper range for BSAI is 2.0 million Mt while for the GOA is 800 thousand Mt, acting as an ecosystem cap. In practice, only the upper OY limit in the BSAI has been a factor in altering and limiting harvests.

D. Management Measures

Fundamental 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.

No. Supporting clauses	**10**
Supporting clauses applicable	**10**
Supporting clauses not applicable	**0**
Overall level of conformity	**HIGH**
Non Conformances	**0**

Summarized evidence:

Management measures:

The Alaska Flatfish commercial fishery is managed according to a modern management plan that attempts to balance long-term sustainability of the resources with optimum utilization. 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 ability and precision in catch control. Part of the assessment procedure is an extensive ecosystem assessment that shows development towards ecosystem-based management.

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 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.

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

The NMFS Alaska Region RAM division requires that all vessels fishing or processing groundfish possess a federal fishing permit, a federal vessel license or/and a federal processing permit. The permit describes all pertinent information about the vessel and its' vessel fishing category, gear type and target fisheries. As a condition of these permits vessels must also comply with all regulations described in the GOA and BSAI FMPs. This includes reporting and landings requirements (*e*landings and logbooks), carrying onboard observers or having shoreside observers at shore plants.

The BSAI and GOA FMPs authorize only non-pelagic trawls and longlines (for Greenland Turbot) for flatfish fishing, hence no dynamiting, poisoning and other comparable destructive fishing practices are allowed. Trawl sweeps modifications that 1) decrease significantly habitat interaction of trawl gear and 2) reduce the bycatch of crabs, and mortality rates of crabs that slip under the gear without being caught, have been implemented in the BSAI in 2011 and the Council has allowed in December 2012 for trials to be conducted in the GOA Region during 2013 and 2014. Longline gear is regulated as for seabird avoidance measures (e.g. use of streamer lines, sink baited hooks, circle hooks, line shooters, lining tubes, night settings etc.). No fish size limits are implemented for flatfish. Market forces assure that fishermen target adult fish as it fetches a higher price per pound.

The flatfish complex fisheries in Alaska are not overharvesting the resource and fleet capacity is carefully measured. Mechanisms are in place via the permitting process, observer program and catch reporting programs to quantify fishing capacity and ensure that excess capacity is avoided. Accordingly, the resources in the GOA and BSAI are generally above their target reference points, except for Greenland turbot. Overall, the flatfish complex in Alaska appears to be lightly exploited. Various management measures to decrease discards and increase retention have been implemented. These are considered efficient measures in that retention in the flatfish fleet of Alaska has increased significantly in recent years. The fleets are measured and controlled in terms of permitting and quota share limitations by federal agencies. Estimated discards are accounted for by observers and accrued towards the TACs for each species.

Regulations implementing the FMP include conservation measures that temporally and spatially limit fishing in certain geographical areas as well as effort around areas important to marine mammals. NMFS uses Stellar sea lion protection measures (SSLPM) to ensure the groundfish fisheries off Alaska are not likely to jeopardize the continued existence of the western population of Steller sea lions or adversely modify their critical habitat. The management measures disperse fishing over time and area to protect against potential competition for important Steller sea lion prey species near rookeries and important haulouts.

D. Management Measures

Fundamental 9

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

No. Supporting clauses	**11**
Supporting clauses applicable	**8**
Supporting clauses not applicable	**3**
Overall level of conformity	**HIGH**
Non Conformances	**0**

Summarized evidence:

Management measures to maintain the Flatfish stocks at maximum sustainable levels:

The flatfish stocks in Alaska part of this unit of certification are not depleted or threatened with depletion. Presently, the resources in the GOA and BSAI are considered to be generally above their target reference points, except for Greenland turbot. Overall, the flatfish complex in Alaska appears to be lightly exploited.

Council guidelines, federal FMP regulations and the MSA with its National Standards all define to management agencies what must be done if a stock becomes depressed. The US Congress established new statutory requirements under the MSA in 2006 to end and prevent overfishing by the use of annual catch limits (ACLs) and accountability measures. These new requirements were implemented in 2010 for all stocks subject to overfishing and in 2011 for all stocks not subject to overfishing. A new provision of the MSA requires that the respective scientific and statistical committees (SSC) of the eight fishery management councils determine scientific benchmarks, while the councils continue to recommend quotas subject to these scientific benchmarks. This separation of authorities represents a major step forward in trying to eliminate overfishing and to enhance recovery of overfished stocks nation-wide.

Assuming that catch is measured accurately, ACLs provide a transparent measure of the effectiveness of management practices to prevent overfishing. They cannot exceed the fishing level determined by the SSC, but catch thresholds can also be established that trigger accountability measures to prevent overfishing. Accountability measures might include: (1) seasonal, area, and gear allocations; (2) bycatch limits; (3) closed areas; (4) gear restrictions; (5) limited entry; (6) catch shares; (7) in-season fishery closures; and (8) observer and vessel monitoring requirements. Accountability measures allow close monitoring of overall catch levels, as well as seasonal and area apportionments. They might close designated areas, or fisheries, if bycatch limits for prohibited species are attained. They also allow monitoring of any endangered or threatened mammals or seabirds and provide a database for evaluating likely consequences of future management actions.

The Council has consistently adopted the annual OFL and acceptable biological catch (ABC) recommendations from its SSC and set the total allowable catch (TAC) for each of its commercial groundfish stocks at or below the respective ABC. The NPFMC first defined OFL in 1991 as a catch limit that never should be exceeded. The NPFMC adopted more conservative definitions of OFL in 1996 and again in 1999, to comply with revised national guidelines. In 1999, the NPFMC prescribed that OFL should never exceed the amount that would be taken if the stock were fished at FMSY (or a proxy for FMSY), after Congress redefined the terms “overfishing” and “overfished” to mean a rate or level of fishing mortality that jeopardizes the capacity of a fishery to produce MSY on a continuing basis. The OFL could be set lower than catch at FMSY at the discretion of the SSC. OFL can be then virtually defined as an upper limit reference point.

In 1996, the NPFMC capped the rate of fishing mortality used to calculate ABC by the rate used to calculate OFL. These rates were prescribed through a set of six tiers defining more and more conservative catch levels as the tiers increased. Harvest rates used to establish ABCs were reduced at low stock size levels, thereby allowing rebuilding of depleted stocks. If the biomass of any stock falls below BMSY, or a proxy for BMSY, the fishing mortality is reduced relative to the stock status.

Both target and non-target species are regularly assessed and bycatch limits and PSC caps are in place to control impacts. Also, Essential Fish Habitat (EFH), as defined in the MSA, are described and evaluated to assure that fishing impacts are not more than minimal or more than temporary. Some areas have been closed to protect dependent species - this includes SSL protection areas around rookeries and haulouts (10 & 20 nm closures).

During the last EFH review in 2010 it has been shown that fishing effects on the habitat of flatfish in the BSAI and GOA do not appear to have impaired either stocks’ ability to sustain themselves at or near the MSY level.

D. Management Measures

Fundamental 10

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

No. Supporting clauses	**3**
Supporting clauses applicable	**3**
Supporting clauses not applicable	**0**
Overall level of conformity	**HIGH**
Non Conformances	**0**

Summarized evidence:

Training opportunities and facilities. The North Pacific Fishing Vessel Owners association (NPFVO) provides a large and diverse training program that many of the professional 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. 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. Also, the University of Alaska Sea Grant Marine Advisory Program (MAP) provides education and training in several sectors, including fisheries management, in the forms of seminars and workshops. MAP also conducts sessions of their Alaska Young Fishermen's Summit. Each Summit is an intense course in all aspects of Alaska fisheries, from fisheries management & regulation (e.g. MSA), to seafood marketing. The 2013 summit was hosted in Anchorage, Alaska, from December 10th to the 12th. The conference aimed at providing crucial training and networking opportunities for fishermen entering the business or wishing to take a leadership role in their industry.

In addition to this, MAP provides training and technical assistance to fishermen and seafood processors in Western Alaska. 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.

E. Implementation, Monitoring and Control

Fundamental 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.

No. Supporting clauses	**6**
Supporting clauses applicable	**3**
Supporting clauses not applicable	**3**
Overall level of conformity	**HIGH**
Non Conformances	**0**

Summarized evidence:

Enforcement agencies and framework:

Effective mechanisms are established for fisheries monitoring, surveillance, control and enforcement measures including, an observer program (although it is designed for biological data collection rather than enforcement), inspection schemes such as US Coast Guard (USCG) boardings, dockside landing inspections and vessel monitoring systems, to ensure compliance with the conservation and management measures for the Alaska flatfish fisheries.

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. 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.

On January 8, 2002, an emergency interim rule (67 FR 956) was issued by NMFS to implement Steller sea lion protection measures. Vessels that catch flatfish also catch Pacific cod since it found in similar fishing grounds and they have quota for it. 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.

Boardings and Violations

Flatfish fisheries in the Bering Sea are primarily targeted by trawl vessels, although there are some longliners that also target various flatfish species. The active fleet size of vessels targeting these species is approximately 87 vessels each year, and the Coast Guard attempts to board 18 of these vessels annually. This fleet has a VMS requirement, which makes them relatively easy to track.

With regards to the question of checking gear, vessels using bottom contact trawl gear in the Bering Sea are required to have elevating devices installed on their trawl sweeps to raise them off the sea floor to reduce interactions with other species. To date, since the implementation of this requirement, there have been no violations detected by at-sea boardings of this requirement. This is the only gear measurement requirement that is in place.
From fiscal year 2008 through the end of fiscal year 2012, the Coast Guard boarded 90 vessels targeting flatfish in the Bering Sea with 7 violations detected on 7 vessels, providing a detected violation rate of 7.77%.

Flatfish fisheries in the Gulf of Alaska are targeted primarily by trawl vessels. The active fleet size of vessels targeting these species is approximately 85 vessels each year, and the Coast Guard attempts to board 17 of these vessels annually. This fleet has a VMS requirement, which makes them relatively easy to track.
Currently, there are no gear modification requirements for this fishery, although there are provisions being put in place to mimic the Bering Sea trawl sweep elevating devices. Given the success of that problem and some of the gains realized by the fishermen for using these devices, there are not expected significant violations associated with implementation of these regulations.
From fiscal year 2008 through the end of fiscal year 2012, the Coast Guard boarded 21 vessels targeting flatfish in the Gulf of Alaska with 5 violations noted on two vessels, providing a detected violation rate of 9.52%.

Fishing permit requirements:

No foreign fleet is allowed to fish in the Alaska's EEZ. Every fishing vessel targeting flatfish in Alaska is required to have a federal permit. The permit programs are managed by the Restricted Access Management (RAM) federal division.

The flatfish fisheries of Alaska under assessment here are harvested exclusively within the Alaska EEZ only. Those fisheries are not part of any international agreement or part of a framework of sub-regional or regional fisheries management organizations or arrangements. Flatfish fisheries in international waters abutting the GOA or BSAI EEZ occur in north-western British Columbia and in Russian waters across the Bering Sea Convention Line. Those fisheries are regulated by their own Governments.

E. Implementation, Monitoring and Control

Fundamental 12

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

No. Supporting clauses	**4**
Supporting clauses applicable	**2**
Supporting clauses not applicable	**2**
Overall level of conformity	**HIGH**
Non Conformances	**0**

Summarized evidence:

Enforcement policies and regulations, state and federal:

In Alaska waters, 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 "Policy for the Assessment of Civil Administrative Penalties and Permit Sanctions" issued by NOAA Office of the General Counsel – Enforcement and Litigation on March 16, 2011, provides guidance for the assessment of civil administrative penalties and permit sanctions under the statutes and regulations enforced by NOAA. The purpose of this Policy is to ensure that: (1) civil administrative penalties and permit sanctions are assessed in accordance with the laws that NOAA enforces in a fair and consistent manner; (2) penalties and permit sanctions are appropriate for the gravity of the violation; (3) penalties and permit sanctions are sufficient to deter both individual violators and the regulated community as a whole from committing violations; (4) economic incentives for noncompliance are eliminated; and (5) compliance is expeditiously achieved and maintained to protect natural resources. Under this Policy, NOAA expects to improve consistency at a national level, provide greater predictability for the regulated community and the public, improve transparency in enforcement, and more effectively protect natural resources. For significant violations, the NOAA attorney may recommend charges under NOAA's civil administrative process (*see* 15 C.F.R. Part 904), through issuance of a Notice of Violation and Assessment of a penalty (NOVA), Notice of Permit Sanction (NOPS), Notice of Intent to Deny Permit (NIDP), or some combination thereof. Alternatively, the NOAA attorney may recommend that there is a violation of a criminal provision that is sufficiently significant to warrant referral to a U.S. Attorney's office for criminal prosecution.

F. Serious Impacts of the Fishery on the Ecosystem

Fundamental 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.

No. Supporting clauses	**13**
Supporting clauses applicable	**13**
Supporting clauses not applicable	**0**
Overall level of conformity	**HIGH**
Non Conformances	**0**

Summarized evidence:

Ecosystem reports and studies:

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 Alaska's groundfish fisheries on the ecosystem and effects of the ecosystem on the groundfish fisheries.

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. 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 Gulf of Alaska 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 Gulf of Alaska. The study includes two field years (2011 and 2013) followed by one synthesis year.

For the Bering Sea, a large multiyear ecosystem project is moving 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 are combining 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.

The NMFS and the NPFMC, and other institutions interested in the North Pacific conduct assessments and research on environmental factors on flatfish and associated species and their habitats. Findings and conclusions are published in SAFE document, annual Ecosystem SAFE documents and other reports. SAFE documents for BSAI and GOA Flatfish summarize ecosystem considerations for the stocks.

Ecosystem Effects on Alaskan flatfish stocks

The prey and predators of BSAI and GOA flatfish are well understood. The composition of most flatfish prey varies by species, time and area. NOAA's AFSC REFM division has done extensive diet studies on multiple species occurring in Alaska's commercial fisheries.

Bycatch and ETP species

Gear modifications have been implemented in the BSAI and are being tested in the GOA to lift the sweep off the seafloor and hence limit detrimental effects on the seafloor. Trials in the BSAI have found a 90% decrease in bottom habitat interaction and reduction in unobserved mortality of crab from interacting with the trawl sweeps. Additionally there are several regulations in place towards seabird avoidance for vessels fishing with hook-and-line gear.

Pacific halibut, Pacific herring, Pacific salmon and steelhead, king crab, and Tanner crab are prohibited species and must be avoided while fishing for groundfish and must be returned to the sea with a minimum of injury, except when their retention is required or authorized by other applicable law. Groundfish species and species under this FMP for which TAC has been achieved shall be treated in the same manner as prohibited species. When a target fishery attains a PSC limit apportionment or seasonal allocation, the bycatch zone or management area to which the PSC limit applies will be closed to that target fishery for the remainder of the year or season.

Bycatch is managed operationally by assessing bycatch species (see SAFE-reports), having bycatch caps (PSC and MRA), using data collected and validated by the observer program to account for total catches. Measures applied to minimize catch, waste and discards of non-target species are described in the Management Measures for the BSAI and GOA Groundfish Fisheries given in the FMPs. Of notice in 2013, the BSAI Alaskan plaice fishery, which had significant discards, was closed in May of 2013 due to the initial TAC having been reached. Vessels fishing flatfish in the BSAI were prohibited from retaining Alaska plaice and forced to move their operations away from areas with high Alaska plaice catches. All retained and discarded catch of the managed (target) species count toward their TAC.

The AFSC also monitors the catch of non-target species in groundfish fisheries in the EBS, GOA and AI ecosystems. There are three categories of non-target species: 1) forage species (gunnels, stichaeids, sandfish, smelts, lanternfish, sand lance), 2) species associated with Habitat Areas of Particular Concern-HAPC species (seapens/whips, sponges, anemones, corals, tunicates), and 3) non-specified species (grenadiers, crabs, starfish, jellyfish, unidentified invertebrates, benthic invertebrates, echinoderms, other fish, birds, shrimp). Stock assessments have been developed for all groups in the other species (sculpins, unidentified sharks, salmon sharks, dogfish, sleeper sharks, skates, octopus, squid) category, so AFSC does not include trends for \other species" in the Ecosystem SAFE.

Total catch of non target species is estimated from observer species composition samples taken at sea during fishing operations, scaled up to reflect the total catch by both observed and unobserved hauls and vessels operating in all FMP areas. From 1997-2002, these estimates were made at the AFSC using data from the observer program and the NMFS Alaska Regional Office. Catch since 2003 has been estimated using the Alaska Region's new Catch Accounting system. These methods should be comparable. This sampling and estimation process does result in uncertainty in catches, which is greater when observer coverage is lower and for species encountered rarely in the catch. Until 2008, observer sample recording protocols prevented estimation of variance in catch; however, the AFSC is developing methods to estimate variance for 2008 on which are planned to be presented in future SAFE reports.

Status and trends: In all three ecosystems, non-specified catch comprised the majority of non target catch during 1997-2011. Non-specified catches are similar in the EBS and GOA, but are an order of magnitude lower in the AI. Catches of HAPC biota are highest in the EBS, intermediate in the AI and lowest in the GOA. The catch of forage fish is highest in the GOA, low in the EBS and very low in the AI.

In the EBS, the catch of non-specified species appears to have decreased overall since the late 1990s. Scyphozoan jellyfish, grenadiers and sea stars comprise the majority of the non-specified catches in the EBS. The 2008-2009 and 2010-2011 increase in non-specified catch was driven by jellyfish. Grenadiers (including the Giant grenadier) are caught in the flatfish, sablefish, and cod fisheries. Jellyfish are caught in the pollock fishery and sea stars are caught primarily in flatfish fisheries. HAPC biota catch has generally decreased since 2004. Benthic urochordata, caught mainly by the flatfish fishery, comprised the majority of HAPC biota catches in the EBS in all years except 2009-2011, when sponges and sea anemones increased in importance. The catch of forage species in the EBS increased in 2006 and 2007 and was comprised mainly of eulachon that was caught primarily in the pollock fishery; however, forage catch decreased in 2008-2010. The forage catch increased again in 2011, primarily due to capelin and eulachon.

In the AI, the catch of non-specified species shows little trend over time, although the highest catches were recorded in 2009-2010. The non-specified catch dropped in 2010-2011, primarily due to a reduction in the catch of giant grenadiers. Grenadiers comprise the majority of AI non specified species catch and are taken in flatfish and sablefish fisheries. HAPC catch has been similarly variable over time in the AI, and is driven primarily by sponges caught in the trawl fisheries for Atka mackerel, rockfish and cod. Forage fish catches in the AI are minimal, amounting to less than 1 ton per year, with the exception of 2000 when the catch estimate was 4 tons, driven by (perhaps anomalous) sandfish catch in the Atka mackerel fishery.

The catch of non-specified species in the GOA has been generally consistent aside from a peak in 1998 and lows in 2009 and 2010. Grenadiers comprise the majority of non-specified catch and they are caught primarily in the sablefish fishery. Sea anemones comprise the majority of the variable but generally low HAPC biota catch in the GOA and they are caught primarily in the flatfish fishery.

The catch of forage species has undergone large variations, peaking in 2005 and 2008 and decreasing in 2006-2007 and 2009-2010. The catch of forage species increased in 2010-2011, primarily due to eulachon and other osmerids. The main species of forage fish caught are eulachon and they are primarily caught in the pollock fishery.

The state of the prohibited and forage species is considered in the setting MSY- and OY-levels. A programmatic supplemental environmental impact statement (PSEIS) was completed in June, 2004. The preferred alternative identified in the PSEIS retained the existing OY range. In addition to impacts on the stocks and stock complexes in the "target species" category the PSEIS analyzed impacts on prohibited species, forage fish, non-specified species, habitat, seabirds, and marine mammals. Ecosystem-level variables analyzed were pelagic forage availability, removal of top predators, introduction of non-native species, energy removal, energy redirection, species diversity, functional diversity (in terms of both trophic relationships and structural habitat), and genetic diversity. Effects were partitioned into direct and indirect effects, persistent past effects, reasonably foreseeable future external effects, and cumulative effects. For the preferred alternative, approximately half of the ecosystem-level effects were determined to be insignificant, conditionally significant/positive, or significant/positive; none were determined to be significant/negative.

Habitat interaction are not considered significant in the flatfish fisheries partly because of the development of trawl sweep modification, already implemented in the BSAI Region and to be implemented in the GOA in 2014. Bycatch is recorded in detail and endangered species interactions with Steller sea lions and short-tailed albatross are tightly monitored and regulated. The current ESA biological opinion specifies that the expected take of Short tailed albatross (bycatch) in the longline fishery is four in any 2-year period. In the event that a fifth bird is bycaught, an ESA Section 7 consultation involving the U.S. Fish and Wildlife Service and the National Marine Fisheries Service must be initiated. This process can lead to additional regulatory action on the fishery. Reports for 2012 show that the bycatch rate for seabirds in fisheries is 40% below the 5-year average, with no short-tailed albatross catches. Also, NMFS uses Stellar sea lion protection measures (SSLPM) to ensure the groundfish fisheries off Alaska are not likely to jeopardize the continued existence of the western population of Steller sea lions or adversely modify their critical habitat. The management measures disperse fishing over time and area to protect against potential competition for important Steller sea lion prey species near rookeries and important haulouts.

The BSAI and GOA flatfish stocks are not considered overfished. Furthermore serious impacts are regulated in the FMPs by identifying ecosystem components and non-target stocks that are vulnerable or important for food web functioning (prohibited and forage species).

Further Information

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Table 1: Global Trust Assessment Team Members

Name	Role	Name	Role
Vito Ciccia Romito, SAIG/Global Trust Certification Ltd. Quayside Business Park Dundalk, Co. Louth Ireland	Lead Assessor	**Dr. Geraldine Criquet,** SAIG/Global Trust Certification Ltd. Quayside Business Park Dundalk, Co. Louth Ireland	Assessor
Erica Fruh, SAIG/Global Trust Certification Ltd. Oregon, USA	Assessor	**Jeff Fargo,** Consulting Fishery Scientist, British Columbia, Canada	Assessor
R.J. (Bob) Allain Consulting Fishery Scientist, Brunswick, Canada	Assessor		

http://sustainability.alaskaseafood.org

Table 2: Peer Reviewers

Rick Stanley	**Dr. Steven Parker**
Rick Stanley received a M.Sc. in Zoology from the University of British Columbia in 1977. Following work on overseas fisheries projects in Indonesia (1978) and El Salvador (1979), he worked for the Department of Fisheries and Oceans Canada (DFO) as a research biologist at the Pacific Biological Station in Nanaimo Canada until August 2013. During those years with DFO, he was senior author or co-author of 19 peer-reviewed stock assessments on British Columbia populations of various species of rockfishes (Sebastes spp.). He also served on the working groups and review committees of assessment on many other species of groundfish and invertebrates. In addition to stock assessment activity, he has published primary papers on the	Steven Parker is a fisheries scientist at the National Institute of Water and Atmospheric Research in Nelson, New Zealand. He received a PhD in Zoology for the University of Maine at Orono in 1995, and worked for the Oregon Department of Fish and Wildlife for a decade focusing on rockfish biology and ecology, bycatch reduction technologies and trawl gear development for the West Coast flatfish fisheries, the Pacific hake fishery observation programme, and served as the State of Oregon's Representative on the North Pacific Fisheries Management Council's Science and Statistical Committee. Since 2008, Steven has been involved in the Fish Stock Assessment working group for the Commission for the Conservation

general biology of rockfishes including papers on ageing, parasites and reproductive biology, as well acoustic biomass estimation. An additional focus of Mr. Stanley's work at DFO was the development of fishery catch monitoring programs and bottom trawl surveys for groundfish. Following his retirement from DFO in August 2013, Mr. Stanley began work as a self-employed fisheries consultant.	of Antarctic Marine Living Resources (CCAMLR), which assesses and manages fisheries in the Southern Ocean. His work there focuses on toothfish migration and ecology, the effects of fishing on fragile benthic habitats, tagging and telemetry, and biological inputs into stock assessment.

Table 3: Certification Committee Members

Bill Paterson, **Legal / Technical /Certification and Accreditation Expert** SAIG/Global Trust Certification Ltd.	
Dr. Samuel Shephard **Fishery Scientist** Independent Scientist.	**Dr. Norman Graham** **Fishery Scientist** Marine Institute, Ireland.
Also in Attendance	
Vito Ciccia Romito: Fishery Scientist SAIG/Global Trust Certification Ltd. (Fishery Presentation to Certification Committee only)	
Geraldine Criquet: Fishery Scientist SAIG/Global Trust Certification Ltd. (Fishery Presentation to Certification Committee only)	