MOODY MARINE LTD

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Final Determination Report for

THE BERING SEA AND ALEUTIAN ISLANDS ARROWTOOTH FLOUNDER TRAWL FISHERY

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SUMMARY

The Best Use Coalition, on behalf of its members engaged in the flatfish fisheries in the Bering Sea and Aleutian Islands (BSAI) and Gulf of Alaska (GOA), contracted Moody Marine Ltd to undertake a Marine Stewardship Council (MSC) fisheries assessment of their trawl fisheries against the MSC environmental standard for sustainable fishing.

Ten units of certification were identified, five in the BSAI (i.e. reflecting the five different species) and, similarly five in the GOA. This report sets out the results of the assessment of the Best Use Coalition BSAI Arrowtooth flounder Trawl Fishery.

The assessment was also undertaken in accordance with the MSC Fisheries Certification Methodology (Version 6) which sets out the assessment and certification process. As a result all the required steps were undertaken, including:

- Announcement of the assessment
- Appointment of a specialist assessment team
- Development and consultation of the Performance Indicators and Scoring Guideposts in the form of an "assessment tree" against which the fishery was assessed
- The notification and undertaking of a site visit to the fishery
- The production of a report that describes the background to the fishery, the fishery management operation and the evaluation procedure and results.
- The nomination and stakeholder consultation of peer reviewers
- Peer review of the report
- Stakeholder consultation of the report
- Final determination by the Moody Marine Governing Board, and
- Posting of the final report on the MSC website for stakeholder consultation.

The specialist assessment team that Moody Marine Ltd appointed were:

- Prof. Joe Powers - A Professor of stock assessment in the School of the Coast and Environment, Louisiana State University.
- Dr Geoff Tingley - a Research Scientist specialising in fisheries management at the Centre for Environment, Fisheries and Aquaculture Science (Cefas), a UK Government research and advisory agency.
- Prof. Susan Hanna - A Professor within the Department of Agricultural and Resource Economics, Oregon State University.

The assessment team undertook a site visit to Kodiak and Seattle and included meetings with Federal and State scientists and managers; individual fishermen; representatives from fishermen's organisations; and, representatives from environmental/conservation organisations. Following the information gathering phase the assessment team undertook a rigorous review and scoring of the fishery against the MSC Criteria and Principles for Sustainable Fishing.

The strengths and weaknesses of the fishery under each MSC Principle include:

Principle 1 - A risk averse management approach which has in place a harvest strategy and harvest control rules that have ensured the limit reference point has not been approached. The stock is neither overfished (i.e. depleted) nor subject to overfishing. However, the assessment team did highlight that there was limited evidence on the effect of the fishery on stock structure and whether this has had an adverse affect on recruitment.

Principle 2 - There has and continues to be significant research into the BSAI ecosystem and the implementation of policies with respect to monitoring and minimizing the effect of the fishery on

habitats and protected, endangered and threatened species. However, further research and information gathering is required with respect to the effect of fishery on the interaction with seabirds and the quantity of lost fishing gear.

Principle 3 - The institutional and operational management of the fishery is considered to be very good. The management system is supported by strong legislation and implemented accordingly through the Regional Council system.

The assessment team concluded that the fishery achieved an overall average score of above 80 for each MSC Principle and scored below 80 against three Performance Indicators. As a result it is determined that the Best Use Coalition BSAI Arrowtooth Flounder Trawl Fishery be certified according to the MSC Principles and Criteria for Sustainable Fisheries subject to the following Conditions of Certification:

The Best Use Coalition is required to:

Provide evidence of the affect of the fishery on stock structure and whether this has had an adverse affect on recruitment. It is required that this part of the Condition is met by the second annual surveillance audit. If the evidence suggests recruitment has been adversely affected remedial measures must be implemented by year four of the certification.

Quantify and identify the location of lost trawl fishing gear and assess the extent of adverse effects, including "ghost fishing". If significant adverse effects are identified identify ways of reducing gear loss and must be described and a program to monitor improving performance implemented. It is required that this Condition is met by the second annual surveillance audit.

Provide adequate quantitative estimates of the effects of the fishery on seabirds by the first annual surveillance audit.

The Best Use Coalition has formally agreed to meet these Conditions within the specified timescales and has set out an Action Plan detailing how they will do this.

1. INTRODUCTION

This report sets out the results of the assessment of the Bering Sea and Aleutian Islands (BSAI) Arrowtooth Trawl Fishery against the Marine Stewardship Council (MSC) Principles and Criteria for Sustainable Fishing.

Arrowtooth flounder (*Atheresthes stomias*) is one of five flatfish species that are being assessed in the BSAI flatfish trawl fishery. The other species are: yellowfin sole (*Limanda aspera* also known as *Pleuronectes asper*), Alaska plaice (*Pleuronectes quadrituberculatus*), flathead sole (*Hippoglossoides elassodon*) and northern rock sole (*Lepidopsetta polyxystra* also known as *Pleuronectes bilineatus*).

For the purposes of this MSC assessment each species is considered to be a single "unit of certification" (see 1.1 below) and so each will be assessed individually and a separate report produced for each. Where appropriate, the reports will provide species specific information, otherwise, the reports will refer to the species collectively as "flatfish".

Given that the fishing method and management framework for each of the five assessed species is the same the structure of each report will be the same as will much of the content. The main differences in the content will be associated with the biology of the species and the stock assessment; these are referred to in sections 3.1 and 4, respectively. The scoring table in Appendix A will also be similar for all of the species reports with the exception of the "Principle 1" section.

1.1 The fishery proposed for certification

The MSC Guidelines to Certifiers specify that the unit of certification is "The fishery or fish stock (=biologically distinct unit) combined with the fishing method/gear and practice (=vessel(s) pursuing the fish of that stock)." The fishery proposed for certification is therefore defined as:

Species: Arrowtooth flounder (*Atheresthes stomias*)

Geographical Area: Bering Sea and Aleutian Islands (BSAI)

Method of Capture: Trawl

Stock: Bering Sea and Aleutian Islands (BSAI)

Management System: Federal and State management stakeholders:

- National Marine Fisheries Service
- North Pacific Fishery Management Council
- US Fish and Wildlife Service
- US State Department
- Pacific States Marine Fisheries Commission
- US Coast Guard
- Alaska Department of Fish and Game
- Washington Department of Fish and Wildlife
- Oregon Department of Fish and Wildlife

Client Group: Successful certification of the fishery will apply to the following Best use Coalition members:

- Cascade Fishing Inc.
- Fishermen's Finest Inc.
- Iquique LLC
- Jubilee Fisheries Inc.
- O'Hara Corporation
- Ocean peace Inc.

- United States Seafoods LLC

1.2 Other eligible fishers

In the course of the certification it is possible that further clients may join the Best Use Coalition client group. This would be in accordance with the MSC's stated desire to allow fair and equitable access to the certification.

The BSAI flatfish and Pacific cod trawl fisheries use the same or similar methods of fishing and operate under the same management regime. The BSAI Pacific cod trawl fishery has been assessed against the MSC standard and was successfully certified on 22nd January 2010. In accordance with MSC TAB Directive D-010 v2 the clients of the flatfish and Pacific cod fisheries are able to enter into certificate sharing agreements, thereby allowing BSAI flatfish (arrowtooth flounder, flathead sole, rex sole, northern rock sole and southern rock sole) and Pacific cod to qualify as MSC certified in both fisheries whether caught as target or retained bycatch.

The MSC are also considering interim measures that will allow certified fisheries that retain species that have been certified in fisheries using a different gear type and operating within the same management regime to enter into certificate sharing agreements. This would allow similar outcomes, as described above, where certified species caught as target or retained as bycatch could be eligible to carry the MSC label, e.g. a certificate sharing agreement between the flatfish (demersal trawl) and pollock (mid-water trawl) sectors would allow pollock caught by flatfish trawlers to be MSC certified and flatfish caught by mid-water pollock vessels to be certified.

Any companies involved in certificate sharing with this fishery will be published on the MSC website.

1.3 Report Structure and Assessment Process

The aims of the assessment are to determine the degree of compliance of the fishery with the MSC Principles and Criteria for Sustainable Fishing, as set out in Section 9.

This report sets out:

- the background to the fishery under assessment and the context within which it operates in relation to the other areas where arrowtooth flounder are fished;
- the qualifications and experience of the team undertaking the assessment;
- the standard used (MSC Principles and Criteria);
- the stakeholder consultation that was carried out -stakeholders include all those parties with an interest in the management of the fishery and include fishers, management bodies, scientists and environmental Non-Governmental Organisations (ENGO's);
- the methodology used to assess ('score') the fishery against the MSC Standard;
- a scoring table with the Performance Indicators adopted by the assessment team and Scoring Guidelines (SGs) which aid the assessment team in allocating scores to the fishery. The commentary in this table then sets out the position of the fishery in relation to the Performance Indicators (PIs).

The intention of the earlier sections of the report is to provide the reader with background information to the fishery. Considerable information is available for this fishery and to avoid this report being excessively large the team have provided references and internet links, where possible, to allow the reader to access further detailed information if they so wish.

Finally, as a result of the scoring, the Certification Recommendation of the assessment team is presented, together with any conditions attached to certification.

In draft form, this report has been subject to public scrutiny on the MSC website and critical review by appropriate, independent, scientists ('peer review'). The comments of these scientists are appended to this report. Responses are given in the peer review texts and, where amendments are made to the report on the basis of peer review comments; these are also noted in the peer review text.

The report, containing the recommendation of the assessment team, any further stakeholder comments and the peer review comments is then considered by the Moody Marine Governing Board (a body independent of the assessment team). The Governing Board then make the final certification determination on behalf of Moody Marine Ltd.

It should be noted that, in response to comments by peer reviewers, stakeholders and the Moody Marine Governing Board, some points of clarification may be added to the final report.

Finally, the complete report, containing the Moody Marine Ltd Determination and all amendments, will be released for further stakeholder scrutiny.

1.4 Information sources used

Information used in the main assessment has been obtained from interviews and correspondence with stakeholders in the flatfish trawl fishery, notably: fishing industry representatives; the National Marine Fisheries Service (NMFS); the Alaska Fish and Game Department (ADF&G); representatives from ENGOs; and, the Client Group – Best Use Coalition.

Other information sources

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2 GLOSSARY OF ACRONYMS, ABBREVIATIONS AND SOME DEFINITIONS USED IN THE REPORT

ABC	Acceptable Biological Catch - is an annual sustainable target harvest (or range of harvests) for a stock or stock complex. It is derived from the status and dynamics of the stock, environmental conditions, and other ecological factors, given the prevailing technological characteristics of the fishery. The target reference point is set below the limit reference point for overfishing.
ACRs	Agenda Change Requests
ADF&G	Alaska Department of Fish and Game
ADMB	Auto-differentiator Model Builder
AFA	American Fisheries Act
AFSC	Alaska Fisheries Science Center
AI	Aleutian Islands
AP	Advisory Panel
AWT	Alaska Wildlife Trooper
B	Biomass
$B_{40\%}$	Biomass equal to 40% of the equilibrium spawning biomass that would be obtained in the absence of fishing
BOF	Board of Fisheries
BS	Bering Sea
CDQ	Community Development Quota
CIE	Center for Independent Experts
CV	Catcher Vessel
CP	Catcher Processor
EBS	Eastern Bering Sea
EEZ	Exclusive Economic Zone
EFH	Essential Fisheries Habitat
ESA	Endangered Species Act
F	Fishing mortality
$F_{40\%}$	Fishing mortality 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.
F_{ABC}	Fishing mortality rate used to set ABC – Acceptable Biological Catch
FIT	Fishery Interactions Team
FMP	Fishery Management Plan
FMA	Fisheries Monitoring and Analysis Division (NMFS)
F_{OFL}	The fishing mortality rate used to set OFL
GOA	Gulf of Alaska
GRS	Groundfish retention standard
HAPC	Habitat Areas of Particular Concern
HCR	Harvest Control Rule
IFQ	Individual Fishing Quota
IPHC	International Pacific Halibut Commission
IR/IU	Improved retention/improved utilization
IUU	Illegal, unreported and unregulated
ITAC	Initial total allowable catch
JEP	Joint Enforcement Program
LAPP	limited access privilege program
LLP	License Limitation Program
LOA	Length Overall
M	Natural mortality rate - the rate at which the numbers in a population naturally decrease with time

MMPA	Marine Mammal Protection Act
MPA	Marine Protected Area
MSA	Magnuson Stevens Act
MSC	Marine Stewardship Council
MSY	Maximum Sustainable Yield - The largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental conditions.
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic Atmospheric Administration
NPFMC	North Pacific Fisheries Management Council
NRC	The National Research Council
OY	Optimum Yield - 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.
OLE	Office of Law Enforcement
OFL	Overfishing level - is a limit reference point set annually for a stock or stock complex during the assessment process. Overfishing occurs whenever a stock or stock complex is subjected to a rate or level of fishing mortality that jeopardizes the capacity of a stock or stock complex to produce MSY on a continuing basis. Operationally, overfishing occurs when the harvest exceeds the OFL.
PBR	Potential Biological Removal - the maximum number of animals, not including natural mortality, which may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population.
PI	Performance Indicator
PPM	Parts Per Million
PPT	Parts Per Thousand
PSC	Prohibited species catch
SAFE	Stock Assessment and Fisheries Evaluation
SG	Scoring Guidepost
SLP	Sea-level pressure
SOPPs	Statement of Organization, Practices and Procedures
SSB	Spawning Stock Biomass - the total weight of all fish (both males and females) in the population which contribute to reproduction. Often conventionally defined as the biomass of all individuals beyond “age at first maturity” or “size at first maturity”
SSC	Scientific and Statistical Committee
TAB	Technical Advisory Board (for the MSC)
TAC	Total Allowable Catch - Total allowable catch is the annual harvest limit for a stock or stock complex, derived from the ABC by considering social and economic factors.
TALFF	Total Allowable Level of Foreign Fishing
USCG	US Coast Guard
USFWS	U.S. Fish and Wildlife Service
VMS	Vessel Monitoring System

A combination of imperial and metric measurements is used in the report:
1 inch = 2.54 cm
1 foot = 30.5 cm
1 fathom = 1.839 m

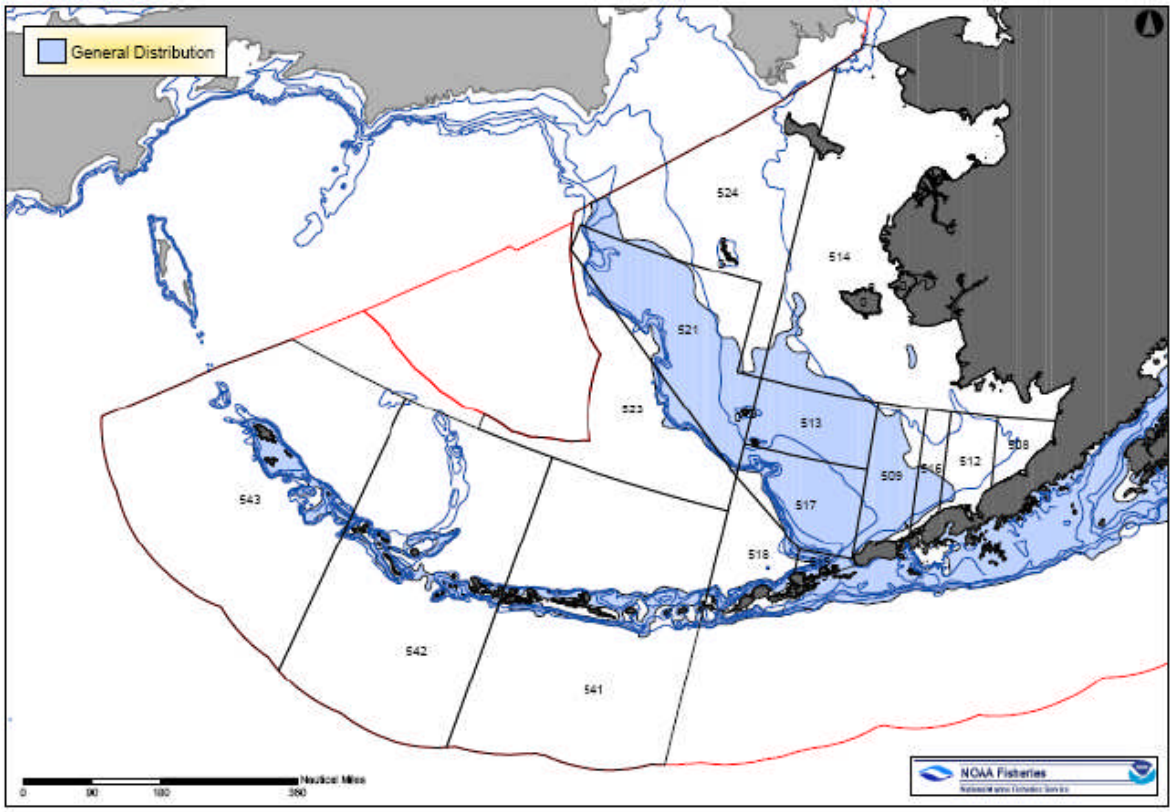
3 BACKGROUND TO THE FISHERY

3.1 Biology of the Species

The following is taken from Wilderbuer and Nichol 2007. Arrowtooth flounder (*Atheresthes stomias*) are a relatively large flatfish that may live to 15 years. Spawning occurs from December through February. The natural mortality has been estimated to be M = 0.20, females; with males evaluated at 0.26-0.3. Arrowtooth flounder are distributed throughout the continental shelf through age 4, and then at older ages disperse to occupy both the shelf and the slope. Based on age data from the 1982 U.S.-Japan cooperative survey, recruitment to the slope gradually increases at older ages and reaches a maximum at age 9. However, greater than 50% of age groups 9 and older continue to occupy continental shelf waters.

Arrowtooth flounder Essential Fish Habitat (EFH), i.e. waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (see section 6.7.7) have been described for the late juvenile and adult stage of its life cycle: EFH for late juvenile and adult arrowtooth flounder 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 and upper slope (200 to 500 m) throughout the BSAI wherever there are softer substrates consisting of gravel, sand, and mud

Figure 1. Essential Fish Habitat distribution for the late juvenile and adult arrowtooth flounder



Parameters of the von Bertalanffy growth curve for arrow tooth flounder from age data collected during the 1982 U.S.-Japan cooperative survey and the 1991 slope are as follows:

Sex	Sample size	Age range	Linf	K	to
1982 age sample					
Male	528	2-14	45.9	0.23	-0.70
Female	706	2-14	73.8	0.14	-0.20
Sexes Combined	1,234	2-14	59.0	0.17	-0.50
1991 age sample					
Male	53	3-9	57.9	0.17	-2.17
Female	134	4-12	85.0	0.16	-0.81

Maturity information from a histological examination of arrowtooth flounder in the Gulf of Alaska indicates that 50% of male and female fish become mature at 46.9 and 42.2 cm, respectively.

3.2 History of the Fishery

Arrowtooth flounder are captured primarily in pursuit of other high value species. Catch records of arrowtooth flounder and Greenland turbot were combined during the 1960s. The foreign fleets that operated in the BSAI increased their effort for Greenland turbot 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 from 1977-2007 as a result of catch restrictions placed on the fishery for Greenland turbot and phasing out of the foreign fishery in the U.S. EEZ.

Before the passage of the Fishery Conservation and Management Act in 1976, foreign fishing took place under a series of bilateral agreements between the US and the respective countries. Several foreign countries, including Japan, the USSR (Russia), Canada, Korea, Taiwan, and Poland conducted large scale groundfish fisheries in the BSAI, with flatfish being a significant component of the catch.

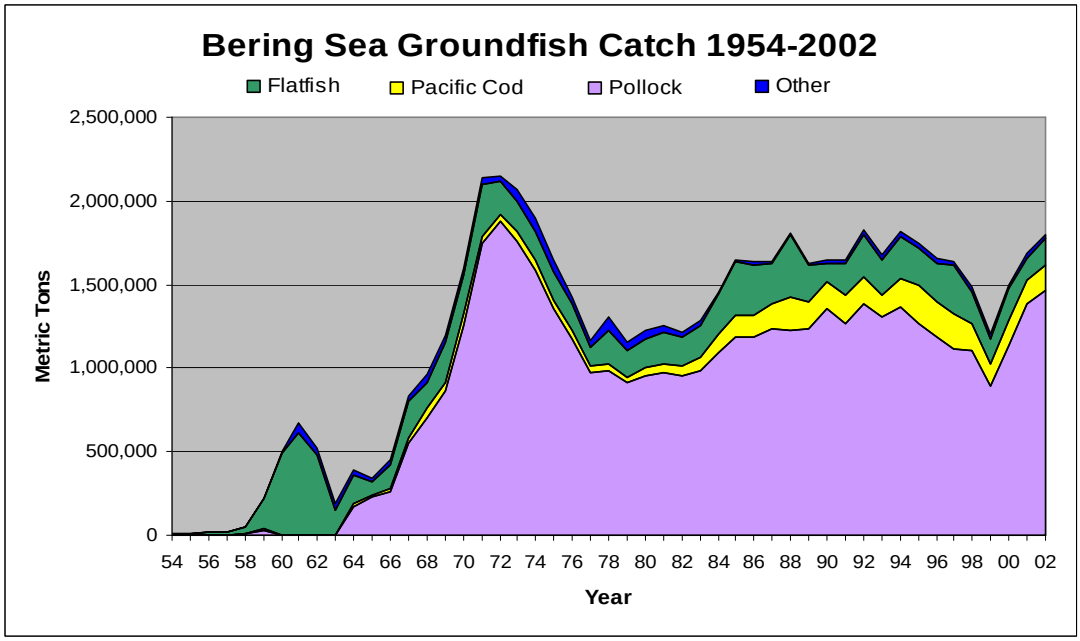
The 1976 enactment of the Fishery Conservation and Management Act (now called the Magnuson-Stevens Act (MSA)) established the North Pacific Fisheries Management Council (NPFMC – or the "Council"), giving it the authority to recommend fishery management programs to the Secretary of Commerce. The American Fisheries Promotion Act of 1980 required that allocations of fish quotas to foreign nations be based on the nation's contributions to the development of the U.S. fishing industry. This led to the development of joint-venture operations, with U.S. catcher vessels delivering their catches directly to foreign processing vessels, followed by full fishery utilization of the domestic groundfish fleet.

Between 1977 and 1991 BSAI fisheries transitioned from being prosecuted almost exclusively by foreign vessels to (by 1988) one in which "joint ventures" between foreigners and Americans were predominant and finally to an "Americanized" fishery in which Americans were required to have majority ownership in harvesting enterprises (Queirolo, 1989).

In 1982 the first Fishery Management Plan (FMP) for Groundfish of the BSAI Management Area was implemented. In-line with the transition from a foreign to domestic fishery the focus of the FMP has changed accordingly (NPFMC 2008a; 2008b). By 1988 domestic capacity was sufficient to harvest the groundfish TAC and 1991, the entire catch of BSAI flatfish was domestic, with yellowfin sole, rock sole, "other flatfish" and arrowtooth flounder comprising important components of the catch (NPFMC 2008a). The green shading in Figure 2 shows EBS flatfish

catches from 1954-2002 relative to the catch of pollock and Pacific cod.

Figure 2. Eastern Bering Sea Groundfish Catch 1954-2002.



Source: (Witherell 2008)

In response to the rapid Americanization of the fisheries, the Council initiated a Comprehensive Rationalization Program in 1992 with the aim of maintaining the health of the marine ecosystem to ensure the long-term conservation and abundance of the groundfish and crab resources. In the following years several Amendments to the FMP were approved limiting the number of participants and the types of groundfish harvest activities. A moratorium on new harvesting vessels entering the groundfish fisheries was implemented through BSAI FMP Amendment 23 thereby reducing the possibility of significant increases in the number of large-capacity harvesting vessels (NOAA 2004a).

In 1992 the Community Development Quota (CDQ) Program was implemented to provide economic development opportunities to rural western Alaska Communities. The program was expanded in 1995 to include allocations for king crab, Tanner crab, and other groundfish species. The expanded multi-species program was fully implemented in 1998 (NOAA 2004a).

In 1996, the Council enacted the License Limitation Program (LLP), a more restrictive form of limited access. This lead to several amendments to the BSAI groundfish FMPs that focused on limiting catches to sustainable levels, and included allocations to particular fleet sectors, i.e. vessels within a particular size range, gear type, mode of operation (NOAA 2004a).

Congress enacted the American Fisheries Act (AFA) in 1998 and had a profound effect on the management of groundfish fisheries in the BSAI and, to a lesser extent, the groundfish fisheries in the Gulf of Alaska (GOA). The AFA changed the inshore/offshore allocation of pollock and allowed the formation of cooperatives among factory trawlers and catcher vessels. Catch limits, commonly referred to as "sideboard limits[1]" were put in place to prevent AFA participants (i.e. the

[1] "Sideboards" are catch limits imposed on one fleet to prevent them from catching more than a specified amount of species targeted by another fishery. The idea is to protect participants in other fisheries from adverse effects of fishing in the "sideboard" fishery

pollock fleets) from catching more than their traditional levels of other groundfish, including Pacific cod (NOAA 2004a; 2008d).

Since the mid 1990s the Council has adopted bycatch and discard reduction management actions. One of these actions was Amendment 49 to the BSAI Groundfish FMP that required all vessels fishing for groundfish in the BSAI management area to retain all pollock and Pacific cod. Further action was taken in 2002 when the Council initiated Amendment 79 to establish groundfish retention standards (GRS). In 2007, Amendment 80 was implemented with the aim, among other things; of reducing discards and improving the utilization of catches by the non-AFA trawl catcher/processor fleet (often referred to as the Head and Gut fleet) by extending the GRS to all vessels. Amendment 80 provided specific groundfish allocations to the catcher/processor sector and encouraged the formation of cooperatives (e.g. Best use Cooperative); the intention being to provide incentives to allow fishers to focus less on harvest rate maximization and more on optimizing their harvest by reducing unwanted incidental catch, improve retention, improve utilization and, as a result, improve the economic health of the H&G trawl CP sector: (http://www.fakr.noaa.gov/sustainablefisheries/amds/80/program_overview.pdf.)

3.3 The Fleet

Arrowtooth flounder is taken as a bycatch by trawl catcher processors (110 - 270 feet length overall (LOA)) that target other high value flatfish from spring through December. Catcher-processor vessels have processing equipment on board that allows them to head, gut and freeze the fish; hence they can be referred to as "head and gut vessels".

Smaller "catcher vessels" (60-90 feet LOA) also targeting higher value flatfish catch arrowtooth and deliver fresh fish to shoreside processors. The catcher boats fish predominantly in the Gulf of Alaska (GOA) while catcher processors fish in both the EBS and the GOA (pers. comm. Gauvin 2008). Fishing occurs throughout the shelf area (Witherell 2000; Hiatt et al 2007).

Tables 1, 2 and 3 provide information on the number of vessels engaged in the BSAI flatfish fishery, the amount of flatfish they caught and the ex-vessel value between 2002 and 2006.

Table 1. The numbers of catcher vessels and catcher processors that targeted flatfish in the BSAI between 2002 and 2006

Year	Catcher Vessels	Catcher Processors
2002	1	26
2003	1	26
2004	4	27
2005	2	27
2006	5	28

Source: (Table 41, Hiatt et al. 2007).

Table 2. The approximate catch (tons) of BSAI flatfish by vessel type between 2002 and 2006

Year	Catcher Vessels	Catcher Processors
2002	4,000	153,000
2003	6,000	149,000
2004	6,000	164,000
2005	4,000	170,000
2006	6,000	178,000

Source: (Table 2, Hiatt et al. 2007).

Table 3.The ex-vessel value ($ millions) of BSAI flatfish catch by vessel type between 2002 and 2006.

Year	Catcher Vessels ($ million)	Catcher Processors ($ million)
2002	0.4	32.6
2003	0.6	32.6
2004	0.7	38.6
2005	1.0	56.3
2006	2.2	61.3

Source: (Table 19, Hiatt et al. 2007).

3.3.1 The Fishing Gear and the Fishing Operation

The following description of the fishing gear and its operation has been taken from the "Environmental Impact Statement for Essential Fish Habitat Identification and Conservation in Alaska" (NOAA 2005).

Yellowfin sole is fished with a two or four seam otter trawl with a relatively low vertical opening (typically 1 to 3 fathoms). Nets are made of polyethylene netting, with codends and intermediates using 5.5 to 8 inch mesh in square or diamond configuration. Trawl codends are usually made with polyethylene netting attached to four longitudinal riblines. The riblines are typically chain, wire, or synthetic rope. Floats are attached along the length of the codend to counteract the weight of the steel components. Container lines around the circumference are attached along the length of the codend to restrict the expansion of the netting, preventing damage and allowing the codend to be hauled up a stern ramp. Sacrificial chafing gear, typically polyethylene fibre, is attached to the codend to protect it from abrasion on the stern ramp and occasional contact with the seafloor.

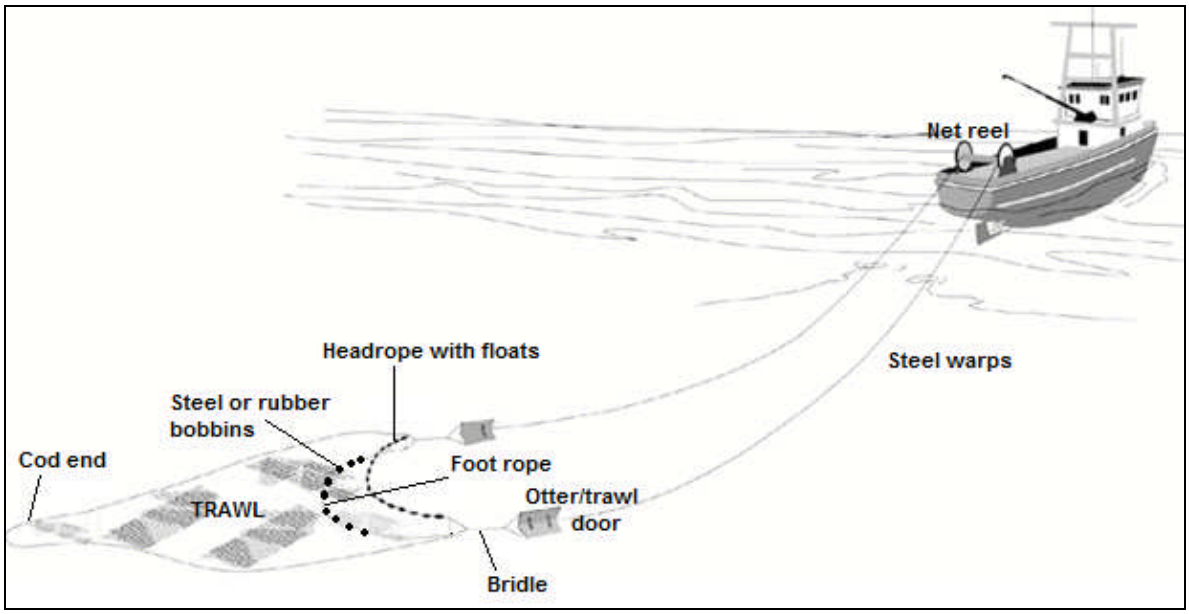
Otter boards (doors) are used to spread the net and keep it open during towing. Steel trawl doors ranging in size from 5 to 11 m^2 spread the nets horizontally. Door spread varies with fishing depth and rigging style, but generally ranges from 100 to 200 m (328 to 656 feet). The rigging between the net and the doors includes bridles and sweeps ('mudgear'), ranging in length from 30 to 200 m (98 to 656 feet), which herd fish into the path of the trawl. Sweeps are made of steel cable covered by rubber disks ranging from 4 to 8 inches in diameter. Footropes keep the front of the net off the bottom to protect it from damage and typically extend between 100 and 200 feet. They are made of rubber disks and bobbins 12 to 18 inches in diameter strung on chain or wire at 18- to 48-inch intervals. Bobbins are mostly rubber, but sometimes are hollow steel balls designed to roll along the seabed.

Contact with the seafloor is predominantly from doors, sweeps, footropes, and to a lesser extent from the codend. Although codends are usually rigged with some poly twine chafing gear, a design objective for modern flatfish nets is to employ sufficient poly floats to buoy the net body and codend to keep it mostly off the bottom or at least reduce the drag on the bottom to the greatest extent possible. This reduces the problem of sand and mud in the catch (which lowers product value and complicates processing).

When set, the net is unwound from a net reel, the sweeps are attached, and then the doors are attached. Wire cable attached to each door is let out to a distance of approximately 3 times the depth. Modern trawl winches are designed to automatically adjust tension and release when necessary. The tow duration in this fishery is about 1 to 4 hours, at a speed of 3 to 4 knots.

Tows may be in a straight line, or they may be adjusted to curve around depth contours or to avoid location of hangs and fixed gear. They may also be pushed by current, or for other reasons. At haulback, the setting procedure is reversed, and the codend is dumped into the fish-hold below decks.

Figure 3. Diagram to show the basic configuration of a groundfish trawl



4 STOCK ASSESSMENT

4.1 Management Units

The flatfish stocks are divided into management units or stocks based upon the spatial distribution, the history of fishing and biological characteristics such as morphometrics, movements, and spawning characteristics including spawning sites. These definitions were the basis of Amendment 56 of the FMP and as such were reviewed by the Plan Team (see 5.2 below), the NPFMC Science and Statistical Committee (SSC) and NMFS assessment scientists through the assessment process. There does not appear to be significant mixing between BSAI and GOA stocks of the same species thus allowing for separate stock assessments and management recommendations to be made for the BSAI and GOA.

4.2 Monitoring of Stock Status

Monitoring of the status of the stocks is done through the normal accumulation of fishery monitoring data of catch, catch at size/age, growth data and through periodic surveys. The data are integrated into population assessment models which indicate trends in biomass, fishing mortality rates, catches and recruitment. Addionally, the assessment results are evaluated relative to management benchmarks, both precautionary targets of management and precautionary limits which are not to be exceeded.

A “Plan Team” is appointed for each FMP and is responsible for reviewing stock assessment information and assist in the preparation of annual Stock Assessment and Fishery Evaluation (SAFE) documents. The SAFE report summarizes the 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 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. For the BSAI groundfish FMP, the SAFE report is published in three sections: a “Stock Assessment” section, an “Economic Status of Groundfish Fisheries off Alaska” section and “Ecosystem Considerations” section, which are bound separately (NPFMC 2007a; Hiatt et al. 2007).

The SAFE report for BSAI groundfish fisheries is compiled by the Plan Team from chapters contributed by scientists at NMFS' Alaska Fisheries Science Center (AFSC) & and the Alaska Department of Fish and Game (ADF&G). The stock assessment section includes recommended acceptable biological catch (ABC) level and overfishing level (OFL) for each stock and stock complex managed under the FMP. The ABC recommendations are reviewed by the 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 management strategies for the fisheries. Figure 8 in Section 6 of this report sets out the TAC setting process.

4.3 Assessment Modelling

The data used in this assessment include estimates of total catch, trawl survey biomass estimates and standard error from shelf and slope surveys, sex-specific trawl survey size composition and available fishery length-frequencies from observer sampling.

Fishery catch data from 1970 - September 8, 2007 and fishery length-frequency data from 1978-91 and 2000-2005 were used in the assessment.

Relative abundance from the survey CPUE of arrowtooth flounder increased substantially on the continental shelf from 1982 to 1990 as the CPUE from AFSC shelf surveys increased. Then CPUE continued to increase through 1997. From 1999 to 2005 the CPUE increased at a high rate each year. The 2005 CPUE of 16.35 kg/ha was the highest ever estimated from the shelf survey. The 2006 and 2007 estimates are lower at 13.12 and 11.79 kg/ha, respectively.

Absolute biomass estimates (t) from trawl surveys for arrowtooth flounder from the standard survey area in the eastern Bering Sea and Aleutian Islands region were available. Although the standard sampling trawl changed in 1982 to a more efficient trawl which may have caused an overestimate of the biomass increase in the pre-1982 part of the time-series, biomass estimates from these surveys on the continental shelf have shown a consistent increasing trend since 1975. Since 1982, biomass point -estimates indicate that arrowtooth abundance has increased eight-fold to a high of 570,600 t in 1994. The population biomass remained at a high level from 1992-97. Results from the 1997-2000 bottom trawl surveys indicate the Bering Sea shelf population biomass had declined to 340,000 t, 60% of the peak 1994 biomass point estimate. Beginning in 2002 the shelf survey estimate increased further and peaked in 2005. In 2006 and 2007 the estimates declined slightly. These recent increases have had a large effect on the model estimates in this assessment.

Arrowtooth flounder absolute abundance estimates are based on "area-swept" bottom trawl survey methods. These methods require several assumptions which can add to the uncertainty of the estimates. For example, it is assumed that the sampling plan covers the distribution of the species and that all fish in the path of the trawl are captured (no losses due to escape or gains due to herding). Due to sampling variability alone, the 95% confidence intervals for the 2006 point estimate are 516,000 – 700,340 t.

Trawl surveys were intermittently conducted over the continental slope in 1979, 1981, 1982, 1985, 1988, 1991, 2002 and 2004. The combined arrowtooth/Kamchatka flounder abundance estimated from the 2006 Aleutian Islands trawl survey was 229,205 t, the highest estimate observed in the Aleutian Islands since surveys began in 1980. Results from trawl surveys in the three areas indicate that approximately 15-20% of the arrowtooth-Kamchatka flounder biomass is located in the Aleutian Islands in any year.

The following describes the assessment of the arrowtooth flounder stock.

The abundance, mortality, recruitment and selectivity of arrowtooth flounder is 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. 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 was optimized by maximizing a log (likelihood) function given distributional assumptions about the observed data. The suite of parameters estimated by the model are classified by the likelihood components: trawl fishery size composition, shelf survey size composition, slope survey size composition, shelf survey age composition and trawl survey biomass estimates with the total log likelihood is being the sum of the likelihoods for each data component. The AD Model Builder software fit the data components using automatic differentiation software allowing numerous parameters to be estimated efficiently. Parameters estimated were: 32 fishing mortality rates, 14 selectivity parameters, 51 year class deviations and 1 parameter relating survey catchability to bottom temperature. A Monte Carlo Markov Chain (MCMC) algorithm is used to obtain estimates of parameter uncertainty. One million MCMC simulations are conducted, with every 1,000th sample saved for the sample from the posterior distribution. Ninety-five percent confidence intervals are produced as the values corresponding to

the 5th and 95th percentiles of the MCMC evaluation.

4.4 Harvest Reference Points

The system of defining fishing mortality and biomass reference levels for the Alaskan fisheries is based on the report of Goodman et al. (2002) and which was subsequently adopted into the FMP in Amendment 56. This system is a hierarchy of 6 tiers. The highest, Tier 1, is a complete assessment with probability density functions (as opposed to point estimates) of key stock variables (biomass, F, etc.) as well as biological reference points including those related to maximum sustainable yield (MSY). Amendment 56 defines the 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. The fishing mortality rate used to set ABC (F_{ABC}) may be less than this maximum permissible level, but not greater.

Because reliable estimates of reference points related to maximum sustainable yield (MSY) are currently not available, but reliable estimates of reference points related to spawning per recruit are, Alaska plaice has been assigned a Tier 3 designation. Tier 3 uses the following reference points:

- $B_{40\%}$ - 40% of the equilibrium spawning biomass that would be obtained in the absence of fishing);
- $F_{35\%}$ - the fishing mortality rate that reduces the equilibrium level of spawning per recruit to 35% of the level that would be obtained in the absence of fishing; and,
- $F_{40\%}$ - 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.

Tier 3 is further divided into subcategories depending on the state of the current biomass relative to the $B_{40\%}$ reference: Tier 3a is a healthy stock and may be fully exploited, 3b has a fishing target that is related to the amount of depletion and 3c has no ABC:

3a) Stock status: $B/B_{40\%} > 1$
$F_{OFL} = F_{35\%}$ $F_{ABC} < F_{40\%}$

3b) Stock status: $0.05 < B/B_{40\%} < 1$
$F_{OFL} = F_{35\%} (B/B_{40\%} - 0.05) \times 1/0.95$ $F_{ABC} < F_{40\%} (B/B_{40\%} - 0.05) \times 1/0.95$

3c) Stock status: $B/B_{40\%} < 0.05$
$F_{OFL} = 0$ $F_{ABC} = 0$

The 2007 spawning stock biomass for arrowtooth flounder was estimated at 993,500 t. Because the estimated $B > B_{40\%}$, the arrowtooth flounder is placed in the subcategory "3a".

4.5 Current status

The current status of the arrowtooth flounder stock based upon the December 2007 SAFE Report is summarized below:

Stock	F_{abc}	Current F Relative to F_{abc}	Current Female Biomass Relative to B_{abc}
Arrowtooth Flounder	0.24	0.03	5.2

The stock is well above the ABC or MSY biomass target and well below the ABC or MSY fishing

mortality rate target. Additionally, the overfishing level (not given, but which has a higher fishing mortality rate level and lower biomass level and than columns (2) and (3) of the above) is not being approached. Hence, there is no overfishing and the stock is not in an overfished state.

The total biomass for arrowtooth flounder for 2007 was estimated at 1,780,300 t with a female spawning biomass of 933,500 t (Wilderbuer and Nichol 2007) (Figure 4). The total landings in 2007 were 11,670 t. Table 5 below shows the TAC, ABC and total catch for arrowtooth flounder in the BSAI between 1991 and 2008. Recruitment trends have been variable, but currently recruitment is high and biomass has been steadily increasing for several decades (Figure 5).

The stock is lightly harvested due to targeting on other species (current F's are less than 0.1) and the regulatory mechanisms related to bycatch with no major shifts in catches in recent years. Similarly, there are no major trends in abundance, i.e. the stock is fluctuating without trend.

Table 5. The TAC, ABC and total catch for arrowtooth flounder between 1991 and 2008

Year	TAC (t)	ABC (t)	Catch (t)	Year	TAC (t)	ABC (t)	Catch (t)
1991	20,000	116,400	22,052	2000	131,000	131,000	12,929
1992	10,000	82,300	10,382	2001	22,015	117,000	13,908
1993	10,000	72,000	9,338	2002	16,000	113,000	11,540
1994	10,000	93,400	14,366	2003	12,000	112,000	12,834
1995	10,227	113,000	9,280	2004	12,000	115,000	17,809
1996	9,000	129,000	14,652	2005	12,000	108,000	13,685
1997	20,760	108,000	10,054	2006	13,000	136,000	13,309
1998	16,000	147,000	15,241	2007	20,000	158,000	11,670
1999	134,354	140,000	10,573	2008	75,000	244,000	19,403

(Source: NPFMC 2009)

Figure 4. Estimates of total biomass

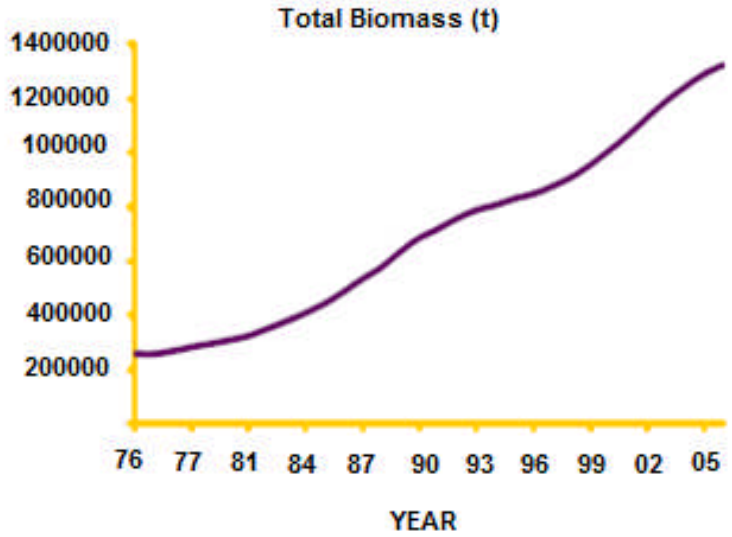
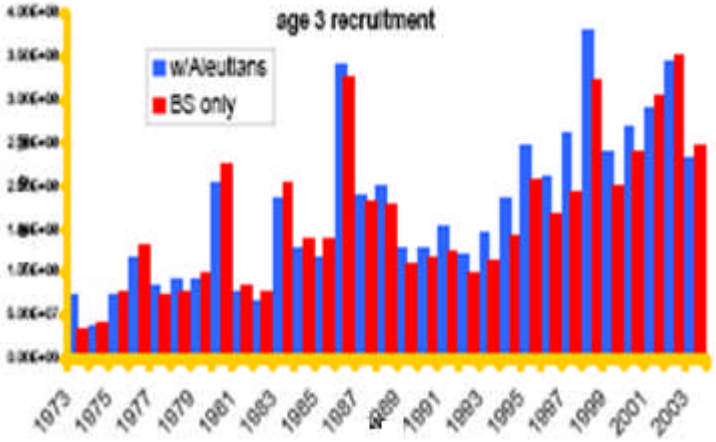


Figure 5. Estimates of total biomass and recruitment


age 3 recruitment
w/Aleutians
BS only
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1975
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5 FISHERY LOCATION, ADMINISTRATIVE BOUNDARIES, AND RESPONSIBILITY

5.1 Administrative Context and Legislation

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act or MSA) is the primary domestic legislation governing management of the United States' marine fisheries. It was most recently reauthorized in 2006. Under the MSA, the North Pacific Fishery Management Council (NPFMC or "Council") is authorized to prepare and submit to the Secretary of Commerce for approval, disapproval or partial approval, a Fisheries Management Plan (FMP) and any necessary amendments, for each fishery under its authority that requires conservation and management. With respect to the flatfish fisheries in the BSAI they come under the umbrella of the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area (NPFMC 2008a).

5.2 BSAI Management Area

The BSAI Management Area is indicated by the clear numbered statistical areas in Figure 6. The subareas and districts of the BSAI management area are illustrated in Figure 7.

5.3 US Waters

The geographic extent of the FMP management unit is the United States (US) Exclusive Economic Zone (EEZ) of the Bering Sea, including Bristol Bay and Norton Sound, and that portion of the North Pacific Ocean adjacent to the Aleutian Islands which is between 170°W longitude and the US Russian Convention Line of 1867. The area is divided into two subareas, the Bering Sea and the Aleutian Islands (NPFMC 2008a).

Figure 6. Bering Sea and Aleutian Islands statistical and reporting areas (NPFMC 2007a).

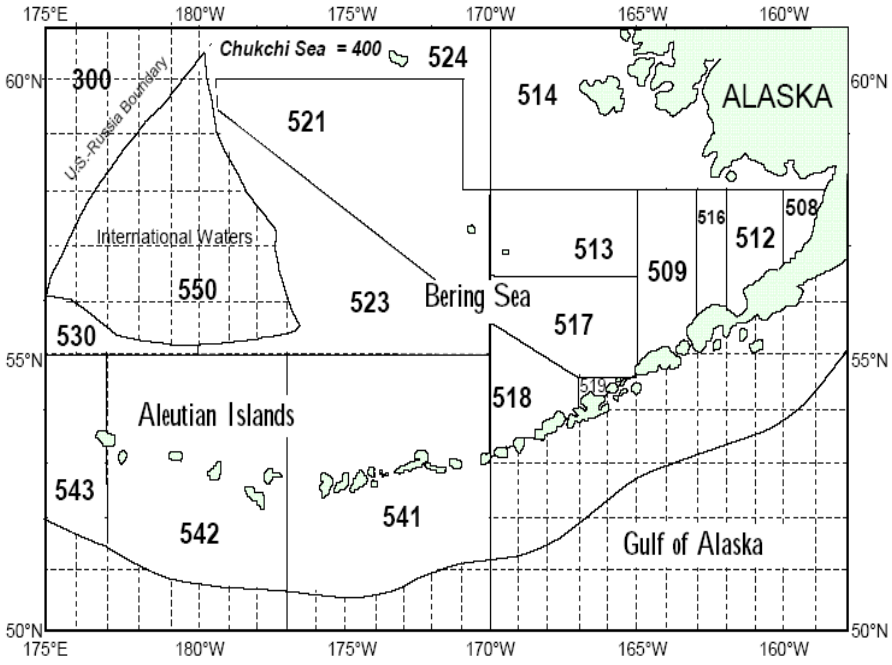
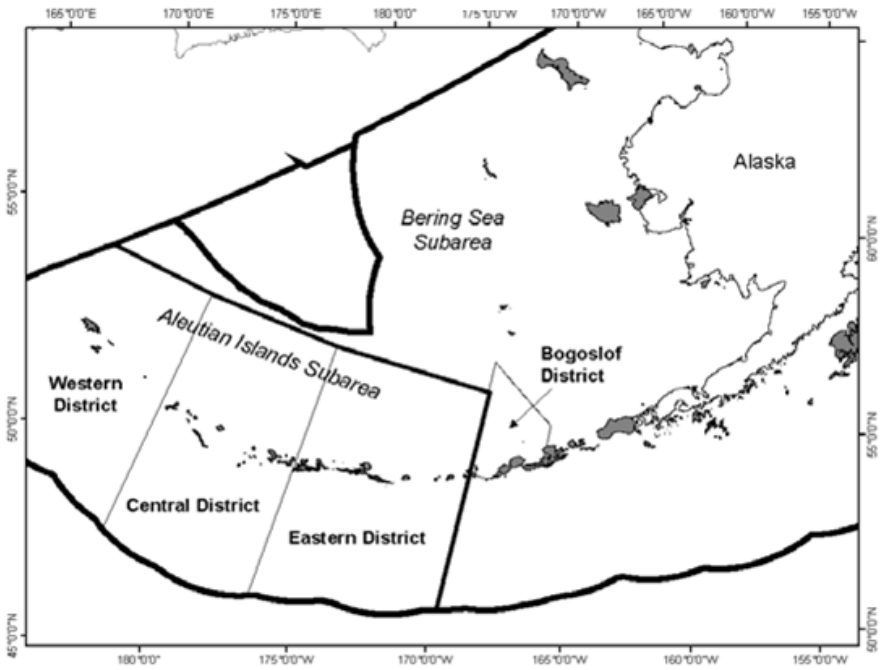


Figure 7. Subareas and districts of the Bering Sea and Aleutian Islands management area.



Source: (NPFMC 2008a)

5.4 International Waters

International waters, the "donut hole", are enclosed by the territories of the US and Russia indicated by Statistical Area 550 in Figure 6.

5.5 Foreign Fishing

Title II of the Magnuson-Stevens Act establishes the system for the regulation of foreign fishing within the US EEZ (50 CFR 600). The regulations provide for the setting of a total allowable level of foreign fishing (TALFF) for species based on the portion of the optimum yield that will not be caught by US vessels. No TALFF is available for the fisheries covered by the groundfish FMP, because the U.S. has the capacity to harvest up to the level of optimum yield of all species subject to the FMP. US fish processors have the capacity to process the optimum yield of BSAI groundfish (NPFMC 2008a).

6 FISHERIES MANAGEMENT FRAMEWORK, PROCESSES AND INTERACTIONS

6.1 The Fishery Management Plan for Groundfish of the BSAI Management Area

The Fishery Management Plan for Groundfish of the BSAI Management Area was first implemented in 1982 and most recently updated in 2008. As of May 2008, 89 amendments had been developed for the FMP, although some are still in development and a few have not yet been fully implemented. A detailed account of each of the FMP amendments, including its purpose and need, a summary of the analysis and implementing regulations, and results of the amendment, can be found at http://www.fakr.noaa.gov/sustainablefisheries/amds/default.htm.

Examples of recent key amendments that affect the flatfish fisheries are shown in Table 5 below.

Table 4. Examples of amendments to the BSAI FMP since 1999

Amendment Number	Description
55	Implementation of Essential Fish Habitat (EFH) provisions.
56	Revision of the overfishing definition.
60	Changes to licensing requirements for CDQ vessels.
61	The inclusion of sideboard measures to strengthen AFA sideboards for non-pollock fisheries.
65 & 78	Establish new habitat areas of particular concern (HAPCs) and revised identification processes.
79	Implement groundfish retention standards for non-AFA catcher-processors.
80	Allocation of non-pollock groundfish in the BSAI among trawl sectors and creation of a limited access privilege program to facilitate the formation of harvesting cooperative in the non-AFA trawl catcher/processor sector.

(NPFMC 2008a).

6.2 National Standards for Fishery Conservation and Management

The Magnuson-Stevens Act (MSA) contains ten national standards (16 U.S.C. § 1851), with which all FMPs must conform. The national standards, listed in abbreviated form below, provide the primary guidance for the management of US fisheries:

Conservation and management measures shall:

1. Prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery.
2. Be based upon the best scientific information available.
3. Manage a fish stock as a unit throughout its range; manage interrelated stocks as a unit or in close coordination.
4. Not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among U.S. fishermen, such allocation shall be: fair and equitable; reasonably promote conservation; and avoid accumulation of excessive shares.
5. Consider efficiency in the utilization of fishery resources; no measure shall have economic allocation as its sole purpose.
6. Allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

7. Minimize costs and avoid unnecessary duplication.
8. Take into account the importance of fishery resources to fishing communities in order to provide for their sustained participation and minimize adverse community economic impacts.
9. Minimize bycatch and to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.
10. Promote the safety of human life at sea.

6.3 The NPFMC Management Approach

The Council has developed a management approach to guide its development of management recommendations to the Secretary of Commerce. This approach has five elements:

- judicious and responsible fisheries management practices
- based on sound scientific research and analysis
- proactive rather than reactive
- ensure the sustainability of fishery resources and associated ecosystems
- benefit future and current generations

The Council states its intent to achieve the five elements of its approach through adaptive management measures, as described in the MSA and in conformance with the National Standards, the Endangered Species Act (ESA), the National Environmental Policy Act, and other applicable law. The Council also intends to adopt appropriate measures that accelerate the precautionary, adaptive management approach through community-based or rights-based management, ecosystem-based management principles that protect managed species from overfishing, and where appropriate and practicable, increase habitat protection and bycatch constraints. All management measures will be based on the best scientific information available.

The fishery management goal associated with this approach is, "to provide sound conservation of the living marine resources; provide socially and economically viable fisheries for the well-being of fishing communities; minimize human-caused threats to protected species; maintain a healthy marine resource habitat; and incorporate ecosystem-based considerations into management decisions" (NPFMC 2008a).

6.4 Management Objectives

The Council adopted a revised groundfish management policy in April 2004, following a programmatic review of the groundfish fisheries. The Council's revised management policy contains forty-five management objectives that are reviewed annually by the Council. An annual workplan outlines specific tasks associated with the implementation of the FMP objectives and a status report is updated at every NPFMC meeting to ensure that the objectives are being achieved (cf. NPFMC 2008c, http://www.fakr.noaa.gov/npfmc/Tasking.htm). The management objectives are grouped into nine categories.

1. Prevent Overfishing:
   - Adopt conservative harvest levels for multi-species and single species fisheries and specify optimum yield.
   - Continue to use the 2 million t optimum yield cap for the BSAI groundfish fisheries.
   - Provide for adaptive management by continuing to specify optimum yield as a range.
   - Provide for periodic reviews of the adequacy of $F_{40\%}$ and adopt improvements, as appropriate.
   - Continue to improve the management of species through species categories.

2. Promote Sustainable Fisheries and Communities:

- Promote conservation while providing for optimum yield in terms of the greatest overall benefit to the nation with particular reference to food production, and sustainable opportunities for recreational, subsistence, and commercial fishing participants and fishing communities.
- Promote management measures that, while meeting conservation objectives are also designed to avoid significant disruption of existing social and economic structures.
- Promote fair and equitable allocation of identified available resources in a manner such that no particular sector, group or entity acquires an excessive share of the privileges.
- Promote increased safety at sea.

3. Preserve Food Web:
   - Develop indices of ecosystem health as targets for management.
   - Improve the procedure to adjust acceptable biological catch levels as necessary to account for uncertainty and ecosystem factors.
   - Continue to protect the integrity of the food web through limits on harvest of forage species.
   - Incorporate ecosystem-based considerations into fishery management decisions, as appropriate.

4. Manage Incidental Catch and Reduce Bycatch and Waste:
   - Continue and improve current incidental catch and bycatch management program.
   - Develop incentive programs for bycatch reduction including the development of mechanisms to facilitate the formation of bycatch pools, vessel bycatch allowances, or other bycatch incentive systems.
   - Encourage research programs to evaluate current population estimates for non-target species with a view to setting appropriate bycatch limits, as information becomes available.
   - Continue program to reduce discards by developing management measures that encourage the use of gear and fishing techniques that reduce bycatch which includes economic discards.
   - Continue to manage incidental catch and bycatch through seasonal distribution of total allowable catch and geographical gear restrictions.
   - Continue to account for bycatch mortality in total allowable catch accounting and improve the accuracy of mortality assessments for target, prohibited species catch, and non-commercial species.
   - Control the bycatch of prohibited species through prohibited species catch limits or other appropriate measures.
   - Reduce waste to biologically and socially acceptable levels.

5. Avoid Impacts to Seabirds and Marine Mammals:
   - Continue to cooperate with U.S. Fish and Wildlife Service (USFWS) to protect ESA-listed species, and if appropriate and practicable, other seabird species.
   - Maintain or adjust current protection measures as appropriate to avoid jeopardy of extinction or adverse modification to critical habitat for ESA-listed Steller sea lions.
   - Encourage programs to review status of endangered or threatened marine mammal stocks and fishing interactions and develop fishery management measures as appropriate.
   - Continue to cooperate with NMFS and USFWS to protect ESA-listed marine mammal species, and if appropriate and practicable, other marine mammal species.

6. Reduce and Avoid Impacts to Habitat:
   - Review and evaluate efficacy of existing habitat protection measures for managed species.
   - Identify and designate essential fish habitat and habitat areas of particular concern pursuant to MSA rules, and mitigate fishery impacts as necessary and practicable to continue the

sustainability of managed species.

- Develop a Marine Protected Area (MPA) policy in coordination with national and state policies.
- Encourage development of a research program to identify regional baseline habitat information and mapping, subject to funding and staff availability.
- Develop goals, objectives and criteria to evaluate the efficacy and suitable design of MPAs and no-take marine reserves as tools to maintain abundance, diversity, and productivity.
- Implement marine protected areas if and where appropriate.

7. Promote Equitable and Efficient Use of Fishery Resources:
   - Provide economic and community stability to harvesting and processing sectors through fair allocation of fishery resources.
   - Maintain the license limitation program, modified as necessary, and further decrease excess fishing capacity and overcapitalization by eliminating latent licenses and extending programs such as community or rights-based management to some or all groundfish fisheries.
   - Provide for adaptive management by periodically evaluating the effectiveness of rationalization programs and the allocation of access rights based on performance.
   - Develop management measures that, when practicable, consider the efficient use of fishery resources taking into account the interest of harvesters, processors, and communities.

8. Increase Alaska Native Consultation:
   - Continue to incorporate local and traditional knowledge in fishery management.
   - Consider ways to enhance collection of local and traditional knowledge from communities, and incorporate such knowledge in fishery management where appropriate.
   - Increase Alaska Native participation and consultation in fishery management.

9. Improve Data Quality, Monitoring and Enforcement:
   - Increase the utility of groundfish fishery observer data for the conservation and management of living marine resources.
   - Develop funding mechanisms that achieve equitable costs to the industry for implementation of the North Pacific Groundfish Observer Program.
   - Improve community and regional economic impact costs and benefits through increased data reporting requirements.
   - Increase the quality of monitoring and enforcement data through improved technology.
   - Encourage a coordinated, long-term ecosystem monitoring program to collect baseline information and compile existing information from a variety of ongoing research initiatives, subject to funding and staff availability.
   - Cooperate with research institutions such as the North Pacific Research Board in identifying research needs to address pressing fishery issues.
   - Promote enhanced enforceability.
   - Continue to cooperate and coordinate management and enforcement programs with the Alaska Board of Fish, Alaska Department of Fish and Game, and Alaska Fish and Wildlife Protection, the U.S. Coast Guard, NMFS Enforcement, International Pacific Halibut Commission, Federal agencies, and other organizations to meet conservation requirements; promote economically healthy and sustainable fisheries and fishing communities; and maximize efficiencies in management and enforcement programs through continued consultation, coordination, and cooperation.

6.5 Advisory Committee Roles

The NPFMC makes active use of fishery advisory committees in its management of flatfish. The Council receives advice each meeting from the Advisory Panel (AP) and the Scientific and Statistical Committee (SSC). The two committees meet in advance and then in conjunction with each Council meeting, providing advice to the Council on each agenda item (NPFMC 2007b). The AP is made up of people who have interest in the fisheries. The Council appoints a membership each year of 20-23 fishery representatives: seafood processors, CDQ groups, environmental interests, commercial fishermen, recreational fishermen and others. Regional representation is also considered. AP meetings are open to the public.

The SSC, made up of state, federal and university scientists in the fields of biology, economics, and sociology, is appointed by the Council yearly to provide recommendations and assistance on issues of scientific data and analysis. The SSC comments to the North Pacific Council on all scientific matters on the Council's agenda. Meetings are open to the public and public testimony is heard on all action items.

The BSAI groundfish FMP Plan Team includes scientists from a wide range of disciplines and affiliations that include NMFS, the Council, state agencies and universities. The Plan Team is responsible for developing the annual BSAI Groundfish SAFE Report, a requirement of the Guidelines for Fishery Management Plans ("602 Guidelines") published by NMFS.

In addition to the AP, SSC and Plan Team, the Council uses several other standing committees in its management of BSAI flatfish:

- Council/Board of Fisheries Joint Protocol Committee
- Ecosystem Committee
- Enforcement Committee
- Non-Target Committee
- Observer Advisory Committee
- Steller Sea Lion Mitigation Committee
- EFH Committee

6.6 Consultations

6.6.1 State of Alaska

The BSAI Groundfish FMP enables formal consultations and coordination with State of Alaska fisheries. The Council meets with the State Board of Fisheries (BOF) annually. The Council/Board of Fisheries Joint Protocol Committee meets twice per year to discuss issues of joint concern (Witherell, 2008).

Parallel groundfish fisheries occur when the State allows the federal species TAC to be harvested in State waters. Vessels fishing inside state waters during the federal fishery are not required to hold a federal permit. However, the BOF can adopt regulations similar to those for the federal fishery if those regulations meet state statute (NPFMC 2008a). At present there are no parallel or state-managed flatfish fisheries for yellowfin sole, flathead sole, arrowtooth flounder, Alaska plaice or northern rock sole in the BSAI region (ADFG 2008; NPFMC 2008a).

6.6.2 Alaska Natives and Communities

An Alaska Native is a member of or descendant of any of the aboriginal peoples of Alaska. Increasing Alaska Native consultation is an objective of the NPFMC because of their traditional interests in coastal fisheries and their traditional knowledge about coastal fisheries.

Objectives 35-37 of the BSAI Groundfish FMP pertain to increasing consultation with Alaska Natives and Communities. The Council's 2008 work plan includes two tasks related to enhancing this consultation: to develop a protocol or strategy for improving the Alaska Native and community consultation process; and to develop a method for the systematic documentation of Alaska Native and community participation in the development of management actions.

The Council co-sponsored community conferences in 2005 and 2006 to address two needs:

- assess impacts of fishery management actions on fishing communities; and,
- provide a forum for coastal residents, fishermen and seafood processors, and federal, state, municipal, and tribal representatives to work together in support of Alaska's coastal fishing economy.

A goal of these conferences was to improve understanding the fishery management process and regulatory framework to allow coastal communities to establish and assert policy positions and to participate more effectively (NPFMC 2008d).

6.6.3 All Stakeholders

The Council provides a range of opportunities for stakeholder input into management required by federal statute and implemented through its standard operating procedures (Statement of Organization, Practices and Procedures (SOPPs) (NPFMC 2008e). Descriptions of stakeholder consultation procedures available on the NPFMC website identify several elements of NPFMC procedures that enable the distribution of information to stakeholders and the provision of public comment to management:

- Consultation among federal agencies, state agencies, universities and stakeholders in the provision of scientific information;
- Review of data and analysis through interdisciplinary Plan Team meetings which are publicly announced and at which public comment is accepted;
- Scientific review and comment on all scientific matters on the Council's agenda by the interdisciplinary SSC, at meetings open to the public;
- Advice to NPFMC provided by the AP representing major segments of the fishing industry; processors, subsistence, sport and commercial harvesters, observers, consumers and environmental organizations. All proposed actions are submitted to the Council's AP prior to consideration by the Council and are discussed at open meetings at which public comment is taken.
- Published timely notice of all meetings and meeting agendas according to requirements of the MSA, with meeting dates and locations scheduled three years in advance, posted on NPFMC website;
- Public notice of upcoming issues to be addressed, posted as the "three-meeting outlook" on the NPFMC website;
- Rotating meeting locations to facilitate public involvement;
- Identification of committee membership, affiliation and contact information of council committees;
- Instructions for submitting written or oral public comment, posted on NPFMC website;
- Public comment on all action items at NPFMC meetings;
- Annual solicitation of recommendations for BSAI Groundfish FMP amendments, using a standard form;
- Publication of FMP amendments, and the proposed rules implementing such measures, in the *Federal Register* to allow for public comment. All comments to final rules receive a written response. A Record of Decision explains the rationale for NMFS action.
- Judicial review of regulations promulgated under the Act is provided by Section 305(f) of the MSA, enabling stakeholders to legally challenge a Secretarial action.

Amendment 48 to the BSAI FMP is designed to expand opportunities for public comment and achieve five goals:

1. Manage fisheries based on the best scientific information available;
2. Provide for improved prior public review and comment to the Secretary on Council recommendations;
3. Provide for additional opportunity for Secretarial review;
4. Minimize unnecessary disruption to fisheries and public confusion; and,
5. Promote administrative efficiency.

6.7 Fisheries Management Methodology

6.7.1 TAC Setting

The NPFMC designates five management categories of finfish and invertebrate species:

1. Prohibited (must be returned to the sea when caught),
2. Target (individual TAC),
3. Other (aggregate TAC),
4. Forage (targeted harvest is prohibited; maximum of 2 percent retainable bycatch), and,
5. Non-specified (all species not included in one of the other categories).

Flatfish are included in the target category (NPFMC 2008a).

Based on the annual SAFE report, the Council recommends to the Secretary of Commerce TACs and TAC apportionments for each target species and the "other species" category. TAC for the "other species" category is set at 5% of the summed target species TACs. The Secretary implements annual TACs which may address up to 2 fishing years, following public comment and Council recommendations at the December Council meeting (NPFMC 2008a). The NPFMC TAC setting process is illustrated in Figure 8.

6.7.2 Bycatch and Retention Policies

By-catch species fall into three groups: (i) managed-species; (ii) non-specified species (species and species groups of no current economic value – see section 7.5); and (iii) prohibited-species (species that support traditional, near-shore Alaska fisheries - see section 6.7.6).

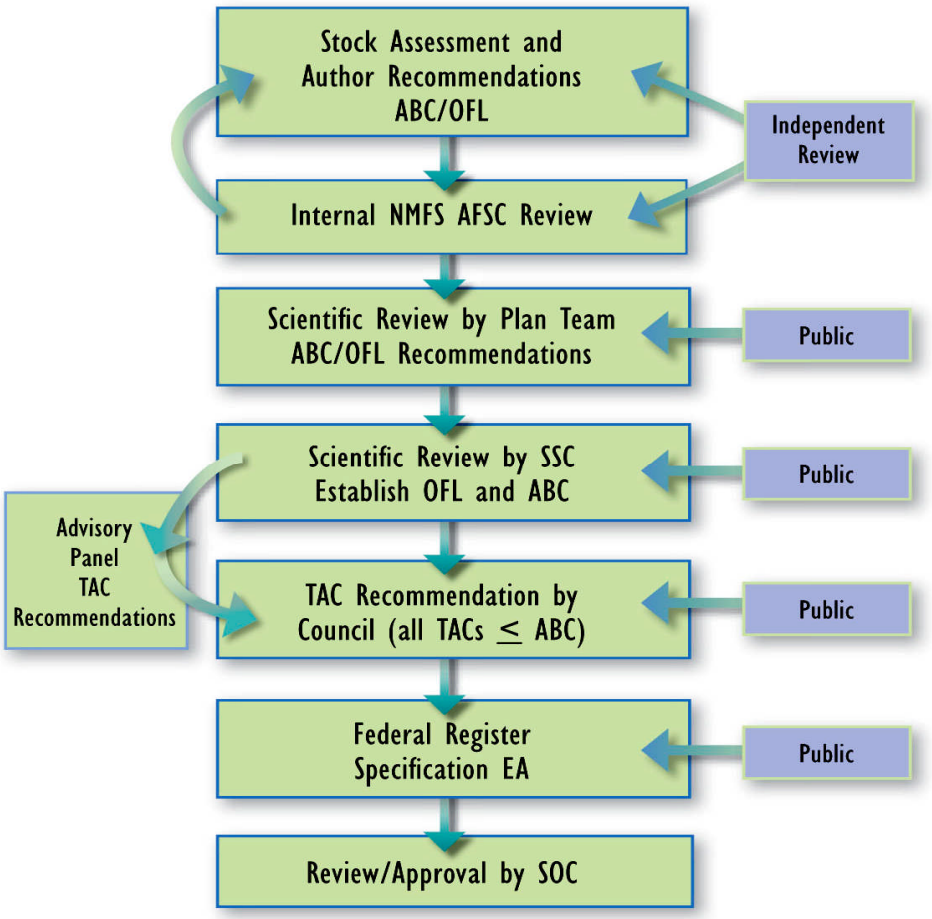
The Council has a history of implementing regulations to control bycatch in order to deliver against its management objectives (see section 6.4 above). These bycatch controls include:

- time and area closures
- prohibited species catch limits
- area closures
- minimum mesh size requirements for trawl cod ends
- legal gear
- legal fishing practices
- rationalization programs (NPFMC 2008d)

Bycatch is monitored by onboard observers and observers at shoreside processors (further information with respect to ecosystem considerations and an example of the bycatch species and amounts is shown in section 7, table 10 below). All permitted catcher vessels $\geq$ 60 ft LOA must maintain a daily fishing logbook regarding fishing activity and location. Catcher processors, motherships, shoreside processors and purchasing stations must maintain daily cumulative production logbooks that record information on fishing activity, haul receipt, production, and discards. Information on groundfish harvest, discard, receipt, and production are reported to NOAA

Fisheries (NPFMC, 2008a) and taken into account when assessing stock status for other managed species.

Figure 8. The North Pacific Fisheries Management Council (NPFMC) TAC setting process.



Source: (Witherell 2008a).

In 1998 the improved retention/improved utilization (IR/IU) program was initiated, requiring 100% retention of pollock and Pacific cod in the BSAI (NPFMC, 2008a) regardless of gear type employed and target fishery. When directed fishing for these species is prohibited, retention of that species is required only up to any maximum retainable amount in effect for that species. No discarding of whole fish of these species is allowed, either prior to or subsequent to that species being landed aboard the vessel. At-sea discarding of any processed product from these species is also prohibited, unless required by other regulations (BSAI FMP 2008).

To meet the Councils and MSA goals of reducing bycatch, minimise waste and improve utilisation of fish resources to the extent practicable the Council initiated Amendment 79 in 2002 to establish a minimum groundfish retention standard (GRS). In January 2008 an overall minimum GRS was implemented under Amendment 79 to the BSAI Groundfish FMP. It requires that between 2008 and 2012 vessels ≥ 125 feet LOA have to increase their target groundfish catch to ≥85%.

Table 6 below shows the estimates of retained and discarded yellowfin sole between 2000 and 2007

Table 5. Estimates of retained and discarded arrowtooth flounder caught in the Bering Sea

Year	Retained (tons)	Discarded (tons)	Total	% Retained
1996	1,372	13,280	14,652	9
1997	1,029	9,024	10,054	10
1998	2,896	12,345	15,421	19
1999	2,538	8,035	10,573	24
2000	5,124	7,805	12,929	60
2001	4,271	6,959	11,230	62
2002	4,039	7,501	11,540	35
2003	4,024	8,810	12,834	31
2004	3,747	14,062	17,809	21
2005	7,010	6,675	13,685	51
2006	6,104	7,205	13,309	46

In the BSAI the catcher processor sector has had a track record of lower retention rates in comparison to other sectors, e.g. during 1995-2001 all other sectors in BSAI had retention rates of >90%; between 2003-05 the catcher processor sector was at a retention rate of between 70% and 80% (NPFMC 2005). In order to assist and provide incentive to help meet the 85% GRS in this sector in 2007 Amendment 80 to the BSAI groundfish FMP was implemented.

6.7.3 Amendment 80

The Council adopted Amendment 80 to meet the 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) 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.

Amendment 80 allocates a portion of TACs for six groundfish species as well as quota for prohibited species catch (PSC) (see section 6.7.6) of halibut and crab to the catcher/processor fleet. These allocations are issued to individual vessels as quota on annual basis, based on catch history. Allocations of target species to the sector are: flathead sole (100%), rock sole (100%), yellowfin sole (up to 93% depending on overall TAC), Atka mackerel (90-100% TAC, by subarea), Aleutian Islands Pacific ocean perch (90-98% by subarea) (NPFMC 2008d)

In so doing, Amendment 80 also encouraged the formation of cooperatives (e.g. Best Use Cooperative), such that flatfish quotas and bycatch limits are pooled and managed by the cooperatives with the intent to make these groups responsible for their own target catch and bycatch and provide incentives to allow fishers to focus less on harvest rate maximization and more on optimizing their harvest by reducing unwanted incidental catch, improve retention, improve utilization and, as a result, improve the economic health of the H&G trawl CP sector. (http://www.fakr.noaa.gov/sustainablefisheries/amds/80/program_overview.pdf.). While still relatively new this has resulted in industry funded research on gear selectivity and the development of new fish products and markets.

In order to ensure that the groundfish retention standards are improved upon a number of special provisions with respect to catch monitoring are placed on the catcher processor fleet and are set out in Table 6 below.

Table 6. Catch monitoring requirements for the catcher/processor fleet.

Catcher/Processor Vessel Operator Requirements
• VMS Check-in Report prior to first departure.
• Submission of a US Vessel Activity Report.
• Carriage at all times of a valid Federal Fisheries Permit and Amendment 80 LLP license.
• Use of an operational VMS while fishing.
• Maintenance of a Catcher/Processor Trawl Gear Daily Cumulative Production Logbook (DCPL) report.
• Submission of processor check-in/check-out reports.
• Submission of product transfer reports (as required).
• Submission of Daily Production Report (as required) via "ELandings" (an electronic landing report).
• At-sea scale inspection prior to commencing fishing.
• Observer sampling station inspection prior to fishing.
• Bin monitoring inspection prior to fishing.
• If fishing for an Amendment 80 cooperative the vessel is required to carry a copy of the Amendment 80 cooperative quota (CQ) permit when fishing in the BSAI.
• If fishing for the Amendment 80 limited access fishery the vessels is required to carry a copy of the Amendment 80 limited access fishery when fishing in the BSAI.
• Ensure compliance with all state regulations.
• Only the vessels listed in regulation can be used as trawl catcher/processors to directed fish for Atka mackerel, flathead sole, Greenland turbot, Pacific cod, Pacific ocean perch, rock sole, or yellowfin sole.
• An operational NMFS-certified flow scale.
• Conduct daily scale tests that are monitored by the observer and maintain testing records.
• Weigh each haul separately.
• No mixing of hauls, processing, or discarding fish prior to being made available for observer sampling.
• Maintain an observer sampling station approved by NMFS at all times.
• Maintain a bin monitoring system approved by NMFS at all times
• Call NMFS at least 24 hours prior to departure if the vessel is carrying an observer who has not been on the vessel within the last 12 months. NMFS may choose to arrange a pre-cruise meeting with the vessel skipper or manager and other observers
• Have two observers, one of whom is lead level 2, onboard at all times vessel is fishing or processing (except when in the scallop fishery).

(Source: http://www.fakr.noaa.gov/sustainablefisheries/amds/80/program_overview.pdf)

6.7.4 License Limitation Program (LLP)

The LLP was created to replace a 1996 vessel moratorium implemented by the NPFMC which banned the entry of new vessels into the groundfish fisheries. The vessel moratorium had served as

a stop-gap measure to curb entry and participation in many of the Alaska fisheries. As of January 1, 2000, any person wishing to fish in Federal LLP Groundfish areas must hold a valid groundfish license issued under the LLP. This license is required for any person who wishes to deploy a catcher vessel or catcher/processor in the BSAI for all groundfish other than fixed gear sablefish (NPFMC 2008d).

Since the LLP was first established, many groundfish licenses have been inactive, or 'latent'. The Council is considering removing latent licenses, to prevent their future re-entry into the fisheries. One amendment addressing "trawl recency" for trawl groundfish licenses is under consideration for BSAI groundfish. BSAI trawl groundfish fisheries are fully utilized. The idea of trawl recency is to protect the current harvest share of trawl vessel participants who have made significant investments in the fisheries, and have recent harvests of BSAI groundfish, from other license holders with little or no recent history in the fisheries (NPFMC 2008d).

6.7.5 Community Development Quota (CDQ) Program

The Community Development Quota (CDQ) Program was implemented in 1992 by the NPFMC. The Program allocates a percentage of all BSAI quotas for groundfish, prohibited species, halibut, and crab to eligible communities for four major purposes: (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 (http://www.fakr.noaa.gov/cdq/default.htm).

Under the latest reauthorization of the MSA allocations to the CDQ Program increased (NPFMC 2008d). The CDQ Program eligible communities in western Alaska now receive a 10.7% of the TAC for each directed BSAI fishery (other than sablefish, halibut, Pollock and crab, which have specific TAC allocations) and a share of the prohibited species catch limits (NPFMC 2008a).

6.7.6 Prohibited Species Catch (PSC)

A number of commercial fish species are afforded added protection and are termed "prohibited species catch" they include: red king crab, Pacific halibut, herring, Tanner crab, snow crab, Chinook and chum salmon. These species must be avoided by the groundfish fleet and must be returned to the sea with minimum injury unless another law is applicable. A PSC limit is allocated to a fishery. If the PSC limit for a species is reached, the fishery will be closed by the NPFMC. The NPFMC allow the donation of Pacific salmon and Pacific halibut to economically disadvantaged individuals through the Prohibited Species Donation Program (NPFMC 2008a).

Halibut and the crab species are the only PSC species that appear to interact with the flatfish fisheries. Because halibut are found on the same ground as flatfish species for most of the year the bycatch of halibut is often what causes the flatfish fisheries to be closed rather than attainment of their TAC. Gear modifications have been voluntarily adopted in an attempt to reduce halibut bycatch. By sharing observer data fishermen identify crab bycatch 'hotspots' so they can be avoided. The NPFMC has also introduced seasonal closed areas for trawling to minimise bycatch of crab and halibut within the BSAI. (See Page 28 & 31 NPFMC Groundfish Management plan and Appendix B:B2 (http://www.fakr.noaa.gov/npfmc/fmp/bsai/bsai.htm).

If a fishery is closed within season, e.g. through attainment of the halibut bycatch limit or the TAC, vessels are notified through radio broadcasts and posted announcements. Observers and enforcement officers also ensure that closures are reported to fishers and adhered to.

6.7.7 Habitat Conservation Restrictions

The MSA includes provisions concerning the identification and conservation of Essential Fish Habitat (EFH). EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." EFH for groundfish species is the general distribution of a species described by life stage. The NMFS and the Council are required to describe and identify EFH in each FMP, minimize to the extent practicable the adverse effects of fishing on EFH, and identify other actions to encourage the conservation and enhancement of EFH. Each FMP contains the following EFH components:

- EFH descriptions and identification
- Fishing activities that may adversely affect EFH
- Non-Magnuson-Stevens Act fishing activities that may adversely affect EFH
- Non-Fishing activities that may adversely affect EFH
- Cumulative impacts analysis
- EFH conservation and enhancement recommendations
- Prey species list and any locations
- Habitat Areas of Particular Concern (HAPC) identification
- Research and Information needs
- Review EFH every 5 years

The 5 year review identified in the final bullet point above is due to take place for the BSAI groundfish FMP in 2010 with EFH measures being revised or amended, as warranted, based on available information, i.e. published scientific literature, unpublished scientific reports, information solicited from interested parties and previously unavailable or inaccessible data.

In the last EFH review in 2005 the Council and NMFS developed an Environmental Impact Statement (EIS) evaluating alternatives and environmental consequences for three actions:

1. describing and identifying EFH for fisheries managed by the Council;
2. adopting an approach for the Council to identify Habitat Areas of Particular Concern, i.e. areas within EFH that may require additional protection from adverse effects owing to the importance of their ecological function, the extent to which the habitat is sensitive to human-induced environmental degradation, whether development activities are, or will be, stressing the habitat type, the rarity of the habitat type.
3. minimizing to the extent practicable the adverse effects of Council-managed fishing on EFH.

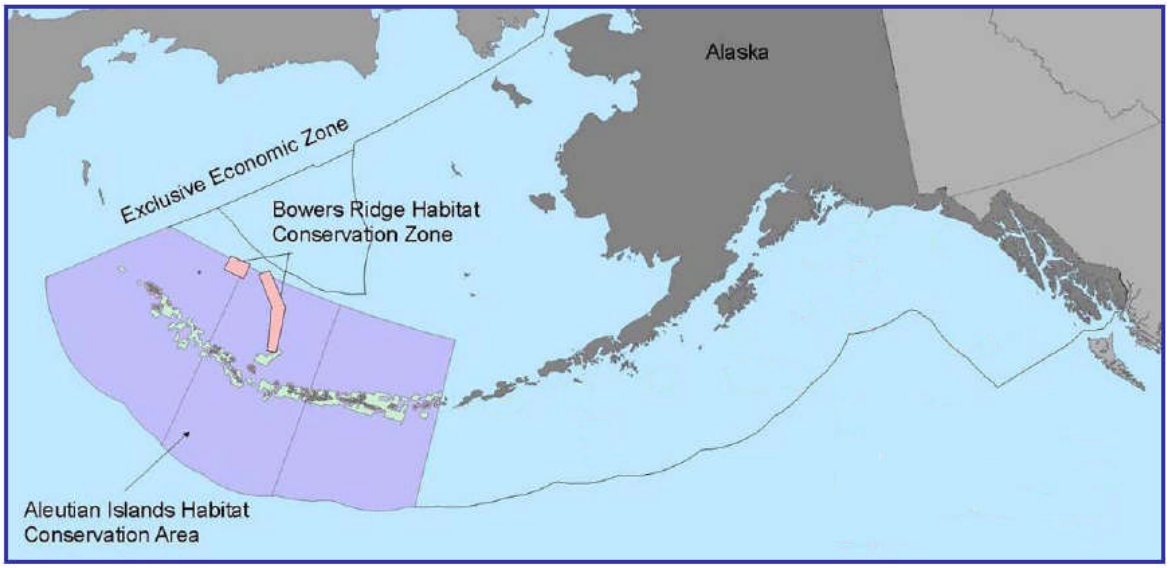
The Council used an extensive public process to develop the alternatives for the EIS, including numerous public meetings and its EFH Committee. The analysis indicated that there are long-term effects of fishing on benthic habitat features off Alaska, and acknowledged that considerable scientific uncertainty remains regarding the consequences of such habitat changes for the sustained productivity of managed species. Nevertheless, based on the best available scientific information, the EIS concluded that the effects on EFH are minimal because the analysis found no indication that continued fishing activities at the current rate and intensity would alter the capacity of EFH to support healthy populations of managed species over the long term. The analysis concluded that no Council-managed fishing activities have more than minimal and temporary adverse effects on EFH, which is the regulatory standard requiring action to minimize adverse effects under the MSA.

Importantly, the Council initiated a variety of practicable management actions and precautionary measures to conserve and protect EFH. The actions the Council and NMFS took in association with this EIS resulted in FMP amendments (Amendment 78 in the BSAI) to modify the existing EFH and HAPC designations and to implement additional measures to reduce the effects of fishing on EFH.

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 nm^2). 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 nm^2, are essentially marine reserves.

In the Aleutian Islands region, the relatively unexplored Bowers Ridge was also identified as a HAPC. As a precautionary measure, the Council acted to prohibit mobile fishing gear that contacts the bottom within this 5,286 nm^2 area (see Figure 9).

Figure 9. Aleutian Islands Habitat Closure Areas.



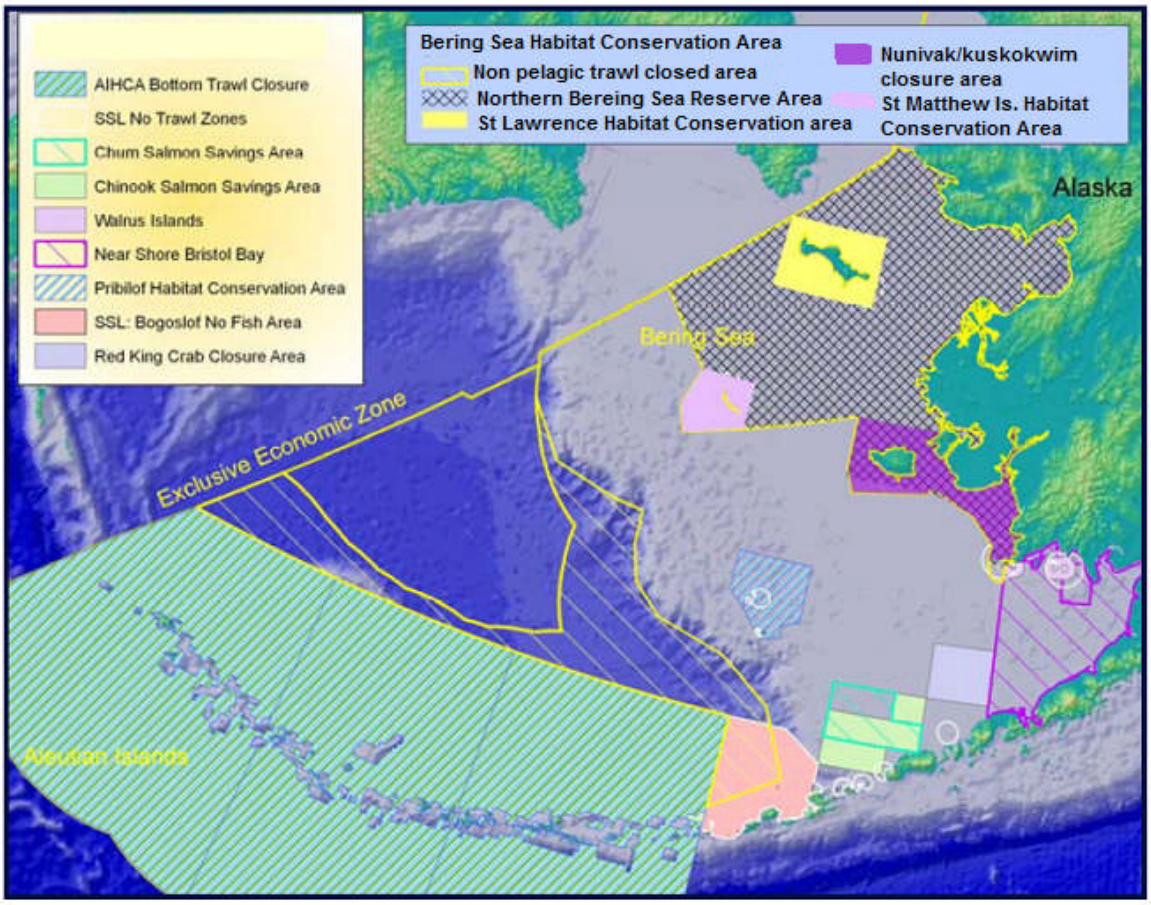
In June 2007, the Council adopted precautionary measures to conserve benthic fish habitat in the Bering Sea by "freezing the footprint" of bottom trawling by limiting trawl effort only to those areas more recently trawled. Implemented in 2008, the new measures prohibit bottom trawling in a deep slope and basin area (47,000 nm^2) and the Northern Bering Sea Research Area that includes the shelf waters to the north of St. Matthew Island (85,000 nm^2).

The entire Northern Bering Sea Research Area will be closed to bottom trawling while a research plan is developed. The research plan may include an adaptive management design, which could allow bottom trawling in designated areas to evaluate effects, or research using other experimental fishing approaches. Specific areas within the Northern Bering Sea Research Area, however, will always remain closed to bottom trawling. The MPAs were established to conserve blue king crab habitat and other EFH where subsistence harvesting and small-scale local fisheries take place, and include the nearshore areas of Nunivak Island and Kuskokwim Bay, and around St. Lawrence and St. Matthew Islands (see Figure 10). The research plan may also identify additional protection measures for blue king and snow crab, marine mammals, ESA-listed species, and subsistence needs for western Alaska communities in nearshore areas.

All of the closed areas for habitat protection can be found in Chapter 3 section 3.5 of the BSAI Groundfish Management Plan (http://www.fakr.noaa.gov/npfmc/fmp/bsai/bsai.htm). Specific regulations and associated conservation areas are located at

http://www.fakr.noaa.gov/habitat/efh.htm and further information on arrowtooth flounder can be found in section 3.1 above.

Figure 10. Bering Sea Habitat Conservation Closure Areas



6.8 Conservation, Protection, and Compliance

6.8.1 FMP Evaluation and Review

The BSAI Groundfish FMP states that the Council will maintain a continuing review of the fisheries managed under the FMP, and all critical components of the FMP will be reviewed periodically. In particular, it is noted that objectives in the management policy statement will be reviewed annually (within the "Ecosystems Considerations" chapter of the SAFE report) and, the Council will conduct a complete review of EFH once every 5 years, and in between will solicit proposals on HAPC and/or conservation and enhancement measures to minimize potential adverse effects from fishing.

6.8.2 Observer Program

U.S. fishing vessels that catch, receive or process NPFMC managed 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 discards, and collect biological information on marine resources. The current domestic observer program was authorized under Amendment 13 to the BSAI groundfish FMP. Under this program, NMFS provides operational oversight, certification training, definition of observer sampling duties and methods, debriefing of observers, and management of the data. Vessel and processing plant owners contract directly with observer

companies and pay for the cost of the observers. The costs associated with managing the program are paid for by the Federal government.

The 1990 Observer Program established coverage levels in Federal regulations for most vessels and processors based on vessel length and amount of groundfish processed, respectively. Since then coverage levels have been increased to implement certain limited access programs with increased monitoring needs, such as the Western Alaska CDQ Program and the BSAI pollock and flatfish fisheries but, aside from these, coverage requirements for the groundfish fleets of the BSAI and GOA have remained largely unchanged.

The North Pacific Groundfish Observer Program is the largest observer program in the United States. It is also one of only two observer programs that are primarily paid for by the fishing industry. Data collected by the program are used for stock assessment; monitoring groundfish quotas; monitoring the bycatch of groundfish and non-groundfish species; assessing the effects of the groundfish fishery on other living marine resources and their habitat; and assessing methods intended to improve the conservation and management of groundfish and other living marine resources (NPFMC 2008d; www.afsc.noaa.gov/FMA).

The Fisheries Monitoring and Analysis Division (FMA) of NMFS is responsible for training, briefing, debriefing and oversight of observers who collect catch data onboard fishing vessels and at onshore processing plants. It is also responsible for quality control/quality assurance of the data provided by observers. Division staff process data and make it available to the Sustainable Fisheries Division of the Alaska Regional Office for quota monitoring and to scientists in other AFSC divisions for stock assessment, ecosystem investigations, and an array of research investigations (http://www.afsc.noaa.gov/FMA/).

The FMA Division operates four programs. The Field Operations Program has staff located in Anchorage and at the major ports Dutch Harbor and Kodiak. The Program is responsible for developing sampling methods, assisting industry in accommodating observer sampling, and assisting observers deployed in the field. The Information and Monitoring Technologies Program is responsible for developing and maintaining the Division's information systems in support of at-sea data collection, data management and processing, data delivery technology innovations for monitoring fishing operations and observing catch. The Observer Services Program develops training materials and trains observers and advises them while they are deployed. Training includes extensive instruction in safety and emergency procedures. The 2009 Observer Manual is available at http://www.afsc.noaa.gov/FMA/Manual_pages/MANUAL_pdfs/manual2009.pdf. The Operations and Administration Program provides administrative services, responds to data requests, works with observer contracting companies to address logistics and operational issues, and provides assistance to the NPFMC in management program development, implementation, and evaluation (http://www.afsc.noaa.gov/FMA/).

Table 7. General observer coverage requirements in the BSAI

Vessel length/type	Observer coverage
Vessels < 60 ft LOA	None
Vessels ≥60 ft but <125 ft LOA	30% of fishing time
Vessels ≥125 ft LOA	100% of fishing time
"Amendment 80" Catcher Processors	2 observers
	100% of fishing time
	All hauls observed

Vessel length/type	Observer coverage
"AFA Catcher Processors: (i.e. the pollock fishery)	2 observers
	100% of fishing time
	All hauls observed
Processing plants	100% of time
Dedicated access privilege programs	Additional coverage requirements

(Source: NPFMC 2008d)

6.8.3 Vessel Monitoring Systems (VMS)

In the Bering Sea, VMS is required on all groundfish vessels except those under 60 feet LOA and/or unless fishing with jig gear. In the Aleutian Islands VMS is required on all vessels with a federal fishing permit, regardless of vessel size, fishery, or gear type. In particular, VMS is used to monitor groundfish closed area conservation measures. Hourly transmissions are sent from the vessels transponder via satellite to the NMFS Office for Law Enforcement (OLE) processing center. At the OLE processing center, the information is validated and analyzed before being disseminated for surveillance, enforcement and/or fisheries management.

6.8.4 Enforcement

Enforcement of BSAI management measures entails a complex and extensive system. In 2003 for the BSAI, there were 152 TAC allocations, 78 PSC allocations, and 34 CDQ allocations. Each allocation represents a possible need for NMFS to take management actions, such as closing fisheries, reallocating incidental catch amounts, or investigating overages. Though the number of allocations has increased, the overall amount of fish harvested has not, and NMFS is required to manage increasingly small blocks of fish. To do this adequately requires the use of increasingly sophisticated catch-monitoring tools, such as, electronic reporting, vessel monitoring systems, and the use of at-sea scales, as well as using observers (NPFMC 2008a).

NMFS/Alaska Region enforcement maintains approximately 36 agents and officers stationed in nine Alaskan ports for monitoring groundfish landings: Juneau, Anchorage, Dutch Harbor, Homer, Ketchikan, Kodiak, Petersburg, Seward, and Sitka. In addition, enforcement personnel regularly travel to other Alaskan ports to monitor landings and conduct investigations. Enforcement personnel associated with NMFS Northwest Region assist in the monitoring of Alaska Region groundfish harvest, primarily IFQ sablefish, landed at ports in the Northwest Region. Also, USCG personnel conduct enforcement activities, monitor vessel activity, conduct at-sea boardings and aircraft overflights, and assist NMFS enforcement personnel in monitoring dockside landings (NPFMC 2008a).

The MSA gives fishery enforcement officers the power to - with or without a warrant or other process:

1. arrest any person, with reasonable cause
2. board, and search or inspect, fishing vessels subject to the provisions of the MSA
3. seize any fishing vessel used or employed in a violation
4. seize any fish taken or retained in violation of any provision of the MSA
5. seize any other evidence related to any violation
6. access for enforcement purposes data from vessel monitoring systems, satellite-based maritime distress and safety systems, or any similar system, subject to the confidentiality provisions of the MSA
7. execute any warrant or other process issued by any court of competent jurisdiction; and
8. exercise any other lawful authority.

NMFS Management, NMFS Enforcement, and the USCG all conduct extensive outreach and education programs that seek not only to explain the regulations, but to help the fishing industry understand the rationale for those regulations (NPFMC 2008a).

Overall, compliance within the flatfish fleets appears to be very good. Compliance reports are given at each Council meeting that include statistics on the number of boardings, violations, violation rates, and types of violations and are archived in the NPFMC website. An annual retrospective report is developed at the end of each calendar year. Enforcement issues are highlighted for discussion at meetings of the Enforcement Committee and brought to the attention of the Council during the enforcement reports. Distribution of enforcement issues is addressed systematically through coordinated enforcement efforts.

When there are breeches in the laws and regulations both civil and criminal penalties for violations are provided for in the MSA. Civil penalties and permit sanctions include fines up to $100,000 for each violation and prison terms of up to 6 months. Each day of a continuing violation amounts to a separate offense. Criminal penalties are defined in MSA section 309 and include fines up to $200,000 and imprisonment up to ten years, depending on the circumstances of the violation. Civil penalties include forfeiture of a fishing vessel, gear, stores and cargo, and fish. Extraordinary fines and prison terms have been applied in particularly egregious cases, e.g. in 2006, a $254,500 civil penalty and permit sanctions were applied against the owner, manager and three captains of a catcher processor for numerous violations, including: tampering with or destroying observer's samples and equipment; failing to provide observers a safe work area; failing to notify observers prior to bringing fish aboard to allow sampling of the catch; failing to provide reasonable assistance to observers; and interfering with or biasing sampling procedure employed by observers (NOAA Office of Law Enforcement 2006).

7 ECOSYSTEM CHARACTERISTICS

7.1 Introduction

Physical and biological characteristics of the BSAI are summarized in great detail in several comprehensive documents:

- Final Alaska Groundfish Fisheries Programmatic Supplemental Environmental Impact Statement (PSEIS) June 2004 (NOAA 2004a);
- Alaska Groundfish Harvest Specification Environmental Impact Statement (NOAA. 2007);
- Final Environmental Impact Statement (EIS) for Essential Fish Habitat (EFH) April 2005, Appendix C, Ecosystem Considerations (NOAA 2005);
- Aydin et al. 2007; and,
- The BSAI FMP 2008 (NPFMC 2008a).

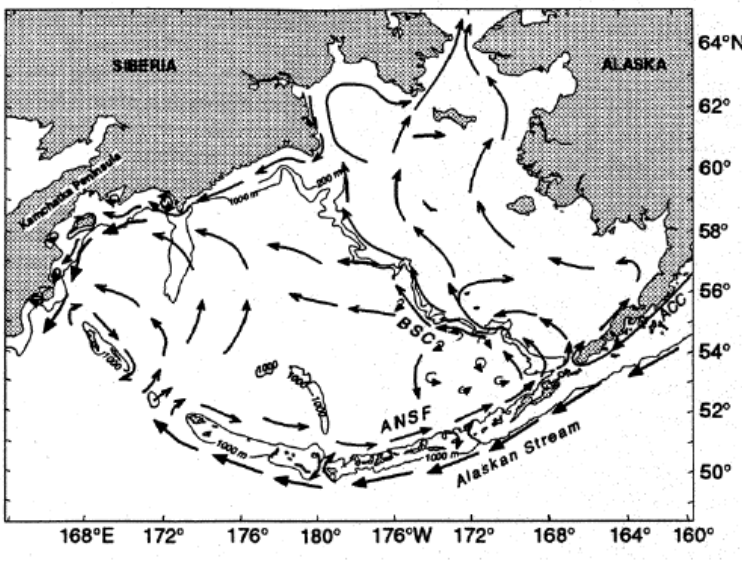
The following text is largely based on these sources.

7.2 Habitat

The EBS is a large semi-enclosed, high-latitude body of water comprising 44 % continental shelf, 13 % continental slope, and 43 % deep-water basin. It is one of the most biologically productive areas of the world. The EBS contains approximately 300 species of fish, 150 species of crustaceans and mollusks, 50 species of seabirds, and 26 species of marine mammals. Pack ice covers most of its eastern and northern continental shelf during winter and spring.

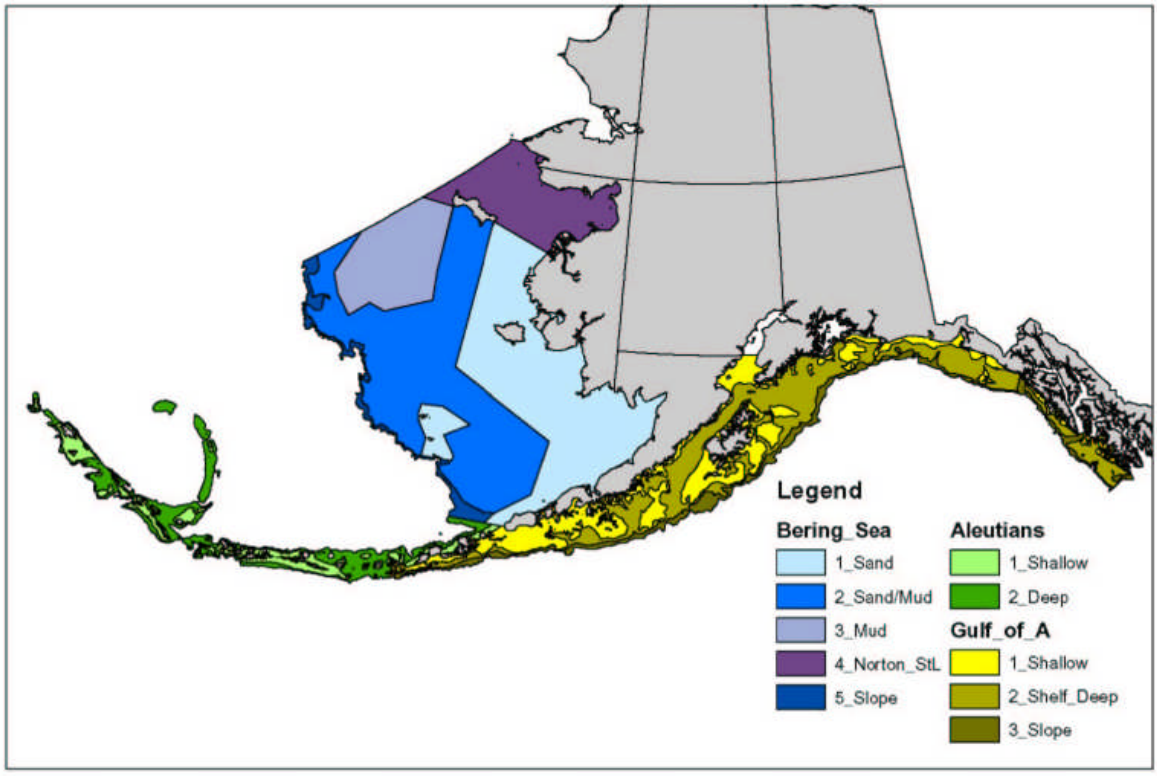
The dominant circulation of the water begins with the passage of North Pacific water (the Alaska Stream) into the EBS through the major passes in the AI (see Figure 11). There is net water transport eastward along the north side of the AI with a turn northward at the continental shelf break and at the eastern perimeter of Bristol Bay. Eventually EBS water exits northward through the Bering Strait, or westward and south along the Russian coast, entering the western North Pacific via the Kamchatka Strait. There is a permanent cyclonic gyre around the deep basin in the central Bering Sea.

Figure 11. **Currents in the BSAI (Source: NPFMC 2008a)**



The EBS sediments are a mixture of the major grades representing the full range of grain sizes of mud (sub-grades clay and silt). Sand and silt are the primary components over most of the seafloor, with sand predominating in waters < 60 m deep. The proportions of finer-grade sediments increase with increasing depth and distance from shore. This grading is particularly noticeable on the south-eastern Bering Sea continental shelf in Bristol Bay and immediately westward. There is a general pattern whereby nearshore sediments in the east and southeast on the inner shelf (0 to 50 m depth) are often sandy gravel and gravelly sand. These give way to plain sand farther offshore and west. On the middle shelf (50 to 100 m), sand gives way to muddy sand and sandy mud, which continues over much of the outer shelf (100 to 200 m) to the start of the continental slope (see Figure 12).

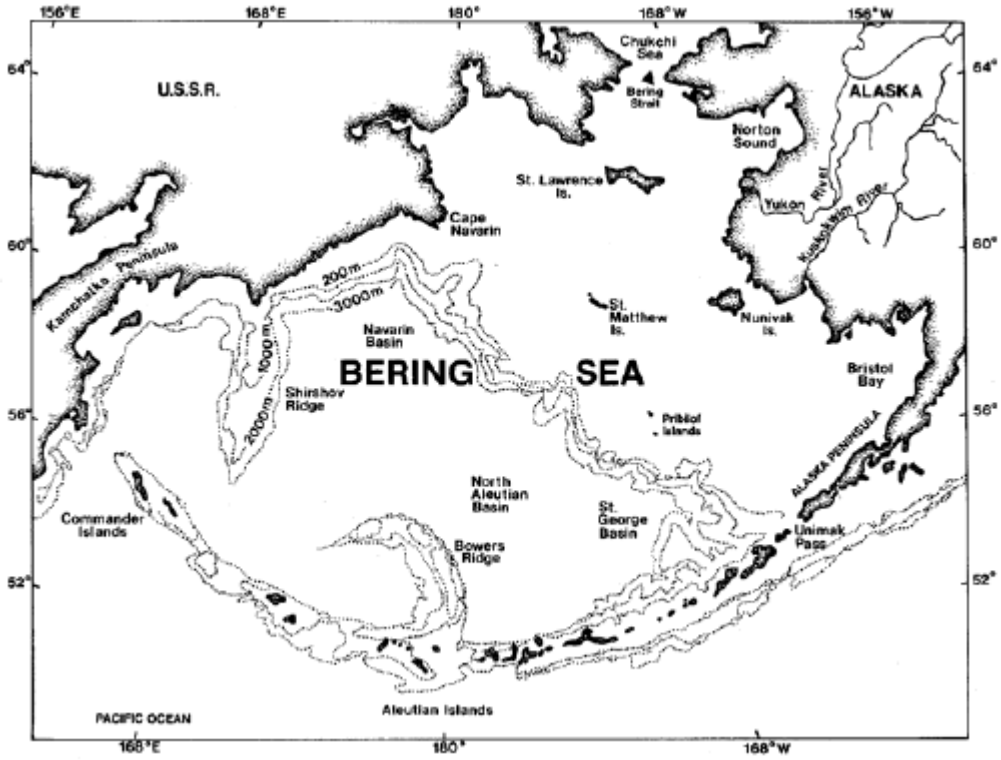
Figure 12. Surficial sediment textural characteristics of the BSAI continental shelf



(source: NPFMC 2008a)

Three fronts, the outer shelf, mid-shelf, and inner shelf, follow along the 200, 100, and 50 m bathymetric contours, respectively; thus, four separate oceanographic domains appear as bands along the broad EBS shelf (see Figure 13). The inner shelf is one well-mixed layer most of the time as temperature, salinity, and density remain constant with depth in the near-surface mixed-layer, which varies from approximately 10 to 30 m in summer to approximately 30 to 60 m in winter. On the middle shelf, a two-layer temperature and salinity structure exists because of downward mixing of wind and upward mixing due to relatively strong tidal currents. On the outer shelf, a three-layer temperature and salinity structure exists due to downward mixing by wind, horizontal mixing with oceanic water, and upward mixing from the bottom friction due to relatively strong tidal currents. The vertical physical system also regulates the biological processes that lead to separate cycles of nutrient regeneration.

Figure 13. Bathymetric map of the Bering Sea



(Source: NPFMS 2008a)

The Aleutian Islands (AI) lie in an arc that forms a partial geographic barrier to the exchange of northern Pacific marine waters with EBS waters. The AI continental shelf is narrow compared with the EBS shelf, ranging in width on the north and south sides of the islands from about 4 km or less to 42 to 46 km; the shelf broadens in the eastern portion of the AI arc. The AI region has complicated mixes of substrates, including a significant proportion of hard substrates (pebbles, cobbles, boulders, and rock). The patterns of water density, salinity, and temperature are very similar to the Gulf of Alaska.

The fisheries management arrangements include a range of approaches to rare and vulnerable habitats, especially the hard substrates of the AI, as well as essential fish habitat using areas closed to all fishing or to fishing with bottom impacts. (see section 6.7.7 above).

7.3 Climate Change

Climate change effects on the AI area are similar to the effects described for climate change in the EBS. A major shift in the Bering Sea occurred after 1977, when conditions changed from a predominantly cold Arctic climate to a warmer subarctic maritime climate. The very warm winters of the late 1970s and 1980s were followed by cooler winters in the 1990s. This cooling was likely a result of a shift in the Arctic Oscillation and hence a tendency for higher sea-level pressure (SLP) over the Bering Sea. Since 1998, negative SLP anomalies have prevailed, which is indicative of greater Pacific influence and consistent with generally milder winters.

The winters of 2003-2005 were anomalously warm and comparable in scale with major warm episodes in the late 1930s and late 1970s – early 1980s. The spring transition occurred earlier, and the number of days with ice cover after March 15 had a significant downward trend. In 2005, the ice cover index reached the record low value. The lack of ice cover over the southeastern shelf during recent winters resulted in significantly higher heat content in the water column. In 2006 and

2007, however, cooler temperatures resulted in more ice cover. In 2007, the presence of sea ice together with below normal ocean temperatures likely resulted in the first ice edge bloom since 1999. There was a pronounced warming in late spring to the extent that upper ocean temperatures were above normal by the middle of summer.

This anomalous warming can be attributed to the relatively high SLP for the region and fewer storms than normal and hence less wind mixing of cold water from depth, and presumably, reduced cloudiness and hence greater solar heating. Considering that a substantial cold pool was also present, the thermal stratification on the Bering Sea shelf was also relatively large. Unlike the northern Bering Sea and Arctic Ocean hot spots, the rate of warming in the southern Bering Sea is slowing down, suggesting a large natural variability component to recent extremes in addition to a background anthropogenic contribution toward warmer temperatures.

7.4 The Food Web

Aydin et al. (2007) presented the first comprehensive mass balance models for the EBS, AI and GOA ecosystems. These three models use the large amount of high quality of data available for Alaskan fisheries and ecosystems by including biomass pools for juveniles and adults of all major groundfish, for many forage species, birds, marine mammals, benthos and zooplankton. The EBS model has the highest quantity and quality of information of the three models due to extensive long term scientific study of this ecosystem. Fishery catch data in this ecosystem are of the highest quality because most large scale fisheries have 100% observer coverage in the EBS.

Production and consumption parameter estimates for all groups were generally available from direct measurements or peer-reviewed literature. Diet data collected aboard NMFS surveys and from fishery observers is extensive in the EBS. The Aleutian Islands is perhaps the most data poor of the three ecosystems modeled and required more adjustments to existing data than the EBS or GOA. Despite this, almost no diets were modified for balancing the AI model, but some biomass estimates were adjusted to balance groups where the main sources of mortality were reliable estimates of predation or directed fishing.

Based on the mass balance model, the EBS has a much larger benthic influence in its food web than either the GOA or the AI. Thus, the consumption of detritus represents the largest portion of consumption, due to the strong benthic energy flow pathway in this system. Consumption of benthic forage fish groups was the highest of the three ecosystems. Benthic amphipods, bivalves, crustaceans, miscellaneous worms and polychaetes account for half of all consumed species groups at trophic level 2.5 in the EBS. In contrast, the AI consumption of trophic level 2.5 groups is 87% pelagic forage; primarily copepods (49%) and euphausiids (33%). In the EBS, pollock, the primary “forage fish” is also a primary commercially fished species as an adult. Therefore, in the EBS, the sustainability of the pollock fishery as well as a large proportion of predator (including adult pollock) consumption depends on continued juvenile pollock production. The much higher estimated densities of copepods and euphausiids in the AI likely reflect the dominance of pelagic energy flow relative to the other two systems. Conversely, the density of EBS bivalves which is the same order of magnitude as AI copepods and euphausiids, reflects the dominant benthic energy flow in the EBS.

The groundfish groups, i.e. “small flatfish” and yellowfin sole, along with crabs and pollock, are dominant in the EBS. Dominant groundfish in the AI occupy the pelagic pathway: Atka mackerel, and Pacific ocean perch. Although there are large biomasses of both piscivorous and invertivorous animals in each ecosystem, overall consumption of fish and large invertebrates amounts to less than 5% of the total in each ecosystem. Consumption of crabs and invertebrates differs by system as well, with the GOA highest at 3%, the EBS next at 2%, and the AI lowest at 1%. Piscivory is a

small proportion of total ecosystem consumption in all three ecosystems, but is the highest proportion of the total in the AI (0.7%), followed by the GOA (0.5%), and then the EBS (0.2%).

Although incomplete, the level of understanding of the trophic relationships within the Alaskan marine ecosystems of the EBS, AI and GOA is substantial and describes some of the world's best studied and best understood large marine ecosystems.

7.5 Protected, Endangered and Threatened Species

The protected, endangered and threatened (PET) species in the BSAI management area are listed in Table 9. Of these species Steller sea lion (*Eumetopias jubatus),* Northern fur seal (*Callorhinus ursinus*), short tailed albatross (*Phoebastria albatrus*), spectacled eider (*Somateria fischeri*) and Steller eider (*Polysticta stelleri*) are known to potentially interact with the flatfish fishery (NOAA 2004a).

Table 9. Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA) species/stocks in the BSAI management area.

ESA Endangered (E) and Threatened (T)	MMPA Depleted
Beluga whale (E-Cook Inlet)	Killer whale (Transient)
Blue whale (E)	
Bowhead whale (E)	
Fin whale (E)	
Humpback whale (E) [a]	
North Pacific right whale (E)	
Sei whale (E)	
Sperm whale (E)	
Steller sea lion (E-Western)	Northern fur seal (Eastern Pacific)
Short-tailed albatross (E)	
Spectacled eider (T)	
Steller's eider (T)	
Northern sea otter (T-Southwest AK)	
Pacific leatherback turtle (E)	
Chinook salmon (T-Lower Columbia River) Chinook salmon (T-Upper Willamette River)	

[a] Includes both the central and western North Pacific stocks of humpback whales.

Steller sea lions are widely distributed in the North Pacific, but are most abundant in the GOA and AI. Although not migratory, individuals disperse widely outside of the breeding season (late May-early July), thus potentially intermixing with animals from other areas. The western U. S. stock of Steller sea lion is currently listed as "endangered" under the ESA, and designated as "depleted" under the MMPA as result of a dramatic decline in numbers. Although counts at some trend sites are missing for both 2006 and 2007, available data indicate that the size of the adult and juvenile portion of the western Steller sea lion population throughout much of its range (Cape St. Elias to Tanaga Island, 145°-178° W) in Alaska has remained largely unchanged between 2004 (N=23,107)

and 2007 (N=23,118) (Fritz *et al.* 2007). A number of management actions were implemented between 1990 and 1998 to promote the recovery of the western U. S. stock of Steller sea lions, including 3 nm no-entry zones around rookeries and prohibition of groundfish trawling within 10-20 nm of certain rookeries.

The groundfish fisheries are known to cause accidental direct mortality to Steller sea lions but mortality rates are such that they do not compromise the Potential Biological Removal (PBR) (the maximum number of animals, not including natural mortality, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population). On average 3.35 Steller sea lion are taken in the flatfish fisheries per year (NOAA 2007).

In 2007 the NMFS and the Council announced intent to prepare an EIS analyzing the impacts of possible changes to the Steller sea lion protection measures for the BSAI and GOA groundfish fisheries. Changes considered would ensure that new scientific information is used to improve the measures protecting Steller sea lion and their habitat while removing any unnecessary fishing restrictions and minimizing impacts to coastal communities. A revised biological opinion on the status-quo protection measures is now scheduled for public review in 2010.

Northern fur seals range from southern California north to the Bering Sea and west to the Okhotsk Sea and Honshu Island, Japan. During the summer breeding season, most of the worldwide population is found on the Pribilof Islands in the southern Bering Sea (NMFS 1993). Following the breeding season, both sexes migrate south and spend the next 7-8 months at sea. Adult females and pups from the Pribilof Islands migrate through the Aleutian Islands into the North Pacific Ocean, often to the Oregon and California offshore waters (Ream *et al.* 2005). Many pups may remain at sea for 22 months before returning to their rookery of birth. Adult males generally migrate only as far south as the GOA in the eastern North Pacific. After a period of increase, the population then began to decrease with pup production declining at a rate of 6.5-7.8% per year into the 1980s (York 1987). Annual pup production on St. Paul Island remained stable between 1981 and 1996, but has been declining since the mid-1990s. A broadly similar pattern was observed on St. George Island. During 1998-2006, pup production declined 6.1% per year on St. Paul Island and 3.4% per year on St. George Island. On June 17, 1988, NMFS declared the stock of northern fur seals on the Pribilof Islands, Alaska (St. Paul and St. George Islands) to be depleted under the MMA.

The flatfish fishery has a low level interaction with Northern fur seals and on average accidentally takes 0.48 per year. This represents an insignificant impact on the these seals at a population level as the PBR for Northern fur seal is 1,967 (NOAA 2007).

Entanglement in fishing lost fishing gear and other plastics is a known source of fur seals mortality. Fowler (2002) suggested that entanglement in marine debris may have contributed significantly to declining trends of the population on the Pribilof Islands during the late 1970s. Studies on the Pribilof Islands between 1995 and 2006, show that although sighting of entangled fur seals persist, the rate are low (<1%, Zavadil *et al.* 2006). Analysis of 187 samples of netting recovered from the Pribilof Islands and elsewhere in Alaska revealed that most of the derelict gear came from trawl fisheries, it was mostly of foreign manufacture and thought to have originated from foreign fishing operations that worked in Alaska prior to the MSA (1976) and the joint venture fisheries which followed during “Americanization.”

The US Fish and Wildlife Service (FWS) are responsible for the assessment and management of endangered and threatened species of seabirds. Three species of seabirds in the action area are listed under the Endangered Species Act. These are the endangered short-tailed albatross, the threatened spectacled eider and the threatened Steller’s eider.

The short-tailed albatross is a long-lived species with a low reproductive rate. Only two breeding

colonies remain active today: Torishima Island and Minami-kojima Island, Japan. Short-tailed albatrosses forage widely across the temperate and subarctic North Pacific, and can be seen in the Gulf of Alaska, along the Aleutian Islands, and in the Bering Sea. The world population has been increasing with a variety of global conservation efforts and is currently estimated to be about 2,364 individuals (http://www.iucnredlist.org/apps/redlist/details/144903/0). Whilst the IUCN listed this species as endangered in 1994 it has been listed as vulnerable since 2000, the vulnerable status is principally due to its localized breeding range.

Spectacled eider's breed along the central coast of the Yukon-Kuskokwim Delta, the arctic coastal plain of Alaska, and the arctic coastal plain of Russia. A few pairs nest on St. Lawrence Island as well. Between the 1970's and the 1990's, the breeding population on the Yukon-Kuskokwim Delta declined by over 96%, and only about 4,000 pairs nest there today. They over-winter in an area south of St. Lawrence Island (http://alaska.fws.gov/media/SpecEider_FactSheet.htm).

World population of Steller's eiders is around 220,000 birds, the majority of which nest in Russia. The number of pairs nesting on Alaska's arctic coastal plain is very roughly estimated at 1,000. Steller's eiders are diving ducks that spend most of the year in shallow, near-shore marine waters and overwinter in the eastern Aleutians and Kenai Peninsula (http://alaska.fws.gov/media/StellEider_FactSheet.htm).

Interaction with the flatfish fishery may include: accidental capture in the trawl on hauling or shooting as birds are attracted to trawling operations, perhaps by the presence of offal discards; entanglement in the cables connecting the trawl or the trawl sonar to the vessel, known as the "third wire"; collision with the fishing vessels themselves at night.

The PSEIS summary of the available information on the effects on seabird populations in the BSAI and GOA, suggests that the estimated seabird bycatch is low relative to seabird populations. Information on total seabird takes is based on extrapolations of observer samples of catches and bycatches. Information on vessel strikes is limited, and for trawlers, the data do not include potential mortalities from interactions with trawl cables or third wires. In general, incidental takes of seabirds compared to natural mortality levels are unknown. (Section 3.7 of the PSEIS provides background on seabirds and their interactions with the fisheries (http://www.fakr.noaa.gov/sustainablefisheries/seis/final062004/Chaps/chpt_3/chpt_3_7.pdf)

7.6 Bycatch

As indicated in section 6.7.3 bycatch species in the BSAI management area falls into three groups:

1) managed-species (target, other, and forage fish species categories);
2) non-specified species; and
3) prohibited-species.

As well as target species the managed-species are from the species-stock complexes of forage fish, rockfish, sculpins, sharks, skates, octopus, and squid. The forage fish complex includes eulachon, capelin, sand lance, sand fish, euphausiids, myctophids, gunnels, and lightfishes. Non-specified species are species and species groups of no current economic value taken incidentally in the groundfish fisheries. Prohibited Species are species that support traditional, near-shore Alaska fisheries (i.e. Prohibited Species Catch – PSC see 6.7.6). These species include halibut, herring, and the several species of salmon and large spider crabs in the BSAI management area. The bycatch of PSC species is to be avoided while fishing for groundfish, and by regulation PSC species must be returned to sea with a minimum of injury, except when their retention is authorized by other law (e.g., donation programs).

Estimates of bycatch of PSC are assessed annually in the SAFE. The FMP establishes catch limits

for prohibited species. Attainment of the catch limit shuts down an area or a fishery for the remainder of the year or season. Other management measures that address prohibited species bycatch include seasonal closure areas, gear modifications, and the modification of fishing patterns as a result of share-based programs such as cooperatives.

The North Pacific Groundfish Observer Program verifies catch composition and quantity, including those discarded at sea. Table 10 provides an example of the bycatch estimates of species from the arrowtooth flounder fishery recorded by the observer program.

Table 8. The bycatch and discard estimates (in tons) of non specified and prohibited species from the arrowtooth flounder fishery between 2003 and 2007.

Species	2003	2004	2005	2006	2007
Halibut	46.1	94.6	201.1	123.1	16.6
Herring	0.1	0.1	0	0.1	0.4
Red King crab (1000s)	0	0.1	0	0.8	0.2
Bairdi crab (1000s)	5.1	3.4	10.5	25.5	21.6
Other Tanner (1000s)	0.5	1.0	.8	6.1	4.8
Benthic urochordata	0.00961	0.00253	0.0152	0.01775	0.01016
Birds	0	0	0.0779	0	0.01553
Bivalves	0.00047	0.01129	0.41558	0.53176	0.04975
Brittle star unidentified	0.45889	0.00001	0.00008	0.00234	0
Capelin	0	0	0.0262	0	0
Corals Bryozoans	0.0053	0.0293	0.00009	0.00244	0.03035
Eelpouts	84.95894	2.77275	8.6635	1.54834	2.39514
Eulachon	0.01268	0.54806	0.01343	0.00642	0
Giant Grenadier	0	0	9.85325	119.4379	1.74163
Greenlings	0.07429	0.00837	0.11159	0.13924	0.09115
Grenadier	40.314	24.33965	25.23691	5.77391	0.01507
Hermit crab unidentified	0.11972	0.02951	0.01309	0.04671	0.51574
Invertebrate unidentified	0.25317	0.07602	0.04336	0.12577	0.46703
Lanternfishes	0	0	0.00091	0	0.00016
Large Sculpins	1.08326	41.39102	109.151	71.70745	24.07986
Misc crabs	0.00551	0.05677	0.00993	0.08166	0.07668
Misc crustaceans	0	0	0.01133	0.03268	0.12918
Misc deep fish	0	0	0	0	0
Misc fish	11.10093	8.54193	24.72647	5.09086	2.48523
Misc inverts (worms etc)	0	0.01011	0.14973	0	0.00115
Octopus	1.514	1.164	0.097	0.235	0.019
Other osmerids	0.33086	0.0238	0.00699	0	0
Other Sculpins	24.71832	6.99615	12.50405	6.24408	5.05433
Pandalid shrimp	0.07865	0.06501	0.14581	0.01268	0.00716
Polychaete unidentified	0	0	0	0	0
Scypho jellies	1.0456	0.64401	0.34008	2.57989	1.0473
Sea anemone unidentified	7.08325	2.6785	3.57892	1.36848	1.0708
Sea pens whips	0.01555	0.0201	0.07334	0.00025	0.00178
Sea star	21.76228	4.78927	4.45504	1.63389	3.06503
Shark, Other	0	0	0	0	0
Shark, pacific sleeper	4.338	12.986	2.451	1.026	0
Shark, salmon	0	0	0.331	0.095	0
Shark, spiny dogfish	0	0	0.06	0	0
Skate, Big	0	0.125	0.531	4.043	7.805
Skate, Longnose	0.162	2.911	0.485	0.259	0.7
Skate, Other	106.006	62.05	128.147	166.938	64.662
Snails	3.44047	0.74865	0.36892	1.52474	2.21876

Species	2003	2004	2005	2006	2007
Sponge unidentified	0.13656	0.10807	0.1585	11.86012	0.06405
Squid	6.509	6.319	10.275	4.105	2.532
Stichaeidae	0	0	0.00076	0.03063	0.01613
Urchins dollars cucumbers	0.18463	0.15971	0.03919	0.05738	0.09668

(Source: Wilderbuer pers comm. 2009)

Of the non specified species, by volume skates and sculpins form the most significant bycatch species. The skate and sculpin complexes are assessed based on catches, trawl-survey-based biomass estimates and opportunistically collected life-history information (Ormseth et al. 2008). Alaska skate (*Bathyraja parmifera*) is thought to be the predominant species in the bycatch. EBS-shelf bottom-trawl survey estimates of Alaska skate biomass show a steady increase from 150,000 tons in the early 1980s to about 500,000 tons recently. Bottom-trawl survey estimates of the skate complex in the AI 1980-2006 show a steady increase from 5,000 to50,000 tons. An age-structured model for the Alaska skate is under development

Biomass estimates are available for all identified sculpin species in the BSAI, but biomass trends are available for only a few species 1982-2005 due to survey priorities and difficulties with identification. The larger species dominate the EBS shelf, with *Myoxocephalus* spp., being the most common, followed by bigmouth sculpins and yellow Irish lords. In the AI, biomass estimates of the six most abundant species of sculpin have been calculated since 1997.

As noted in Section 7.7 (below) a range of ecosystem indicators are regularly monitored some of which would also indicate significant impacts on bycatch species

7.7 Ecosystem impacts

The NMFS Alaska Fisheries Science Centre (AFSC) assesses the status of the BSAI and GOA ecosystems annually and reports the results in the *Ecosystem Considerations* chapter of the Alaska groundfish SAFE (e.g. Boldt *et al.* 2008). The assessment is drawn from a collection of ecosystem status indicators. A context for the indicators is provided by a host of supporting management indices and information. The purpose of the assessment is to summarize historical climate and fishing effects on the BSAI and GOA ecosystems. The development and description of the status indicators is a way to provide new information and updates on the status and trends of ecosystem components to stock assessment scientists, fishery managers, and the public (Livingston *et al.* 2005). By also tracking selected management indices (e.g., catch composition, amount, and location), any signals of direct human effects on ecosystem components that might warrant management intervention may be detected early. NMFS Ecosystem Approach to Management (EAM) strategy consists of a plan containing measures to address all main impacts of the groundfish fishery on the ecosystem, the strategy continues to evolve as a science-based consensus emerges as concerns the optimal nature and combination of principles, goals, policies, and measures (e.g. Anon 2005a, Evans and Wilson 2005, Field and Francis 2006, Gaichas 2006, Murawski 2007).

8 OTHER FISHERIES RELEVANT TO THIS ASSESSMENT

Other groundfish fisheries which take a by-catch of arrowtooth flounder in the BSAI would be relevant. It is noted, however, that all flatfish catches are recorded and set against the relevant TAC.

A number of other fisheries are certified or within the MSC assessment process within or associated with the BSAI: the BSAI Pacific cod fisheries, the Alaska salmon fisheries, the pollock fishery, US black cod fishery, US halibut fishery, British Columbia salmon fisheries and British Columbia halibut fishery.

9 STANDARD USED

The MSC Principles and Criteria for Sustainable Fisheries form the standard against which the fishery is assessed and are organised in terms of three principles. Principle 1 addresses the need to maintain the target stock at a sustainable level; Principle 2 addresses the need to maintain the ecosystem in which the target stock exists, and Principle 3 addresses the need for an effective fishery management system to fulfil Principles 1 and 2 and ensure compliance with national and international regulations. The Principles and their supporting Criteria are presented below.

9.1 Principle 1

A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery. [2]**:**

The intent of this principle is to ensure that the productive capacities of resources are maintained at high levels and are not sacrificed in favour of short term interests. Thus, exploited populations would be maintained at high levels of abundance designed to retain their productivity, provide margins of safety for error and uncertainty, and restore and retain their capacities for yields over the long term.

Criteria:

1. The fishery shall be conducted at catch levels that continually maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity.
2. Where the exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level consistent with the precautionary approach and the ability of the populations to produce long-term potential yields within a specified time frame.
3. Fishing is conducted in a manner that does not alter the age or genetic structure or sex composition to a degree that impairs reproductive capacity.

9.2 Principle 2

Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.

The intent of this principle is to encourage the management of fisheries from an ecosystem perspective under a system designed to assess and restrain the impacts of the fishery on the ecosystem.

Criteria:

1. The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to trophic cascades or ecosystem state changes.

[2] The sequence in which the Principles and Criteria appear does not represent a ranking of their significance, but is rather intended to provide a logical guide to certifiers when assessing a fishery. The criteria by which the MSC Principles will be implemented will be reviewed and revised as appropriate in light of relevant new information, technologies and additional consultations

2. The fishery is conducted in a manner that does not threaten biological diversity at the genetic, species or population levels and avoids or minimises mortality of, or injuries to endangered, threatened or protected species.

3. Where exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level within specified time frames, consistent with the precautionary approach and considering the ability of the population to produce long-term potential yields.

9.3 Principle 3

The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.

The intent of this principle is to ensure that there is an institutional and operational framework for implementing Principles 1 and 2, appropriate to the size and scale of the fishery.

A. Management System Criteria:

1. The fishery shall not be conducted under a controversial unilateral exemption to an international agreement.

The management system shall:

2. Demonstrate clear long-term objectives consistent with MSC Principles and Criteria and contain a consultative process that is transparent and involves all interested and affected parties so as to consider all relevant information, including local knowledge. The impact of fishery management decisions on all those who depend on the fishery for their livelihoods, including, but not confined to subsistence, artisanal, and fishing-dependent communities shall be addressed as part of this process.

3. Be appropriate to the cultural context, scale and intensity of the fishery – reflecting specific objectives, incorporating operational criteria, containing procedures for implementation and a process for monitoring and evaluating performance and acting on findings.

4. Observe the legal and customary rights and long term interests of people dependent on fishing for food and livelihood, in a manner consistent with ecological sustainability.

5. Incorporates an appropriate mechanism for the resolution of disputes arising within the system[3].

6. Provide economic and social incentives that contribute to sustainable fishing and shall not operate with subsidies that contribute to unsustainable fishing.

7. Act in a timely and adaptive fashion on the basis of the best available information using a precautionary approach particularly when dealing with scientific uncertainty.

[3] Outstanding disputes of substantial magnitude involving a significant number of interests will normally disqualify a fishery from certification.

8. Incorporate a research plan – appropriate to the scale and intensity of the fishery – that addresses the information needs of management and provides for the dissemination of research results to all interested parties in a timely fashion.

9. Require that assessments of the biological status of the resource and impacts of the fishery have been and are periodically conducted.

10. Specify measures and strategies that demonstrably control the degree of exploitation of the resource, including, but not limited to:

    a) setting catch levels that will maintain the target population and ecological community's high productivity relative to its potential productivity, and account for the non-target species (or size, age, sex) captured and landed in association with, or as a consequence of, fishing for target species;
    b) identifying appropriate fishing methods that minimise adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas;
    c) providing for the recovery and rebuilding of depleted fish populations to specified levels within specified time frames;
    d) mechanisms in place to limit or close fisheries when designated catch limits are reached;
    e) establishing no-take zones where appropriate.

11. Contains appropriate procedures for effective compliance, monitoring, control, surveillance and enforcement which ensure that established limits to exploitation are not exceeded and specifies corrective actions to be taken in the event that they are.

B. Operational Criteria

Fishing operation shall:

12. Make use of fishing gear and practices designed to avoid the capture of non-target species (and non-target size, age, and/or sex of the target species); minimise mortality of this catch where it cannot be avoided, and reduce discards of what cannot be released alive.

13. Implement appropriate fishing methods designed to minimise adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas.

14. Not use destructive fishing practices such as fishing with poisons or explosives;

15. Minimise operational waste such as lost fishing gear, oil spills, on-board spoilage of catch etc.

16. Be conducted in compliance with the fishery management system and all legal and administrative requirements.

17. Assist and co-operate with management authorities in the collection of catch, discard, and other information of importance to effective management of the resources and the fishery.

10 BACKGROUND TO THE EVALUATION

10.1 Evaluation Team

Evaluation leader: Dr Andrew Hough
Andy has a PhD in marine ecology from the University of Wales, Bangor and fourteen years post-doctoral experience in commercial marine and coastal environmental management projects. He is manager of Moody Marine operations within Moody International Certification with particular responsibility for the implementation of MSC Certification procedures and for providing contributions on behalf of Moody Marine towards the development of MSC methodologies. Andy has been the lead assessor on the majority of Moody Marine MSC pre assessments and main assessments.

Project Coordinator: Paul Knapman
Paul is a lead assessor with Moody Marine and is responsible for Moody Marine operations in North America. He has extensive experience of the fishing industry in North America and Europe. He was previously Head of an inshore fisheries management organisation, a senior policy advisor to the UK government on fisheries and environmental issues, a fisheries officer and a fisheries consultant working in Europe and Canada.

Expert advisor: Prof. Joe Powers
Joe currently serves as a Professor of stock assessment in the School of the Coast and Environment, Louisiana State University. Previously he served as Senior Stock Assessment Scientist of the Southeast Fisheries Science Centre. He has had extensive experience in conducting population dynamics studies, scientific stock assessments, in communicating results to constituents and managers, and serving as a fisheries manager. He has been the lead US scientist conducting stock assessments for Atlantic tuna and billfish species for the International Commission for the conservation of Atlantic Tunas (ICCAT). Additionally, Joe served as the Chairman of the Scientific Committee of ICCAT (1998-2002). His research interests continue to be the modelling of robust sustainable management procedures, integrating ecosystem factors into stock assessments, risk analysis in decision making and the role of scientific investigations in fisheries management policy.

Expert advisor: Dr. Geoff Tingley
Geoff is a fisheries scientist working for the Centre for Environment Fisheries and Aquaculture Science (Cefas) in Lowestoft. He has twenty years experience working in stock assessment and management of marine and freshwater fisheries His experience includes the scientific, management, licensing and policy issues of the fisheries around the Falkland Islands, seven years as the Team Leader of the group providing scientific and management advice to the Director of Fisheries and the Falkland Islands Government including the management of a trawl fishery for hake. He was a member of the UK Delegation on the South Atlantic Fisheries Commission (and its predecessors) from its inception in 1989 to 1996, including membership of the scientific subcommittee. Geoff also worked in South Africa briefly as part of a World Bank Project on fisheries policy development for Angola in the mid-1990's.

Expert Advisor: Prof. Susan Hanna
Susan is a Professor within the Department of Agricultural and Resource Economics, Oregon State University. Her principal research interests are marine economics and policy, application of incentive-based approaches to fishery management; institutional evolution in U.S. fisheries management, economics of ecosystem based fishery management, economics of property rights and the economic history of New England and Pacific fisheries. Other recent professional activities include membership of the U.S. Commission on Ocean Policy Science Advisory Panel; National Oceanic and Atmospheric Administration Science Advisory Board; Pacific Fishery Management

Council Scientific and Statistical Committee; National Marine Fisheries Service Independent Science Advisory Board and the National Oceanic and Atmospheric Administration Marine Fisheries Advisory Committee.

10.2 Previous Certification Evaluations

The fishery has not been previously assessed against the MSC standard.

10.3 Inspections of the Fishery

Inspection of the fishery focused on the practicalities of fishing operations, the mechanisms and effectiveness of management agencies and the scientific assessment of the fisheries.

Meetings were held as follows. Some of the key issues discussed have been identified for each meeting.

Table 9. A list of individuals and/or organisations that were interviewed or provided information in the course of the site visit to the fishery.

Name	Affiliation	Date	Key Issues
Jon Warrenchuck	Oceana	12/05/08	Bycatch and effects on habitat
Pat Livingstone	NOAA/NMFS/AFSC	13/05/08	Status of stock and the environment
Anne Hollowed	NOAA/NMFS/AFSC	13/05/08	Status of stock and the environment
William Stockhausen	NOAA/NMFS/AFSC	13/05/08	Status of stock and the environment
James Browning	AFDF	13/05/08	Fishery operation and management
Grant Thompson	NOAA/NMFS/AFSC	13/05/08	Status of stock and the environment
Dan Nichol	NOAA/NMFS/AFSC	13/05/08	Status of stock and the environment
Mark Wilkins	NOAA/NMFS/AFSC	13/05/08	Status of stock and the environment
Tom Wilderbuer	NOAA/NMFS/AFSC	13/05/08	Status of stock and the environment
Beth Daudishel	Best Use Coalition	13/05/08	Fishery operation and management
Jason Anderson	Best Use Coalition	13/05/08	Fishery operation and management
Jim Ianelli	NOAA/NMFS/AFSC	13/05/08	Status of stock and the environment
Jack Turnock	NOAA/NMFS/AFSC	13/05/08	Status of stock and the environment
Kerim Aydin	NOAA/NMFS/AFSC	13/05/08	Status of stock and the environment
Shannon Fitzgerald	NOAA/NMFS/AFSC	13/05/08	Status of stock and the environment
Sarah Gaucher	NOAA/NMFS/AFSC	13/05/08	Status of stock and the environment
Sue Salveson	NOAA/NMFS/AFSC	13/05/08	Status of stock and the environment, management of the fisheries
Craig Rose	NOAA/NMFS/AFSC	13/05/08	Status of stock and the environment, management of the fisheries
Melanie Brown	NOAA/NMFS/AFSC	13/05/08	Status of stock and the environment, management of the fisheries
Glenn Merrill	NOAA/NMFS/AFSC	13/05/08	Status of stock and the environment, management of the fisheries
David Witherell	NPFMC	14/05/08	Status of stock and the environment, management of the fisheries.
Craig Rose	NOAA/NMFS/AFSC	14/05/08	Status of stock and the environment
Jennifer Sepez	NOAA/NMFS/AFSC	14/05/08	Management and socio economics

Name	Affiliation	Date	Key Issues
Nick Sagalkin	ADF&G	16/05/08	Management of the fisheries.
Charles Trowbridge	ADF&G	16/05/08	Management of the fisheries.
Bubba Cook	WWF	23/05/08	Bycatch and seabed impacts of demersal gears.

11 STAKEHOLDER CONSULTATION

11.1 Stakeholder Consultation

A total of 65 stakeholders were identified and consulted specifically by Moody Marine. Information was also made publicly available at the following stages of the assessment:

Table 10. Stakeholder consultations held

Date	Purpose	Media
20/11/07	Notification of confirmation of assessment	Direct E-mail/letter Notification on MSC website
11/12/07	Notification of Assessment Team nominees	Direct E-mail Notification on MSC website
24/01/08	Confirmation of Assessment Team	Direct E-mail Notification on MSC website
18/04/08	Consultation on draft Performance Indicators and Scoring Guideposts	Direct E-mail Notification on MSC website
19/08/08	Release of final Performance Indicators and Scoring Guideposts	Direct E-mail Notification on MSC website
1/05/08	Notification of confirmation of assessment	Advertisement in press
8/05/08	Notification of assessment visit and call for meeting requests	Direct E-mail Notification on MSC website
19-20/06/08	Assessment visit	Meetings
16/09/09	Notification of Proposed Peer Reviewers	Direct E-mail Notification on MSC website
10/02/10	Notification of the Public Comment Draft Report	Direct E-mail Notification on MSC website

11.2 Stakeholder Issues

Feedback from stakeholders has assisted in the selection of the assessment team peer reviewers and refinement of the Performance Indicators and Scoring Guideposts.

No stakeholder comments were received during the course of the 30 day consultation period for the Public Comment Draft Report.

12 OBSERVATIONS AND SCORING

12.1 Introduction to the Scoring Methodology

The MSC Principles and Criteria set out the requirements of certified fishery. The certification methodology adopted by the MSC involves the interpretation of these Principles and Criteria into specific Performance Indicators against which the performance of fishery can be measured according to pre-specified guideposts.

The Performance Indicators developed by the Moody Marine assessment team have been identified on the MSC website (Performance Indicators and Scoring Guideposts). In order to make the assessment process as clear and transparent as possible, these guideposts identify the level of performance necessary to achieve 100, 80 (a pass score), and 60 scores for each Performance Indicator.

These generic Performance Indicators and Scoring Guideposts have been the subject of stakeholder consultation and have been confirmed or modified following this process based on the judgement of the assessment team. Prior to scoring, the Indicators are also 'weighted' in relative importance according to the nature of the fishery undergoing certification.

At the top level, no weightings are assigned in terms of each MSC Principle; a fishery must 'pass' each of Principles 1, 2 and 3 in order to achieve certification and these are of equal importance.

Within each Principle, and related to each MSC Criterion, Sub-criteria and Performance Indicators are grouped in a hierarchy. Each level represents separate areas of important information (e.g. Indicator 1.1 requires a sufficient level of information on the target species and stock, 1.2 requires information on the effects of the fishery on the stock and so on).

At the level of the Performance Indicators, the performance of the fishery is assessed as a 'score'. In order for the fishery to achieve certification, an overall weighted average score of 80 is necessary for each of the three Principles and no Indicator should score less than 60. Accordingly, 100 represents a theoretically ideal level of performance and 60 a measurable shortfall. As it is not considered possible to allocate precise scores, a scoring interval of five is used in evaluations. As this represents a relatively crude level of scoring, weighted average scores are rounded to the nearest whole number.

Weights and scores for the fishery are presented in the scoring table. Weights for criteria, sub-criteria and Performance Indicators add to a total of 100 at each level of the hierarchy. Scores are allocated relative to the Scoring Guideposts.

12.2 Evaluation Results

Observations are presented in the scoring table, together with any weighting applied to the fishery and the scores allocated.

13 LIMIT OF IDENTIFICATION OF LANDINGS FROM THE BSAI ARROWTOOTH FLOUNDER TRAWL FISHERY

13.1 Traceability

Traceability of product from the sea to the consumer is important so as to ensure that the MSC standard is maintained. There are several aspects to traceability that the MSC require to be evaluated: Traceability within the fishery; at-sea processing; at the point of landing; and subsequently the eligibility of product to enter the chain of custody. These requirements are assessed here.

13.2 Traceability Requirements Within the Fishery

Those companies and their vessels identified in Section 1.1 and in those instances described in Section 1.2, will be eligible to sell MSC certified arrowtooth flounder (as and when the fishery is certified). Existing fisheries management requirements include the clear identification of species, quantity, fishing method and area of capture by all vessels landing fish from the fishery. All catches of arrowtooth flounder are reported in logbooks, on landing tickets, processor check-in/check-out reports, product transfer reports and through daily radio hail-ins or via an electronic fish ticket system, "Elandings" which is accessible and monitored by federal management staff on a daily basis. On board observers (30% - 200% coverage depending on the size of the vessel) also monitor, cross check and verify their reports with the vessels logbook.

Cross referencing of VMS data with logbooks, observer and aerial and at-sea surveillance reports also ensures that fish is reported from the correct area of capture. Electronic landing reports are also filed by processors enabling cross referencing with landing statistics. Dockside sampling is conducted and shore based processors have 100% observer coverage thereby monitoring product origin and throughput at the processing facility.

13.3 At-Sea Processing

Product is generally landed as headed and gutted, frozen fillet blocks and individually frozen fillets. The landings are subject to the same reporting and monitoring requirements as indicated above. There is no known traceability risk factors associated with any of the at-sea processing operations.

13.4 Points of Landing

The limit of identification of landings is the landing of arrowtooth flounder by Best Use Coalition member's vessels at recognised ports where appropriate recording and monitoring of landings may take place. There are no known risk factors after the point of landing that may influence subsequent chain of custody assessments. Chain of custody should begin from the first point of sale.

13.5 Eligibility to Enter Chain of Custody

Products, including those processed at sea, landed by any of the vessels owned by any of the companies listed in Section 1.1 and 1.2 are eligible to enter further chains of custody. Companies buying directly from this fishery are required to have chain of custody certification. Land-based processing sites owned by companies listed in Section 1.1 and 1.2 must have a separate chain of custody certification in order for them to process products from this fishery. Any companies buying from the vessels owned by any of the companies listed in Section 1.1 and 1.2 must also seek chain of custody certification in order to sell product as MSC.

13.6 Eligibility date

In accordance with MSC Technical Advisory Board Directive (TAB D) 021 MSC product eligibility date may be up to a maximum 6 months prior to the publication of the Public Comment Draft Report (PCDR) as long as Chain of Custody audits have been conducted. The PCDR was published on 10th February 2010. The client was confirmed that their members wish to gain the maximum benefit from the eligibility date hence, the eligibility date extends back to 10th August 2009.

14 CERTIFICATION RECOMMENDATION

14.1 Certification recommendation

The Performance of the Fishery in relation to MSC Principles 1, 2 and 3 is summarised below:

MSC Principle	Fishery Performance	
Principle 1: Sustainability of Exploited Stock	Overall : 87	Pass
Principle 2: Maintenance of Ecosystem	Overall : 86	Pass
Principle 3: Effective Management System	Overall : 93	Pass

The fishery attained a score of 80 or more against each of the MSC Principles and did not score less than 60 against any Indicators. It is therefore determined that the Best Use Coalition Arrowtooth Flounder Trawl Fishery be certified according to the Marine Stewardship Council Principles and Criteria for Sustainable Fisheries.

14.2 Scope of Certification

This assessment relates only to the fishery defined in Section 1.1 up to the point of landing as defined in Section 13.

Monitoring and control of fishing locations and methods is considered sufficient to ensure fish and fish products invoiced as such by the fishery originate from within the evaluated fishery:

- 100% satellite tracking based on mandatory VMS transponders, plus aerial surveillance;
- At-sea inspections;
- Completion and submission of vessel log books and landing declarations allowing cross-referencing of position with the VMS, aerial surveillance and at-sea inspection reports;
- 30 - 200% observer coverage depending on vessel size;
- 100% observer coverage at processing plants; and,
- Random landing and processing plant inspections by enforcement officers.

This will allow fish and fish products from this fishery to enter into further chains of custody subject to appropriate assessment and certification.

14.3 Conditions and Recommendations Associated with Certification

14.3.1 Conditions

As a standard requirement of the MSC certification methodology, the fishery shall be subject to (as a minimum) annual surveillance audits. These audits shall be publicised and reports made publicly available.

The fishery attained a score of below 80 against three Performance Indicators. The assessment team has therefore set conditions for continuing certification that the Best Use Coalition, as the client for

certification, is required to address. Conditions are applied to improve performance to at least the 80 level within a period set by the certification body but no longer than the term of the certification.

As a standard condition of certification, the client shall develop an 'Action Plan' for Meeting the Conditions for Continued Certification', to be approved by Moody Marine.

The conditions are associated with three key areas of performance of the fishery. The Conditions, associated timescales and relevant Scoring Indicator are set out below.

Condition 1 - Stock Structure

The following is the narrative used for the performance indicator (PI) that was considered to be deficient (i.e. scored 75) in this area of the assessment and the associated 80 scoring guidepost (SG):

PI 1.3.1.2 - Does information indicate any changes in [stock] structure that would alter reproductive capacity?

SG 80 - Evidence exists that the fishery has not caused changes in stock structure that would affect recruitment, or, potentially adverse changes in structure are clearly identified and effective remedial measures are in place.

The assessment team concluded that the score would have been higher if there was an evaluation to show that the fishery had no harmful effects on stock structure in relation to reproductive capacity. In order that this deficiency is resolved the following Condition of Certification has been set:

The client is required to provide evidence of the affect of the fishery on stock structure and whether this has had an adverse affect on recruitment. It is required that this part of the Condition is met by the second annual surveillance audit. If the evidence suggests recruitment has been adversely affected remedial measures must be implemented by year four of the certification.

In order to achieve this outcome it is recommended that the client:

a) Evaluates the evidence of change in the stock structure in relation to reproductive capacity and relate this to the activities of the fishery.
b) If there is evidence of a potentially damaging change in stock structure caused or assumed to be caused by the fishery, appropriate remedial measures should be defined and implemented by year four of the certification.

Condition 2 – Effects of the Gear

The following is the narrative used for the performance indicator (PI) that were considered to be deficient (i.e. scored 75) in this area of the assessment and the associated 80 scoring guidepost (SG):

PI 2.1.3.2 - Is any gear lost during fishing operations and can 'ghost fishing' occur?

SG80 - There is knowledge of the type, quantity and location of gear lost during fishing operations. Estimates can be made on the extent of adverse effects, including 'ghost fishing'.

In order that this deficiency is resolved the following Condition of Certification has been set:

The client is required to quantify and identify the location of lost trawl fishing gear and assess the

Condition 2 – Effects of the Gear

extent of adverse effects, including "ghost fishing". If significant adverse effects are identified identify ways of reducing gear loss and implement a program to monitor improving performance. It is required that this Condition is met by the second annual surveillance audit.

It is recommended that in order to achieve this Condition the client develops a standard lost gear reporting and recording scheme so that the potential impact of lost gear can be better evaluated.

Condition 3 – Protected, Endangered and Threatened (PET) Species

The following is the narrative used for the performance indicator (PI) that were considered to be deficient (i.e. scored 75) in this area of the assessment and the associated 80 scoring guidepost (SG):

PI 2.2.1.2 - Are interactions of the fishery with such [PET] species adequately determined?

SG80 - Adequate quantitative estimates are made of the effects of interactions directly related to the fishery.

The assessment team recognised that much effort has been directed at understanding the interactions of seabirds with other fisheries in the region but considered that the interactions of the trawl fisheries with seabirds requires better quantitative definition, especially in the extent of the net sonde (third) cable in causing injury and mortality.

In order that this deficiency is resolved the following Condition of Certification has been set:

The client is required to provide adequate quantitative estimates of the effects of the fishery on seabirds by the first annual surveillance audit.

It is recommended that in order to achieve this Condition the client reviews the state of knowledge of both the impacts of the fishery on seabirds and the adequacy of both current and future approaches to mitigation needs to bring together the large but fragmented literature and associated data. Such a review could also specifically assess (i) the desirability or need for additional data; and (ii) the impact of the 'third wire' in species specific seabird mortality.

14.3.2 Recommendation

It is recommended that in association with Performance Indicator 2.1.2.2 a review to document the approach to measuring and/or estimation of slippage in the fishery (i.e. where a catch is not landed owing to wrong species, undersize fish, or some other reason, and so is released or "slipped") should be conducted.

15 APPENDICES

Appendix A: Scoring Table

Appendix B: Peer Review Reports
1. Peer Reviewer Biographies
2. Peer Review Report A
3. Peer Review Report B

Appendix C: Client Action Plan

APPENDIX A

SCORING TABLE

SCORING INDICATORS	Comments	Weight	Score

Principle 1		**A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery.**	**33.3**	**87**
1.1 *(MSC Criterion 1)*		**The fishery shall be conducted at catch levels that continually maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity.**	**33.3**	**86**
1.1.1		There should be sufficient information on the target species and stock separation to allow the effects of the fishery on the stock to be evaluated.	**16.7**	**86**
Weighting Commentary		No weighting is applied to the MSC Principles – these are equally weighted and each must attain a weighted score of 80 or more for certification to be granted. The three MSC criteria are considered of equal importance. The four sub-criteria under 1.1 (MSC Criterion 1) and the Performance Indicators under sub-criterion 1.1.1 are also considered of equal importance; essentially representing a 'logical sequence' of issues.		
1.1.1.1		Are the species readily identified as adults and juveniles?	**14.6**	**90**
60	Misidentification is possible and increases recording errors of catches, but this does not compromise monitoring to unacceptable levels. Methods to improve identification are under development.	Arrowtooth flounder are readily identifiable as both adults and juveniles by fishers and regulators unlikely to be confused in the recording of the catch.		
80	The target species is unlikely to be confused with any other species and is recorded appropriately.			
100	The species is readily identified by fishers and by regulators and is recorded appropriately.			

SCORING INDICATORS		Comments	Weight	Score
1.1.1.2		Is the life history of the species understood and the spawning and nursery areas described?	**14.6**	**85**
60	There are gaps in information but the basis of the life history is understood. Information is adequate to support a general population model, but some assumptions are required. There is some information on spawning and nursery areas.	The arrowtooth flounder life history is well enough understood for assessment purposes, as adequate information regarding spawning and nursery grounds exists and are adequate for assessment purposes through population modeling (Wilderbuer and Nichol. 2007a). Arrowtooth flounder live to 15 years. Spawning occurs from December through February. The natural mortality has been estimated to be M = 0.20, females; with males evaluated at 0.26-0.3. Arrowtooth flounder are distributed throughout the continental shelf through age 4, and then at older ages disperse to occupy both the shelf and the slope. Recruitment to the slope gradually increases at older ages and reaches a maximum at age 9. However, greater than 50% of age groups 9 and older continue to occupy continental shelf waters. Waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (see section 6.7.7) have been described for the late juvenile and adult stage of its life cycle: habitat for late juvenile and adult arrowtooth flounder 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 and upper slope (200 to 500 m) throughout the BSAI wherever there are softer substrates consisting of gravel, sand, and mud		
80	The life history of the species is clearly documented and understood. Information is adequate to support an appropriate population model. Spawning and nursery areas are adequately well described.			
100	The life history of the species is clearly documented and understood including behaviour and ecological interactions. Spawning and nursery areas are sufficiently well documented to support closed area / seasons where this is deemed necessary.			

SCORING INDICATORS		Comments	Weight	Score
1.1.1.3		Is the geographical range of the target stock known and any seasonal migration described?	**14.6**	**85**
60	A management unit approximating the stock is used with some biological justification. This is based upon a sufficiently robust estimation of the geographical range of the target stock.	The geographical range of the arrowtooth flounder stock and seasonal migration are broadly understood. Stock assessment and management units are consistent with their distribution (Wilderbuer and Nichol. 2007a). Arrowtooth flounder live to 15 years. Spawning occurs from December through February. The natural mortality has been estimated to be M = 0.20, females; with males evaluated at 0.26-0.3. Arrowtooth flounder are distributed throughout the continental shelf through age 4, and then at older ages disperse to occupy both the shelf and the slope. Recruitment to the slope gradually increases at older ages and reaches a maximum at age 9. However, greater than 50% of age groups 9 and older continue to occupy continental shelf waters. Waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (see section 6.7.7) have been described for the late juvenile and adult stage of its life cycle: habitat for late juvenile and adult arrowtooth flounder 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 and upper slope (200 to 500 m) throughout the BSAI wherever there are softer substrates consisting of gravel, sand, and mud. Stock sssessments are consistent with these findings		
80	A reliable estimate of the geographic range of the target stock is available including seasonal patterns of movement and availability. Stock assessment and management units are consistent with the majority distribution of the stock.			
100	The complete geographic range of the stock, including seasonal patterns of movement/availability, is estimated and documented and is kept under review.			

SCORING INDICATORS		Comments	Weight	Score
1.1.1.4		Is there information on fecundity and growth?	**14.6**	**85**
60	There is some appropriate information available on fecundity and growth.	Growth information is used as a surrogate for fecundity in the stock assessment and there is also adequate time-series of growth (Wilderbuer and Nichol. 2007a). Growth is monitored periodically for changes. Per capita fecundity is assumed to be proportional to mass of individual females. Spawning biomass is monitored through the assessment (see text). Sex-specific growth rates are estimated and are monitored with sex-ratios to obtain sex-specific sizes and ages over time. These are coupled in the assessment to estimates trends in growth and, indirectly, relative fecundity.		
80	Reliable estimates are available of fecundity at size and/or weight and growth rates, and this information forms an adequate time series.			
100	There is comprehensive and reliable information on fecundity at size, growth rates, and length and weight at age, and these are monitored over time to detect trends and shifts.			

SCORING INDICATORS		Comments	Weight	Score
1.1.1.5		Is there an understanding of the relationship of recruitment to parental stock?	**14.6**	**80**
60	Indices of recruitment levels and recruiting ages, and corresponding spawning stock levels are available.	Adequate estimates of recruitment are available for arrowtooth flounder and these are related to spawning stock levels. Current levels of spawning biomass are high. Contrast in data is unavailable but also unimportant in relation to current conservation see recruitment and biomass trends in Section 4 (Wilderbuer and Nichol. 2007a). Both biomass and recruitment have undergone a three decade trend of increase. Since both increased during these 30 years, there are limited contrasts for stock-recruitment estimation. For these reasons, management was based on SPRs rather than the stock-recruitment relationship. Given that the trend has been increasing and given that SPRs are estimated as being high, the limitations of lack of contrasts is not considered to be a significant limitation to conservation management.		
80	Adequate estimates of recruitment and spawning stock are available. Sufficient years of data and contrast are available to establish a general relationship between stock and recruitment.			
100	The relationship between stock and recruitment is well understood with high statistical reliability.			

SCORING INDICATORS		Comments	Weight	Score
1.1.1.6		Is information collected on the abundance/density of the stock?	**14.6**	**90**
60	Either fishery dependent or fishery independent indices are available on the abundance of the stock biomass. Qualitative information exists on the appropriateness of the indices as proportional indicators of stock size.	Information is collected on the abundance/density of arrowtooth flounder from fishery dependent and independent sources. Indices are used in the assessments to generate trends through full analytic assessments of tier 3 leading to confidence in the trends (Wilderbuer and Nichol. 2007a). These indices (see Section 4 for description) provide the basis for monitoring abundance trends in the assessment. Indices used in this assessment include catch, trawl survey biomass indices and standard error from shelf and slope surveys, sex-specific trawl survey size composition and available fishery length-frequencies from observer sampling. Relative abundance from the survey CPUE of arrowtooth flounder increased substantially on the continental shelf from 1982 to 1990 as the CPUE from AFSC shelf surveys increased. Then CPUE continued to increase through 1997. From 1999 to 2005 the CPUE increased at a high rate each year. The 2005 CPUE of 16.35 kg/ha was the highest ever estimated from the shelf survey. The 2006 and 2007 estimates were lower at 13.12 and 11.79 kg/ha, respectively. Absolute biomass estimates (t) from trawl surveys for arrowtooth flounder from the standard survey area in the eastern Bering Sea and Aleutian Islands region were available. Biomass estimates from these surveys on the continental shelf have shown a consistent increasing trend since 1975. Since 1982, biomass point -estimates indicate that arrowtooth abundance has increased eight-fold to 1994. Arrowtooth flounder absolute abundance estimates are based on "area-swept" bottom trawl survey methods. These methods require several assumptions which can add to the uncertainty of the estimates. For example, it is assumed that the sampling plan covers the distribution of the species and that all fish in the path of the trawl are captured (no losses due to escape or gains due to herding). Due to sampling variability alone, the 95% confidence intervals for the 2006 point estimate are 516,000 – 700,340 t. The uncertainties (standard errors, indices versus absolute biomass) are evaluated in the assessment. While there are limitations to the precision in the data, in aggregate the status of the stock as evaluated in the assessment is robust to those uncertainties		
80	Fishery dependent and/or fishery independent indices are available on the abundance/density of the stock. Uncertainties have been analysed and any uncertainties reduced so as to allow trends to be determined from the indices. Indices are suitable to provide a high degree of confidence in the evaluation of stock abundance trends.			
100	Multiple fishery dependent and/or fishery independent indices are available on the abundance/density of the stock with sufficient time series to allow trends in abundance to be understood clearly. Where fishery independent surveys are used (for juveniles and/or adults) the design of the survey is statistically rigorous and robust, Indices are consistent and there is clear evidence that they are proportional to the stock size. Uncertainties have been fully analysed.			

SCORING INDICATORS		Comments	Weight	Score
1.1.1.7		Is information available on environmental influences on the stock dynamics?	**12.5**	**90**
60	Some relevant studies have been undertaken on the effects of biological and physical factors which could affect the stock (including natural mortality). Research is encouraged and ongoing.	Substantial environmental information has been and is collected, including both biological and physical data. These data provide a significant resource for application in defining environmental influences on the stock dynamics. With the exception of considering periodic regime shifts that affect recruitment, physical factors have not been used. Biological factors, such as predation, have been sufficiently studied to be used in assessment. The effect of spatial distributions and other physical factors are monitored for the other species . Additionally, bottom temperature is used as a covariate in estimating shelf survey catchability (Wilderbuer and Nichol. 2007a).		
80	There is knowledge of biological and physical factors affecting distribution, survival and year class strength (including natural mortality). Some information is sufficiently robust for use in the stock assessment process.			
100	There is comprehensive knowledge of biological and physical factors affecting distribution, survival and year class strength (including natural mortality). Key information is sufficiently robust for use in the stock assessment process.			

SCORING INDICATORS		Comments	Weight	Score
1.1.2		There should be sufficient information on the fishery to allow its effects on the target stock to be evaluated	**16.7**	**92**
Weighting Commentary		All Performance Indicators within this sub-criterion are considered of equal significance.		
1.1.2.1		Are all major sources of fishery related mortality recorded/ estimated, including landings, discards and incidental mortality?	**25**	**90**
60	Sufficient information is available on the fishery to allow accurate estimates to be made of landings, broken down as required for an evaluation to be made. Estimates of discards and incidental mortality are available.	Landings and discards are accurately recorded and monitored, including the sizes (age) of the fish, fisheries observers and the in-season TAC monitoring process. Discards are reported by fishers and monitored by the observer program with post–report analysis for input into the stock assessment process. Hiatt et al (2007) report contains discard rates for the period 2002 to 2006. Estimates are available and incorporated into the assessments. In recent years the retained catch has not exceeded 62%.		
80	Landings are accurately recorded. Discards and incidental mortality are well estimated for the fishery.			
100	Landings, discards and incidental mortality are accurately estimated and monitored.			

SCORING INDICATORS		Comments	Weight	Score
1.1.2.2		Are fleet descriptions, fishing methods and gear types known throughout the fishery under assessment?	**25**	**100**
60	Significant fishing methods and gear types are known for the fishery with some information on geographical areas of use. Information is available on the size and composition of the fleets, but is not regularly updated.	In the federal fishery, all fishing methods and gear types employed in the fishery are well known and described through the licensing system. *In-situ* observations are made of fishing practices, including through the observer and enforcement programs. This comprehensive knowledge of the size and composition of the fleet fishing in Federal waters is recorded and regularly updated through standard Council regulatory processes (Hiatt et al, 2007).		
80	Significant fishing methods and gear types are known and information is available on the geographical areas of use. Recorded information is available on the size and composition of the fleets. This is reviewed and updated at appropriate intervals.			
100	All fishing methods and gear types employed in the fishery are known. *In-situ* observations are made of fishing practices. Comprehensive knowledge is recorded and regularly updated, on the size and composition of the fleets.			

SCORING INDICATORS		Comments	Weight	Score
1.1.2.3		Is gear selectivity known for the fishery?	**22.8**	**85**
60	Appropriate information is available on selectivity and qualitative changes in selectivity.	Selectivity for species is estimated within the assessment models, both seasonal and annual. Current assessment methods can indicate changes over time. Spatial trends in selectivity do not appear to have been examined fully. However, size/age frequency data do not indicate major shifts (Wilderbuer and Nichol. 2007a) (see Section 4). Selectivity by size, age and sex were estimated for the gear using a logistic model. Fits to the length distributions indicate that selectivities are estimated accurately and that there are no apparent changes over time..		
80	Selectivities of gear types are well estimated by size. Information is sufficient to determine any changes in selectivity over time.			
100	Full selectivities have been accurately estimated for all gears, locations and times of fishing over time.			

SCORING INDICATORS		Comments	Weight	Score
1.1.2.4		Is the target species taken in other fisheries in the area that are not subject to this certification, and are such catches recorded or estimated?	**25**	**90**
60	There is an appropriate level of information relating to other fisheries in the area that are not subject to this certification, although these are not fully identified. The catches are estimated in the stock assessments. Levels of IUU fishing are estimated, but with some uncertainty.	Arrowtooth flounder are taken in a number of other fisheries (e.g. the pollock trawl fishery). The catches (landings and discards) are all recorded as part of the normal State and Federal monitoring of the fisheries sector and are used in the stock assessment. There is substantive and effective surveillance of fishing operations in this area and together with the monitoring of catches and the observer program. Illegal,Unreported and Unregulated (IUU) fishing is reliably estimated to be negligible relative to the impacts on the stock assessments.		
80	The main fisheries not subject to certification are identified. Significant catches of the target species (including IUU fishing) are either recorded or reliably estimated in the stock assessments in a precautionary manner.			
100	All fisheries (and other sources of human-induced mortality) in the area that are not subject to this certification are identified and monitored. All the catches are recorded and used in the stock assessment. Levels of IUU fishing are reliably estimated to be negligible.			

SCORING INDICATORS	Comments	Weight	Score

1.1.3		Appropriate reference levels have been developed for the stock	16.7	85
Weighting Commentary		All Performance Indicators within this sub-criterion are considered of equal significance.		
1.1.3.1		Are there appropriate limit and precautionary reference points based on stock biomass and fishing mortality?	100	90
60	Limit and precautionary reference points have been set based on justifiable and reasonable practice appropriate to the species.	The Alaskan management system, incorporating OFL, ABC and TAC levels, and the tier system which incorporates more caution for stocks that are less well estimated is implicitly precautionary. Arrowtooth flounder is based upon Tier 3a assessments. F Reference points are established such that $F_{ABC} \leq F_{OFL}$ where F_{OFL} is based on F35% or Fmsy. Additionally, minimum biomass targets and limits have been estimated (based on these F levels) to indicate an overfished state (Wilderbuer and Nichol. 2007a). The tier 3a stock status benchmarks are: B/B40% > 1; FOFL = F35%; FABC < F40% The biomass ABC benchmarks ($B_{40\%}$) and overfished limit reference points ($B_{35\%}$) are justified based on stock biology.		
80	Appropriate limit and precautionary reference points are justified based on stock biology (e.g. a stock-recruitment relationship) and are measurable given data and assessment limitations.			
100	Appropriate limit and precautionary reference points are justified based on stock biology, uncertainty, variability, data limitations and statistical simulations of these factors.			

SCORING INDICATORS	Comments	Weight	Score

1.1.4		There is a well-defined and effective harvest strategy to manage the target stock.	**16.7**	**90**
Weighting Commentary		All Performance Indicators within this sub-criterion are considered of equal significance.		
1.1.4.1		Is there a mechanism in place to contain harvest as required?	**33.3**	**90**
60	Mechanisms are in place to monitor and (if necessary) reduce harvest, but do not fully contain harvest, or have not been tested. Measures provide a reasonable degree of confidence in stock management.	Harvest is controlled through the OFL, ABC and TAC setting procedures. TACs are specified such that it is unlikely that either the ABC or the OFL will be exceeded. Furthermore, catches are monitored and results indicate that catches are near the target TACs (Wilderbuer and Nichol. 2007a). Since the fishery is small and governed by bycatch in other fisheries, the current fishing mortality rates are small. In this fishery, the TACs are management targets to allow bycatch objectives to be met. Thus, the TACs are targets not limits. The limits are defined by overfishing levels and the ABC. Actual catches are much less than the ABCs. The robustness of the rules are demonstrated by the realized catches being an order of magnitude below the ABC.		
80	Appropriate mechanisms are utilised to contain harvest as and when required to maintain, or allow the target stock to return to, productive levels. These have been tested if/as appropriate for robustness against uncertainties in the assessment and management process.			
100	Mechanisms are in place to contain harvest as and when required to maintain (or allow the target stock to return to) productive levels. Measures are robust to uncertainty in data inputs or stock biology. Specific measures to demonstrate effectiveness are in place and their robustness has been examined against a wide range of uncertainties.			

SCORING INDICATORS		Comments	Weight	Score
1.1.4.2		Are clear, tested decision rules set out?	**33.3**	**90**
60	It can be demonstrated that decision making, though not necessarily formally documented, is recorded, logical and appropriate. Rules may not have been tested, but appear appropriate for management.	Clear, documented decision rules are fully implemented and have been fully reconciled with reference points and the data and assessment limitations, and have been periodically evaluated, most recently for the 2007 assessment. The decision rules have been tested within the Tier system in general but not specifically for this stock. Given the status of the BSAI flatfish stocks, management strategy evaluations are limited to projections of future biomass at the current F_{ABC}. The definitions of the tiers are given in Amendment 56 of the Fishery Management Plan. The assignment of tiers is based upon the availability of data and, in particular, the ability to estimate reference points directly or indirectly using analytic models or trend analysis. The initial selection was done by the SSC and they review this annually when reviewing the assessments and the SAFE reports.		
80	Clear decision making rules are used, are fully documented, but may not have been fully tested. Decision rules are reconciled with reference points and with data and assessment limitations.			
100	Clear, documented and tested decision rules are fully implemented and have been fully reconciled with reference points and the data and assessment limitations, and have been periodically evaluated.			

SCORING INDICATORS		Comments	Weight	Score
1.1.4.3		Are appropriate management tools specified to implement decisions in terms of input and/or output controls?	**33.3**	**90**
60	Management tools exist within the fishery under assessment to implement decisions of input and/or output controls. Evidence shows that tools are effective enough to achieve the minimum level of control necessary to meet the main management objectives.	A range of management tools are in place and are monitored and updated regularly. Most tools are directed at output controls (e.g. catch restrictions) but input controls also exist, such as gear restrictions, seasonal and area closures. The tools used are appropriate, responsive and can be changed in a timely fashion as required. Given the status of the arrowtooth flounder and other flatfish stocks, there has not been a lot of interest in changing the control measures (current methods are working from a management standpoint and are evaluated through comparison of empirical results with conservation and management standards, the stocks are not overfished and are not undergoing overfishing). However, alternatives which might be used in the future are not adequately evaluated.		
80	Management tools have been specified to implement decisions on the level of input and/or output controls. Evidence exists to show clearly that tools are appropriately effective in achieving relevant management objectives.			
100	Management tools have been specified to implement decisions on the level of input and/or output controls. Tools are responsive, relevant and timely. Performance of the tools has been evaluated and evidence exists to show clearly that the tools are effective in achieving relevant management objectives.			

SCORING INDICATORS	Comments	Weight	Score

1.1.5	There is a robust assessment of stocks.	16.7	90
Weighing Commentary	All Performance Indicators within this sub-criterion are considered of equal significance.		
1.1.5.1	Are assessment models used and are they appropriate to the biology of the target species and the type of fishery?	**20.0**	**90**

60	Robust assessment models are used. These are generic and do not account for specific characteristics of either the biology of the species or the nature of the fishery.	The assessment models utilize age-structure methods with maximum likelihood estimation of relevant parameters. The likelihood components were chosen to encompass the observation data in terms of catch, indices catch at age and other components as appropriate to the available data. Reference points are chosen based upon the Tier analysis from the assessment models based on the biology the available data and the uncertainty in model parameter estimates (Wilderbuer and Nichol. 2007a). The abundance, mortality, recruitment and selectivity are assessed with a separable catch-age analysis that uses survey estimates of biomass and age/size composition as auxiliary information to be fitted by population dynamics.. The fit obtained by maximizing the log (likelihood) function given distributional assumptions about the observed data. The suite of parameters estimated by the model is classified by the likelihood components: survey size composition, survey biomass, catch biomass and recruitment deviations with the total log likelihood being the sum of the likelihoods for each data component.. A Monte Carlo Markov Chain (MCMC) algorithm is used to obtain estimates of parameter uncertainty. Approximate 90 percent confidence intervals are produced as the values corresponding to the 5th and 95th percentiles of the MCMC evaluation. Specifically, parameters were estimated for fishing mortality rates, annual recruitment, initial stock size, fishery age selectivity, survey age selectivity and the stock-recruitment parameters. Using these estimates, annual age-specific abundance, biomass and spawning biomass were computed. The assessment model discussed in Section 4 accounts for age structure, fishery selectivity, growth, mortality and reproduction. There are some limitations to the recruitment (reproduction) functions. However, the model structure is appropriate to the biology and fishery.
80	Adequate assessment models are used. Major criteria are related to the species and/or the fishery, but there are some areas of the assessment that are generic.	
100	Adequate assessment models are used and capture all major features appropriate to the biology of the species and the nature of the fishery and the nature of the management questions being asked.	

SCORING INDICATORS		Comments	Weight	Score
1.1.5.2		Does the assessment take into account major uncertainties in data and have assumptions been evaluated?	**20.0**	**85**
60	Major uncertainties are identified. Some attempt has been made to evaluate these in the assessment.	The assessment models utilize age-structure methods with maximum likelihood estimation of relevant parameters. The likelihood components were chosen to encompass the observation data in terms of catch, indices catch at age and other components as appropriate to the available data. Reference points are chosen based upon the Tier analysis from the assessment models based on the biology the available data and the uncertainty in model parameter estimates (Wilderbuer and Nichol. 2007a). The evaluation of this indicator is similar to that for indicator 1.1.5.1 The assessment model discussed in Section 4 accounts for age structure, fishery selectivity, growth, mortality and reproduction. There are some limitations to the recruitment (reproduction) functions. However, the model structure is appropriate to the biology and fishery. Alternative model structures were explored . Additional multiple management scenarios were run. The fact that catches are a tenth of the ABC serves to inform that the precision is adequate for the management structure. Additionally, parameter uncertainty is evaluated through: The abundance, mortality, recruitment and selectivity are assessed with a separable catch-age analysis that uses survey estimates of biomass and age composition as auxiliary information to be fitted by population dynamics.. The fit obtained by maximizing the log (likelihood) function given distributional assumptions about the observed data. The suite of parameters estimated by the model is classified by the likelihood components: survey size composition, survey biomass, catch biomass and recruitment deviations with the total log likelihood being the sum of the likelihoods for each data component.. A Monte Carlo Markov Chain (MCMC) algorithm is used to obtain estimates of parameter uncertainty. Approximate 90 percent confidence intervals are produced as the values corresponding to the 5th and 95th percentiles of the MCMC evaluation. Specifically, parameters were estimated for fishing mortality rates, annual recruitment, initial stock size, fishery age selectivity, survey age selectivity and the stock-recruitment parameters. Using these estimates, annual age-specific abundance, biomass and spawning biomass were computed. The assessment model has been shown to meet sufficient levels of precision and accuracy to allow the management process to achieve its objectives..		
80	The assessment takes into account major uncertainties in the data and functional relationships. The most important assumptions have been evaluated and the consequences are known.			
100	The assessment addresses all significant uncertainties in the data and functional relationships and evaluates the assumptions in terms of scope, direction and bias relative to management-related quantities. The assessment model has been shown to meet sufficient levels of precision and accuracy to allow the management process to achieve its objectives.			

SCORING INDICATORS		Comments	Weight	Score
1.1.5.3		Are uncertainties and assumptions explored and reflected in management advice?	**20.0**	**90**
60	Major uncertainties are recognised and are reported in management advice, as well as possible implications of those uncertainties on the management advice.	Major uncertainties and assumptions are handled in the Tier system and through the development of SSC advice to managers. The tier system includes appropriate decisions rules (Wilderbuer and Nichol. 2007a).		
80	Major uncertainties and assumptions are addressed in the management advice and through the appropriate decision rules to address those limitations.			
100	All significant uncertainties and assumptions are addressed and reflected in the management advice, including appropriate decision rules.			

SCORING INDICATORS		Comments	Weight	Score
1.1.5.4		Does the assessment evaluate current stock status relative to reference points and make forecasts for the future?	**20.0**	**90**
60	The stock status is estimated relative to reference points.	The current status relative to reference points is determined and future projections based on ABC are made. The assessment model discussed in Section 4 accounts for age structure, fishery selectivity, growth, mortality and reproduction. There are some limitations to the recruitment (reproduction) functions. However, the model structure is appropriate to the biology and fishery. Additional multiple management scenarios were run by 5 year projections at current F. Projected biomass is well above limits. The fact that catches are a tenth of the ABC serves to inform that the precision is adequate for the management structure.		
80	The assessment makes an evaluation of the stock status relative to the reference points. Both short and medium term forecasts are made.			
100	The assessment makes a reliable probabilistic evaluation of the stock status relative to the reference points and projects these into the future over appropriate timescales.			

SCORING INDICATORS		Comments	Weight	Score
1.1.5.5		Does the assessment include the consequences of current harvest strategies?	**20.0**	**90**
60	The assessment makes an appropriate initial approximation of the consequences of current harvest strategies.	The assessment outputs include the consequences of current harvest strategies and forecasts future consequences of those strategies and also evaluate stock trajectories under the operating decision rules (Hiatt et al, 2007). Annual SAFE reports indicate the current status of the stock relative to reference points; projections are made of future status under the management reference points.		
80	The assessment includes a robust approximation of the consequences of current harvest strategies. Uncertainties in the model are adequately considered in harvest strategy evaluations.			
100	The assessment includes the consequences of current harvest strategies, forecasts future consequences of these and evaluates stock trajectories under decision rules.			

SCORING INDICATORS	Comments	Weight	Score

1.1.6	The stock(s) is/are at appropriate reference level(s).	16.7	85
1.1.6.1	Is there evidence that stock status is consistent with that providing long-term productivity? **[Score ≥80: Criterion 1.1 is complete and Criterion 1.2 does not apply. Score 79 or less: Answer Criteria 1.2 in addition]**	100	100

60	The stock has a high probability of being above its limit reference point
80	The stock has a high probability of being above its limit reference point and the stock is at, or fluctuating around, it's precautionary/target reference point.
100	The stock has a high probability of being consistently at or above its precautionary/target reference levels.

There is high confidence of not approaching targets or limits. Current fishing is very much less than either precautionary limits or targets (Wilderbuer and Nichol. 2007a).

Region	Stock	F_{abc}	Current F Relative to F_{abc}	Current Female Biomass Relative to B_{abc}
BSAI	Arrowtooth Flounder	0.24	0.03	5.2

Because this Performance Indicator scores ≥80 Criterion 1.1 is complete and Criterion 1.2 does not apply and so does not appear in the scoring table.

F relative to F_{ABC} shows expresses the current fishing rate compared to ABC fishing

The stock has a high probability of being consistently at or above its precautionary/target reference levels since biomass is more than five times the biomass estimate at ABC. Additionally, biomass trends clearly show increases over time.Thus, biomass has been consistently above precautionary targets.

SCORING INDICATORS	Comments	Weight	Score

1.3 *(MSC Criterion 3)*	**Fishing is conducted in a manner that does not alter the age or genetic structure or sex composition to a degree that impairs reproductive capacity.**		**33**	**82**
1.3.1	**Fishing activity maintains the age, genetic structure or sex composition of the stock to a degree that does not impair reproductive capacity.**		**100**	**82**
Weighting Commentary		All Performance Indicators within this sub-criterion are considered of equal significance.		
1.3.1.1		Is the age/sex/genetic structure of the stock monitored so as to detect any impairment of reproductive capacity?	**50**	**90**
60	There is some information available on the sub-population/sex/age structure of the stock, and the relationship of these to reproductive capacity. Some monitoring of age/sex and/or sub-populations is conducted and evaluated periodically.	Data are available on the sex and size structure, based on adequate sampling and verification from the observer program for these stocks, and the relationship of these to reproductive capacity. The data are included in the assessment models to indicate changes in recruitment age-structure and reproductive output, culminating in stock-recruitment relationships. Spatial attributes of the stock from the survey and fishery data does not suggest distinct genetic sub-populations. Monitoring is continuing to collect such information on a time scale appropriate to the species and fishery. Observed survey and age frequency data (see Section 4) are compared to the estimates from the population models to indicate the uncertainty in understanding of these factors (Wilderbuer and Nichol. 2007a). Estimates are available of the sex and size structure, based on adequate sampling. Sub-population studies have been carried out as appropriate. Monitoring is continuing to collect such information on a time scale appropriate to the species and fishery. There is reliable information on sex / age structure of the stock. Population structure is well estimated with only insignificant errors.		
80	Estimates are available of the sex and size structure, based on adequate sampling and verification for this stock, and the relationship of these to reproductive capacity. Genetic or sub-population studies have been carried out as appropriate. Monitoring is continuing to collect such information on a time scale appropriate to the species and fishery.			
100	There is comprehensive and reliable information on the sub-population /sex / age structure of the stock, and the relationship of these to reproductive capacity as well as evaluations of the implications of shifts in these parameters on productivity and management quantities. Population structure is well estimated with only insignificant errors. Genetic studies have been conducted.			

SCORING INDICATORS		Comments	Weight	Score
1.3.1.2		Does information indicate any changes in structure that would alter reproductive capacity?	**50.0**	**75**
60	Changes in stock structure have been detected but there is no evidence of negative effect on recruitment of the stock. Or potentially adverse changes in structure are identified and remedial measures are in the process of implementation over defined timeframes.	Baseline and subsequent routine stock structure analyses have not been conducted for these species that would permit structural change to be observed. Any changes in growth within part or all of the area may affect reproductive capacity, however, no temporal change in growth has been reported to date. Also, although seasonal selectivities are fitted, they are treated as constant over the period of the assessment model suggesting a fairly stable size/age structure in terms of proportions at age. While biomass and recruitment trends are positive, the stock-recruitment relationship is not well defined (low contrasts in data). The score would have been higher if there was an evaluation to show that the fishery had no harmful effects on stock structure in relation to reproductive capacity.		
80	Evidence exists that the fishery has not caused changes in stock structure that would affect recruitment. Or potentially adverse changes in structure are clearly identified and effective remedial measures are in place.			
100	Data strongly indicate a robust age, sex and genetic structure in the stock, such as would maintain reproductive capacity.			

SCORING INDICATORS	Comments	Weight	Score

Principle 2		**Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends**	**33.3**	**86**
2.1 *(MSC Criterion 1)*		**The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to trophic cascades or ecosystem state changes.**	**33.3**	**85**
2.1.1		**There is adequate understanding of ecosystem factors relevant to the distribution and life history strategy of the target species.**	**20**	**90**
Weighting Commentary		The three MSC Criteria are given equal weightings.		
2.1.1.1		Are the nature, sensitivity and distribution of habitats relevant to the fishing operations known?	**33.3**	**90**
60	Appropriate information exists but may not be comprehensive or up to date. The seasonal distribution of fishing operations is mapped.	Qualitative and some quantitative information is available on the diet of Arrowtooth flounder (*Atheresthes stomias*), and how this changes with age/size. The trophic position of the flatfish are known to a variable extent depending on species and life history stage. Generally the information is good. There is scope to improve the detail in a number of areas. The arrowtooth flounder, for example, is a high trophic level predator with nearly half of the adult diet comprising juvenile pollock (47%), adult pollock (19%) and euphausids (9%). Data from 1991 show the top three predators of large arrowtooth flounder (>30 cm) to be walleye pollock (29% of the total mortality), Alaska skate (21%) and sleeper shark (11%) (NPBSAI SAFE, 2007). The SAFE document series provides some time-series of information on the understanding of flatfish in the ecosystem. These and other data have been used to estimate trophic positions and the relative ecological importance of the various flatfish, including Arrowtooth flounder, as a target species		
80	Nature, sensitivity and distribution of all main habitats are known in adequate detail. Information is recent. The distribution of fishing operations is monitored.			
100	The nature, sensitivity and the distribution of all habitats relevant to the fishing operations are known in detail. Information is recent. The distribution of fishing operations and their effort is monitored, and an appropriate time series of information is available.			

SCORING INDICATORS		Comments	Weight	Score
2.1.1.2		Is information available on the trophic position, status and relationships of the target species within the food web?	**33.3**	**90**
60	Key prey, predators and competitors are known.	Qualitative and some quantitative information is available on the diet of Alaska plaice (*Pleuronectes quadrituberculatus*), and how this changes with age/size. The trophic position of Alaska plaice is generally good. There is scope to improve the detail in a number of areas. For example, Alaska plaice juvenile diet is rather poorly understood but the adult diet is well understood and the position of this species in the wider trophic framework is also relatively well understood with Alaska plaice forming a small component of the diets of Pacific cod, Pacific halibut and yellowfin sole compared to the other flatfish (NPBSAI SAFE, 2007). The SAFE document series provides some time-series of information on the understanding of flatfish in the ecosystem. These and other data have been used to estimate trophic positions and the relative ecological importance of the various flatfish, including Alaska plaice, as a target species, within the food web (Aydin *et a*l. 2007, NOAA TM 178).		
80	Appropriate information is available on the position, relationships and importance of target species in the environment at key life stages.			
100	Quantitative information is available on the position and importance of the target species and their relationships within the food web at key life stages.			

SCORING INDICATORS		Comments	Weight	Score
2.1.1.3		Is there information on the potential for the ecosystem to recover from fishery related impacts?	**33.3**	**90**
60	Those elements of the functioning of the ecosystem, most relevant to the fishery, are identified and generally understood. This allows some assessment of recovery potential to be made.	Ecosystem models of the BSAI have been constructed using data from a wide variety of sources. These models provide the basis for our understanding of the main elements of the structure and functioning of the ecosystem relevant to the fishery (Aydin *et al*. 2007). Essential fish habitat analyses have provided preliminary estimates of the recovery potential of soft and hard bottom habitats.		
80	The main elements of the functioning of the ecosystem, relevant to the fishery, have been documented and are understood, allowing reasonable assessment of recovery potential.	EFH studies and review of other work elsewhere in relation to bottom damage by trawls and recovery. Long-term Effect Indices for the effects of fishing on benthic EFH features indicate that the effects are mostly small and reversible (Table 4.3-1 and Appendix B, EFH EIS 2005). Recovery rate was assessed to be dependent upon substrates type, with hard substrate types having a significantly longer recovery time than soft substrates.		
100	Detailed information is available on the potential for affected elements of the ecosystem to recover from fishery related impacts.			

SCORING INDICATORS		Comments	Weight	Score
2.1.2	**General risk factors are adequately determined.**		**20**	**81**
Weighting Commentary				
2.1.2.1		Is information available on the nature and extent of the by-catch (capture of non-target species)?	**30**	**80**
60	The main non-target species affected have been identified and qualitative information is available on significant by-catch.	The Observer Program routinely collects quantitative information on non-target species directly affected by the fishery, especially the fish and shellfish (See Table 10 in Section 7.6 above). For the more frequently affected non-target species, data from sampling is considered sufficient to estimate by-catch rate with reasonable precision. Estimates of by-catch of PSC are assessed annually in the SAFE. Biomass estimates of many key biomass species, including skates and sculpins. There have been a number of *ad hoc* studies by, for example, Melvin *et al*. on various Alaskan fisheries that provide considerable information about seabird by-catch and mitigation. A higher score is achievable through, for example, improving the range and quality of the information available about by-catch species, especially those where fishery related impacts may be expected to be greatest, such as with the elasmobranches. Research is underway to identify seabirds from body parts, which will assist in reducing the unidentified component of seabird mortalities. Impacts and acceptable limits have been estimated for protected species, such as short tailed albatross, but have not been determined for other impacted birds such as the Northern fulmar.		
80	Information is available on non-target species directly affected by the fishery including their distribution and/or ecology. Quantitative information is available on significant by-catch. If obtained by sampling, this is considered sufficient to provide adequate information.			
100	Information is available on all non-target species directly affected by the fishery including the distribution and ecology. Accurate records are kept on the nature and extent of all by-catch species including species size and sex composition.			

SCORING INDICATORS		Comments	Weight	Score
2.1.2.2		Is information available on the extent of discard and slippage (where a part or the total catch may be deliberately released without being hauled aboard due to, for example, the catch of the wrong species or high grading)?	**30**	**90**
60	Information is available to estimate the extent of discarding and slippage, including an assessment of the main species represented.	The Observer Program allows routine estimates of discards in the flatfish trawl fisheries. Compliance is monitored through the Observer Program. The high level of knowledge has enabled regulatory controls to be implemented to monitor and control the most important aspects of by-catch in the flatfish fisheries of invertebrates, fish, marine mammals, reptiles, and birds. There appears to be no data about the levels of slippage in the fishery. Anecdotal reports suggest that slippage does not occur within the fishery to any significant extent. No stakeholders raised slippage as a cause for concern in this fishery. The information available permits slippage to be estimated as negligible and interpreted as having no material effect on the stock, thus meeting the 80 guidepost. A higher score is justified based on the availability of observer data to validate the lack of slippage, however, incomplete observer coverage and lack of records of the low level of slippage leaves some room for improvement hence the score of 90.		
80	Information is available to allow appropriate estimates of discard and slippage to be calculated and interpreted.			
100	Accurate and verifiable information is available on the extent of all discards and slippage (by age/size), and the consequences of these. Or the entire catch is landed.			

SCORING INDICATORS		Comments	Weight	Score
2.1.2.3		Is information available on other unobserved fishing mortality on target or other species?	**18**	**80**
60	Sources of potential unobserved mortality have been identified.	Unobserved mortality derived from fishing activities is often difficult to study and therefore to understand and control. The impacts of trawl gear on unobserved mortality of the target species will mostly be through damage to smaller individuals that pass through the meshes of the net. Studies have been conducted on this for a large number of different species around the world (see for example, FAO Fisheries Technical Paper 478; Suuronen 2004 Fisheries Research 71, 151-163.; Ingólfsson *et. al.* 2007 ICES J. of Marine Science 64, 1836-1844**).** Given its mobility and contact with the bottom, demersal trawling is understood to have greater impact on demersal organisms than most other gears. Mortality of non-target benthos is likely to be directly related to the area trawled and the type of benthic community. Information on the types of benthos at risk is available (for larger benthos) from data collected during fisheries and other research surveys. Estimates of the Long-term Effects Indices (LEI) from the EIS EFH suggests that the level of unobserved mortality on benthos and the benthic environment will mostly be small and effects temporary. Some specific studies have been carried out, e.g. for red king crab (Rose, 1999. Marine Fisheries Review 72-76) and more are in progress (NPRB Project # R711: Quantification of unobserved injury and mortality of Bering Sea crabs due to encounters with trawls on the seafloor). There is considerable aerial and other surveillance/enforcement activity focussed on Alaskan and surrounding waters that would define the level of illegal, unreported and unregulated (IUU) fishing. As there appear to be no reports of IUU activity, it is considered that IUU mortality is negligible.		
80	Information is available to allow estimates to be made of unobserved mortality.			
100	Information is available to allow quantitative estimates to be made.			

SCORING INDICATORS	Comments	Weight	Score

2.1.3		There is adequate knowledge of the effects of gear-use on the receiving ecosystem and extent and type of gear losses.	20	83
Weighting Commentary		All performance indicators were given equal weighting.		
2.1.3.1		Is there adequate knowledge of the physical impacts on the habitat due to use of gear?	**50**	**85**
60	Main impacts of gear use on the habitat are identified including extent, timing and location of use.	Essential fish habitat (EFH) studies have examined the impact of trawl gear on the physical structure of the seabed according to the different habitat types. This approach has attempted to define both the effect of, and recovery from, impacts. Long-term Effect Indices for the effects of fishing on benthic EFH features indicate that the effects are mostly small and reversible (Table 4.3-1 and Appendix B, EFH EIS 2005). Recovery rate was assessed to be dependent upon substrates type, with hard substrate types having a significantly longer recovery time than soft substrates. As a contrast to this local information there is a growing literature from other parts of the world looking at the benthic impacts of fishing and recovery rates which can be used as a basis for comparative or extrapolation studies (Dernie *et al.*, 2003; Collie *et al.*, 2004).		
80	All impacts of gear use on the habitat are adequately identified including extent, timing and location of use.			
100	The physical impacts on the habitat due to use of gear have been studied and quantified, including details of any irreversible changes.			

SCORING INDICATORS		Comments	Weight	Score
2.1.3.2		Is any gear lost during fishing operations and can 'ghost fishing' occur?	**50**	**75**
60	Some recording of gear losses takes place and an assessment can be made of ecosystem impacts, including possible 'ghost fishing'.	Although lost gear may be noted in vessel logbooks, there appears to be no formal recording or collating of when and where trawl gear is lost. However, given the high cost of trawl gear, every attempt is made to grapple and retrieve lost gear. Impacts of lost trawl gear are likely to be minimal in terms of ghost fishing. The amount of gear lost is likely to be small but cannot be quantified. Overall although little information is available, the relationship between typical levels of lost trawl gear in trawl fisheries and the very low impact of lost trawl gear strongly suggests that there will be no measurable effects from gear loss.		
80	There is knowledge of the type, quantity and location of gear lost during fishing operations. Estimates can be made on the extent of adverse effects, including 'ghost fishing'. Estimates made show that losses do not cause unacceptable impacts on the ecosystem			
100	There is detailed knowledge of the type, quantity and location of gear types lost during fishing operations. The impact of gear loss on habitat, target and non-target species has been well estimated or recorded. The effect of gear loss on target and non-target species has been measured and shown to have negligible effects on habitats, ecosystems or species of concern.			

SCORING INDICATORS		Comments	Weight	Score
2.1.4		**Strategies have been developed within the fisheries management system to address and restrain any significant negative impacts of the fishery on the ecosystem**	**20**	**87**
Weighting Commentary		All the performance indicators are weighted the same.		
2.1.4.1		Levels of acceptable impact are determined and reviewed.	**25**	**80**
60	There is sufficient information to determine acceptable impacts for main target and non-target species and habitats.	Ecosystem considerations are reviewed annually in the "Ecosystem Considerations" SAFE report and are also updated in the FMP. The potential for significant negative effects of the fishery has been extensively assessed in the analysis of essential fish habitat (EFH EIS) and ongoing ecosystem modelling (e.g. Aydin *et al*. 2007). Impacts and acceptable limits have been estimated for key species (e.g. for some protected species), raising the score above the 80 guidepost. The Observer Program also collects information to estimate impacts of fisheries on essential fish habitat and non-target species. Areas where improvement could be made exist, specifically in relation to approaches to reduce interactions with seabirds, for example, Northern fulmars make up a significant proportion of seabirds killed in the trawl fisheries and effective approaches to reduce this should be sought and implemented.		
80	Levels of acceptable impacts (e.g. biological reference points) for key aspects of the ecosystem within main fishing areas have been estimated and are regularly reviewed.			
100	Levels of acceptable impact for key populations (such as of indicator species) and habitats have been accurately estimated and are subject to frequent review.			

SCORING INDICATORS		Comments	Weight	Score
2.1.4.2		Are management strategies in place to address impact identification and avoidance/reduction?	**100**	**85**
60	Management strategies include some appropriate consideration of ecosystem impact identification and avoidance/reduction, but may not be tested.	The FMP contains a number of elements to address the identification of impacts from fisheries and to avoid or reduce identified impacts (BSAI FMP 2008). These measures include the use of seasonal and spatial closed areas to reduce or avoid impacts on habitats for fish (spawning areas, nursery areas), seabirds (close to breeding colony locations), and marine mammals (rookery, haul out sites and adjacent foraging areas). These elements are supported by the EFH EIS analyses and ecosystem modelling (e.g., Aydin *et al*. 2007). The use of bottom contact gear is prohibited in the Aleutian Islands Coral and Alaska Seamount Habitat Protection Areas year-round. Pacific halibut, Pacific herring, Pacific salmon and steelhead, king crab, and Tanner crab are prohibited species and must be returned to the sea with a minimum of injury except when their retention is authorized by other applicable law. Habitat areas of particular concern (HAPCs) are specific sites within EFH that are of particular ecological importance to the long-term sustainability of managed species. The following areas have been designated in the BSAI management area: • Bowers Ridge Habitat Conservation Zone (Bowers Ridge and Ulm Plateau) • Alaska Seamount Habitat Protection Area (Bowers Seamount). The Observer Program also collects information to estimate impacts of fisheries on essential fish habitat and non-target species.		
80	Management strategies are in place to detect and reduce ecosystem impacts, although these may not have been fully tested. These are designed to adequately protect key aspects of the ecosystem within main fishing areas.			
100	Management strategies are in place to monitor, detect and reduce impacts. These are designed to adequately protect ecosystems, habitats and populations of target and non-target species and keep impacts within determined acceptable levels.			

SCORING INDICATORS		Comments	Weight	Score
2.1.5		**Assessments of impacts associated with the fishery including the significance and risk of each impact, show no unacceptable impacts on the ecosystem structure and/or function, on habitats or on the populations of associated species.**	**20**	**83**
Weighting Commentary		All the performance indicators are weighted the same.		
2.1.5.1		Does the removal of target stocks have unacceptable impacts on ecosystem structure and function? **If there is evidence of depletion of non-target species, then Criteria 2.3 should also be addressed.**	**25**	**90**
60	The removal of target stocks could lead to impacts upon ecological systems (applying the precautionary approach where necessary). A program is in development to identify these and, if appropriate, reduce these to acceptable, defined limits.	There has been substantive research on the impacts of removals of the target stock on the ecosystem and specific species through ecosystem modelling and the EFH approach (BSAI FMP 2008). Some specific resources that have key ecosystem functions are protected. These include, for example, the forage fish species. There are also catch controls in place to limit catches which will have a secondary effect of limiting some potential ecosystem interactions. These include the overall regional groundfish cap (OY) of 2 million metric tonnes which limits ecosystem impacts of the fishing sector as a whole on ecosystem function. The fishery TACs are generally well below the ABC for most species/stocks. Also, catches are not infrequently below the TAC. A limit on by-catch of 5% of target species TAC is set to provide protection to non-target species which will also provide some protection to ecosystem structure and function (BSAI FMP 2008). Aydin *et al*. (2007) present evidence for the impacts of this fishery on the ecosystem and its sustainability.		
80	Sufficient information is available on consequences of current levels of removal of target species to suggest no unacceptable impacts of the fishery on ecological systems within major fishing areas.			
100	The ecological consequences of current levels of removal of target stocks has been quantified and documented to be within acceptable, pre-determined, limits.			

SCORING INDICATORS		Comments	Weight	Score
2.1.5.2		Does the removal of non-target stocks have unacceptable impacts on ecosystem structure and function? **If there is evidence of depletion of non-target species, then Criteria 2.3 should also be addressed.**	**25**	**85**
60	The removal of non-target stocks could lead to impacts upon ecological systems (applying the precautionary approach where necessary). A program is in development to identify these and, if appropriate, reduce these to acceptable, defined limits.	There is no general evidence of significant depletion of non-target species by the fishery based on the observed levels of by-catch, ecosystem studies, by-catch studies and, for some species, direct assessment of population size. Specific species of concern, due to low population numbers, restricted breeding sites, low reproductive rates and/or slow growth rates would typically include deepwater species of fish and large, late maturing seabirds. Adequate information is available for most of these species e.g. grenadiers, which are defined as not depleted in the SAFE 2007. Some species may be being more impacted than desirable (e.g. some seabirds, some sharks, rays and sculpin) and further data and analyses on these would be desirable but there is no suggestion that the fishery impact on these species is adversely affecting ecosystem structure or function. For example, the annual by-catch of sculpin in the BSAI ranges between 1-4 percent of annual survey biomass estimates, however little is known of the species breakdown of this by-catch (BSAI FMP 2008), such losses do, however, need to be balanced against, the reduced predation of these species by some of the flatfish species as a direct effect of the removal of flatfish in the trawl fishery.		
80	Sufficient information is available on consequences of current levels of removal of non-target species to suggest no unacceptable impacts of the fishery on ecological systems within major fishing areas.			
100	The ecological consequences of current levels of removal of non-target stocks has been quantified and documented to be within acceptable, pre-determined, limits.			

SCORING INDICATORS		Comments	Weight	Score
2.1.5.3		Does the fishery have unacceptable impacts on habitat structure? **(Management measures related to habitat are considered under Principle 3)**	**25**	**90**
60	There is no evidence that the fishery is having unacceptable impacts, further work is planned or underway if appropriate.	Bottom trawling inevitably impacts habitat structure. Mitigation is established to limit significant impacts. This has been addressed though the EFH EIS studies and analyses. Substantial areas are protected from bottom trawling covering all habitat types and especially vulnerable habitats/communities such as the coral 'gardens' of the Aleutian Islands, Bowers Ridge and Aleutian Islands habitat conservation zones (BSAI FMP 2008). Restrictions on extending the trawl footprint have also been introduced recently (2007) (BSAI Groundfish Management Plan (http://www.fakr.noaa.gov/npfmc/fmp/bsai/bsai.htm); see also figures 7 and 8 in Section 6.7.7 above). The EFH EIS documents provide a review of the available knowledge about the habitat needs of the species required for spawning/breeding, adult feeding, growth to maturity for juveniles. Also presented are the evaluation of effects though long-term effect indices and issues such as overlap between key feeding and high intensity fishing areas, the state of knowledge is clearly stated, other comparative studies from other regions are correctly drawn upon, and summary effects are presented for each issue. Taken together, the knowledge of some of the impacts on key aspects of habitat structure and the protection of significant areas of habitat from bottom trawling clearly provides for in some elements of the 100 guidepost in that the known effects are well documented and also that this are within acceptable justified limits. These analyses make some assumptions which have not been verified but represent a substantial body of evidence.		
80	Appropriate information is available on the effects of the fishery on habitat within major fishing areas. This indicates no unacceptable impacts.			
100	Effects on habitat structure are well documented and are within acceptable tested/justified limits.			

SCORING INDICATORS		Comments	Weight	Score
2.1.5.4		Are associated biological diversity, community structure and productivity affected to unacceptable levels? **If there is evidence of depletion of non-target species, then Criteria 2.3 should also be addressed.**	**25**	**80**
60	There is no evidence that the fishery is having unacceptable impacts, further work is planned or underway if appropriate.	Based on substantive and extensive ecosystem studies, supported by the overall 2 million mt regional removals cap, secondary removal limits (ABCs & TACs) as well as a extensive network of closed areas and MPAs, trophic impacts are not considered unacceptable. Benthic communities are not indicative of significant impacts, with on-going monitoring through the research surveys but some elements require further determination. There is extensive protection of benthic habitats through the application of MPAs and closed areas both for protection of the benthic communities and also for crab, other fish, bird and mammal species (see figures 7 and 8 in Section 6.7.7 above). By-catches (including non-target species) are not indicative of significant impacts, but some elements require further determination. Modelling studies (Aydin *et al.* 2007) indicate that other predators are not significantly affected by changes in the survival of most prey species. Impacts on biological diversity, community structure and productivity appear acceptable and reversible.		
80	Appropriate information is available on the effects of the fishery on biological diversity, community structure and productivity. This indicates no unacceptable impacts.			
100	The effects of the fishery on biological diversity, community structure and productivity have been quantified and are within acceptable tested/justified limits.			

SCORING INDICATORS		Comments	Weight	Score
2.2 *(MSC Criterion 2)*		**The fishery is conducted in a manner that does not threaten biological diversity (at the genetic, species or population levels and avoids or minimises mortality of, or injuries to endangered, threatened or protected species.**	**32.4**	**86**
2.2.1		**Fishing is conducted in a manner, which does not have unacceptable impacts on recognised protected, endangered or threatened species.**	**50.0**	**85**
Weighting Commentary		All performance indicators are weighted the same		
2.2.1.1		Is there information on the presence and populations of protected, endangered or threatened (PET) species?	**33.3**	**90**
60	There is a program in place to identify protected, threatened and endangered species directly related to the fishery. There is periodic monitoring of the main population trends and status of protected, endangered and threatened species.	The 80 scoring guidepost is clearly met as PET species in the BSAI management area are identified (listed below) and at www.nmfs.noaa.gov/pr/species/. They are protected under the Endangered Species Act (ESA), the Migratory Bird Treaty Act and the Marine Mammal Protection Act. Beluga whale, killer whale, blue whale, bowhead whale, fin whale, humpback whale, north Pacific right whale, sei whale, sperm whale, Steller sea lion, northern fur seal, short-tailed albatross, spectacled eider, Steller's eider, northern sea otter, Pacific leatherback turtle, Chinook Salmon. Also, there is regular monitoring of key species including, for example, the short-tailed albatross (see below) and Stellar sea lions. (http://dels.nas.edu/dels/rpt_briefs/steller_sea_lions_final.pdf) . The flatfish trawl fisheries have the potential to interact with four threatened or endangered species: the short-tailed albatross (*Phoebastria albatrus*), the Steller's eider (*Polysticta stelleri*), Steller sea lion (*Eumetopias jubatus*) and Northern fur seal (*Callorhinus ursinus*). Adequate information on the presence and populations of these species is collected and available. There is information on the species and distribution of elasmobranches, as well as on-going research examining trends in catches and relative abundance (Tribuzio *et al*. 2008). Combined skate biomass in Alaskan waters is reported to have been increasing over the last 15 to 20 years (GOA FMP 2005) but concern about the paucity of information on biomass and catches for some elasmobranch species has been identified as potentially important (Aydin *et al*. 2007). Some elements of the 100 guidepost are also met as populations of most species of PET species are regularly monitored either locally, regionally or globally and many are supported by appropriate research and intervention programmes. For example, the short-tailed albatross has a history or population assessments, occurrence and breeding distributions, adult breeding, egg and chick numbers at indictor locations, all supporting the current U.S. Fish and Wildlife Service Short-Tailed Albatross Recovery Plan (http://alaska.fws.gov/fisheries/endangered/pdf/stal_recovery_plan.pdf).		
80	All protected, threatened and endangered species significantly related to the fishery have been identified. Populations of key species are monitored on a regular basis.			
100	There is knowledge of all populations of protected species directly or indirectly related to the fishery including their dynamics. Regular monitoring of protected, endangered and threatened species is undertaken, supported by research programmes to assess threats and promote their conservation. The type and distribution of critical habitats have been identified.			

SCORING INDICATORS		Comments	Weight	Score
2.2.1.2		Are interactions of the fishery with such species adequately determined?	**33.3**	**75**
60	The main interactions directly related to the fishery are known.	Because of separation of feeding areas and the fishery, interactions between the fishery and the threatened Steller's eider is considered to be negligible. On average 3.35 Steller sea lions are taken in the flatfish fisheries per year (NOAA 2007). Adequate quantitative estimates are made of the effects of interactions directly related to the fishery with mammals & the short-tailed albatross. Disturbance competition and by-catch are also understood for mammals, and exclusion zones around breeding sites and haulout sites exist based on foraging and disturbance studies. The inter-actions of seabirds and the trawl fishery have been reasonably well studied and documented (e.g. Zador *et al*. 2008). There have also been a number of *ad hoc* studies by, for example, Melvin *et al*. on various Alaskan fisheries that provide considerable information about seabird by-catch and mitigation. The score is lower than otherwise on competition quantification and incomplete incidental mortality recording (especially seabirds). Much effort has been directed at understanding the interactions of seabirds with other fisheries, notably the long-line fisheries, in the region but bird strikes in gears and vessels by species are incompletely recorded (PSEIS). The interactions of the trawl fisheries with seabirds needs better quantitative definition, especially in the extent of the net sonde (third) cable in causing injury and mortality.		
80	Adequate quantitative estimates are made of the effects of interactions directly related to the fishery.			
100	Reliable quantitative estimates are made of the interactions of all populations directly related to the fishery, and qualitative information is available on indirect impacts. Incidental mortalities are recorded and reported.			

SCORING INDICATORS		Comments	Weight	Score
2.2.1.3		Do interactions pose an unacceptable risk to such species?	**33.3**	**85**
60	Known effects are within acceptable limits of national and international legislative requirements and are believed to create no biological threats to the species concerned.	The flatfish trawl fisheries interact with the endangered western stock of Steller sea lions in two ways: by competing for prey and through incidental by-catch mortality (NOAA 2009). Aydin *et al*. (2007) and NOAA 2009 review the regional predator-prey interactions and conclude that flatfish are not a significant element in the diet of Steller seas lions and thus there is unlikely to be significant competition between the sea lions and trawl fishery for flatfish. Designated aquatic critical habitat for the eastern stock of the Steller sea lion consists of the areas within 3,000 ft (0.9 km) of designated rookeries and haulout sites. Mortalities of sea lions due to fishing activities are monitored in a number of ways, including through the onboard Observer Program. No mortalities were recorded between 2002 and 2005 (TM-180). Between 2000 and 2004, the Kenai-Kiska and western Alaska population trend site counts of non-pup Steller sea lions increased by 12% (Fritz and Stinchcomb 2005). However, counts in the eastern AI showed no trend between 1990 and 2004, suggesting that western Steller sea lions in the core of their Alaskan range may currently be oscillating around a new lower mean level (SSL recovery plan 2008). On average 3.35 Steller sea lions are taken in the flatfish fisheries per year (NOAA 2007). Monitoring is conducted on appropriate timescales for most PET species. For example, there are reporting schedules for all vessels interacting with certain PET species, also the observer program specifically records and reports interactions. Such information permits the level of interaction to be evaluated, as for the Stellar sea lion on an annual basis (NOAA 2007). Aydin *et al*. (2007) presents evidence for the lack of significant negative effects on top predators of fish removal by the various fisheries. Northern fur seals were listed as depleted under the MMPA in 1988. During 1998-2004, pup production on the Pribilofs declined 6.2% per year on St. Paul Island and 4.5% per year on St. George Island. Fisheries regulations were implemented in 1994 (50 CFR 679.22(a) (6)) to create a Pribilof Islands Area Habitat Conservation Zone, in part, to protect the Northern fur seals. There is little evidence that the flatfish trawl fisheries have any negative impact on the fur seal population with only about 8% of their diet being flatfish in the EBS and less elsewhere (Aydin *et al*. (2007)). An analyses of the impact of trawl mortality on the short-tailed albatross suggests that exceeding the current expected incidental take in the Alaskan groundfish trawl fishery by as much as a factor of 10 would have little impact on the proposed recovery goals for the species are achieved (Zador *et al*. 2008). The population of this albatross has been increasing and its status was changed from endangered to vulnerable by the IUCN in 2000 (http://www.iucnredlist.org/apps/redlist/details/144903/0). The direct and indirect effects of the fishery on some PET species are demonstrated to be within acceptable limits. For example, the effects of the fishery on the short-tailed albatross have been shown to be within acceptable limits by Aydin *et al.* (2007) for indirect interactions and Zador *et al.* (2008) for direct mortality. This justifies a score in excess of 80. A higher score is achievable with improvements in demonstration of lack of direct and indirect impacts by the fishery on a wider range of PET species and species groups.		
80	Critical interactions (which could be direct or indirect effects) are well estimated. Available information shows interactions to be below a level which poses a significant additional risk to PET species. Interactions are monitored at appropriate intervals.			
100	It is established that the direct and indirect effects of fishing on threatened and endangered species are within acceptable pre-defined limits.			

SCORING INDICATORS		Comments	Weight	Score
2.2.2	**Strategies have been developed within the fisheries management system to address and restrain any significant impacts of the fishery on protected, endangered or threatened species.**		**50.0**	**90**
2.2.2.1		Are management objectives and accompanying strategies in place in relation to impact identification and avoidance/reduction?	**100**	**90**
60	Management systems are in place to address key areas of impact identification and avoidance/reduction.	There is a well developed approach to the management of interaction between the fishery and PET species. This includes for example, the very clear objectives in this regard in the FMP; the detailed objectives of the Observer Program; the development and application of seabird by-catch and incidental catch reduction actions (e.g. tori lines); on–going seabird take reduction research (Dietrich *et al.* 2007); MPAs and closed areas around sea lion rookeries; and seabird research plans under the PSEIS. A number of these management objectives are thoroughly tested through long-term use in both this region and elsewhere in the world thus meeting some elements of the 100 scoring guidepost. For example, the objectives of observer programmes to both reduce and monitor specific by-catch are well tested worldwide in many different fisheries also the effectiveness of applying certain management measures as part of a broader strategy to reduced specific interactions such as bird strikes through the deployment of tori lines, with appropriate penalties for non-compliance and have also been thoroughly tested and found to have significant benefits in reducing negative interactions.		
80	Management objectives are set to detect and reduce impacts. Accompanying strategies are designed to adequately protect recognised protected, endangered or threatened species.			
100	Tested management objectives are set to detect and reduce impacts. Accompanying strategies are designed to adequately protect recognised protected, endangered or threatened species.			

SCORING INDICATORS	Comments	Weight	Score

2.3 *(MSC Criterion 3)*		**Where exploited populations (of non-target species) are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level within specified time frames, consistent with the precautionary approach and considering the ability of the population to produce long-term potential yields.**	**35.3**	**81**
2.3.1		**There are management measures in place that allow for the rebuilding of affected populations.**		
Weighting Commentary				
2.3.1.1		Is there sufficient information to allow determination of necessary changes in fishery management to allow recovery of depleted populations?		
60	There is some information on functional relationships, sufficient to allow alterations to be made to fishing to recover and rebuild depleted species.	This MSC Criterion and associated Performance Indicators are not scored as there are no depleted populations of non target species that are exploited by this fishery.		
80	There is adequate information, combined with a precautionary approach wherever necessary, to allow alterations to be made to fishing that would be expected to recover and rebuild depleted species to specified levels within appropriate timeframes.			
100	There is a clear understanding of functional relationships between the impacted population and the fishery. Intervention measures based on this understanding have been tested and /or are known to be effective in promoting recovery of depleted species to specified levels within appropriate timeframes.			

SCORING INDICATORS	Comments	Weight	Score

Principle 3		**The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable**	**33.3**	**93**
3.A		**Management System Criteria**	**50**	**91**
3A.1 (*MSC Principle 3 Intent and Criterion 3*)		**A management system containing an institutional and operational framework exists with clear lines of responsibility.**	**12.5**	**97**
Weighting Commentary		Under sub-criterion 3A.1, external review was given a slightly lower weighting than the other performance indicators.		
3A.1.1		Are organisations with management responsibility clearly defined including areas of responsibility and interactions?	**25.8**	**100**
60	Organisations with management responsibility are known. Responsibilities and interactions require clarification and occasional issues may arise.	Management authorities, responsibilities and interactions are clearly defined. Management of the BSAI flatfish fisheries is carried out under the ultimate authority of the Magnuson Stevens Fishery Conservation and Management Act, first passed in 1976 and most recently reauthorized in 2006. Under the Act, the North Pacific Fishery Management Council recommends management actions to the National Marine Fisheries Service (NOAA Fisheries) for approval. Ultimate decision authority is placed with the Secretary of Commerce. These management authorities are clearly defined in law and are functional. Evidence suggests that working relations between the Council and NMFS are strong and effective. The Council and State Board of Fisheries (BOF) meet annually in February. The Council and Board also support a six-member joint protocol committee (three members from each body) which meets biannually to discuss issues of joint concern. In addition, the BOF forms ad hoc committees to address special regulatory issues as they arise, for example the Task Force on BS/AI Crab Rationalization. The Alaska Board of Fisheries has management authority for fisheries in state waters (0-3 miles from shore). The Board develops regulations and makes allocation decisions that become the responsibility of the Alaska Department of Fish and Game to implement. At present there are no parallel or state-managed flatfish fisheries for yellowfin sole, flathead sole, arrowtooth flounder, Alaska plaice or northern rock sole in the BSAI region (ADFG 2008; NPFMC 2008a). State and Federal management authorities coordinate actions through the NPFMC. NPFMC structure and function is clearly defined through law and through Council Operating Procedures (COPs). The BSAI Groundfish FMP enables formal consultations and coordination with State of Alaska fisheries. The Council meets with the State Board of Fisheries annually in February. The Council/Board of Fisheries Joint Protocol Committee meet twice per year to discuss issues of joint concern. Enforcement action is carried out by NMFS, the US Coast Guard and the Alaska Department of Fish and Game. The US Fish and Wildlife Service, the US Coast Guard, the Pacific States Marine Fisheries Commission, the US Department of State, and the state fishery management agencies are cooperating but non-voting agencies on the NPFMC.		
80	Organisations with management responsibility have been defined including key areas of responsibility and interaction. In general, interactions are effective and operate without serious difficulties.			

SCORING INDICATORS		Comments	Weight	Score
100	Organisations with management responsibility are clearly defined including all areas of responsibility and interaction. Interactions are demonstrably effective.	The fishery takes place under clearly specified Federal and State management jurisdictions. Interactions between State and Federal authorities, and among Federal entities, appear to be well coordinated and effective.		

SCORING INDICATORS		Comments	Weight	Score
3A.1.2		Is the management system consistent with the cultural context, scale and intensity of the fishery?	**25.8**	**90**
60	Inconsistencies arise in some key areas but a programme is in place to address these.	The management system is consistent with the cultural context, scale and intensity of the fishery which includes native, State and Federal components. In recent years it has expanded in complexity to better represent the array of fishery interests. The flatfish fisheries are part of the larger Alaskan groundfish fishery. North Pacific fisheries constitute an important economic and environmental resource, comprising a large proportion of total U.S. fisheries production. The flatfish TACs for the AI region are allocated among the CDQ and other federal fisheries and by gear type. There are no direct allocations of flatfish species TACs to the State guideline harvest level in State waters of the Aleutian Islands subarea. For Aleutian Islands Pacific ocean perch, flathead sole, rock sole and yellowfin sole: After subtraction of the CDQ allowance, and incidental catch amount, the remaining TAC is apportioned among vessels using trawl gear. Amendment 80 allocates a portion of TACs for Atka mackerel, Pacific ocean perch, yellowfin sole, rock sole and flathead sole as well as PSC quota for halibut and crab to the Amendment 80 sector. These allocations are issued annually as quota share to individual vessels, based on catch history. Allocations of target species to the Amendment 80 sector are: • Flathead sole (100%) • Rock sole (100%) • Yellowfin sole (up to 93% depending on overall TAC) • Atka mackerel (90-100% TAC, by subarea) • Aleutian Islands Pacific ocean perch (90-98% by subarea) (NPFMC 2008d) At the state level the Board of Fisheries (BOF) includes several community-level Advisory Committees that communicate local issues and perspectives on regulatory changes. The Advisory Committee structure allows input regarding cultural aspects of fisheries management to be provided to the BOF by tribal organizations, village councils, elder councils. Objectives 35-37 of the BSAI Groundfish FMP pertain to increasing consultation with Alaska Natives and Communities. The Council's 2008 work plan includes two tasks related to enhancing this consultation: to develop a protocol or strategy for improving the Alaska Native and community consultation process; and to develop a method for the systematic documentation of Alaska Native and community participation in the development of management actions.		
80	The system is consistent with key elements of the cultural context, scale and intensity of the fishery.			
100	The system is entirely consistent with the cultural context, scale and intensity of the fishery.			

SCORING INDICATORS		Comments	Weight	Score
3A.1.3		Is the management system subject to internal review?	**25.8**	**100**
60	There are mechanisms in place to allow for internal review.	Establishment of quotas results from recommendations submitted to the Council by the scientific staff of the NMFS based on the results of comprehensive stock assessment surveys and observer collection of catch data. The NMFS scientists' recommendations are reviewed by the Council's Scientific and Statistical Committee composed of peer review scientists and the Advisory Panel composed of stakeholders. Their recommendations are passed (at times with suggested changes) to the Council for consideration and the final setting of TACs, prohibited species by-catch limits, and time/area closures for protection of species of concern. Public debate and discussions of the recommendations take place at Council meetings along with consideration of written commentary. Thus, there exists an on-going regular and frequent system of internal review of the biological and economic base of management conducted on an annual cycle. AFSC staff presented evidence that stock assessment methodology is subject to continuous internal review and evaluation. Monitoring and evaluation of model performance (predictions) are on-going. As part of the regional fishery management process, the results of on-going scientific review and evaluation of management performance are made public.		
80	The management system is subject to internal review at appropriate intervals. Monitoring and evaluation are responsive to reviews. The major components of the management system are subject to internal performance review and evaluation at appropriate intervals. Results of on-going evaluation of management performance are made public. Evaluation results demonstrate that the management system shows improvements.			
100	The management system is subject to regular and frequent internal performance review. This includes evidence that the assessment methodology has been evaluated extensively and that any recommended changes have been made. Monitoring and evaluation are ongoing and improvements quickly tested and implemented. Results of on-going evaluation of management performance are made public.			

SCORING INDICATORS		Comments	Weight	Score
3A.1.4		Is the management system subject to external review?	**22.7**	**100**
60	There are mechanisms in place to allow for external review.	The NPFMC system conducts regular reviews of the groundfish fisheries during which external parties have full opportunity for critical comment. Reviews of FMP amendments include input from the Scientific and Statistical Committee (SSC), the Advisory Panel (AP), external scientists, industry, environmental NGOs, and the general public. The Plan Team solicits peer reviews of stock assessments and its meetings consider outside views regarding its analyses. For the U.S. as a whole, legal challenges to Council and NMFS management decisions regarding the groundfish fisheries have often required managers to explain and justify their management actions. Agencies such as the Government Accountability Office (GAO) have conducted a number of intensive reviews of the federal fisheries management process. Congressional committees have conducted oversight and legislative hearings regarding the region's fisheries and the Magnusson/Stevens Act (MSA) itself is subject to periodic review. The Council and NMFS frequently turn to outside sources for technical advice, particularly regarding scientific matters and monitoring issues. For example, a panel of seven distinguished outside scientists conducted a review of the Alaskan groundfish fisheries directed toward describing current management strategies, determining whether the current quota setting approach was consistent with the MSA and if it was considerate of ecosystem needs (Goodman *et al*. 2002). The NMFS AFSC makes regular use of the Center for Independent Experts (CIE) to conduct reviews of stock assessments. The team concludes that the management system has mechanisms in place for external review, and uses them on a regular basis. Monitoring and evaluation are an ongoing process. Examples of review recommendations that have been tested are implemented.		
80	The management system is subject to external review at appropriate intervals. Monitoring and evaluation are responsive to reviews. Results of the reviews are made public.			
100	The management system is subject to regular and frequent external review. Monitoring and evaluation are ongoing and improvements quickly tested and implemented. Results of on-going evaluation of management performance are made public.			

SCORING INDICATORS	Comments	Weight	Score

3 A.2 (*MSC Criteria 1, 2, 4*)	**The management system has a clear legal basis.**		**11.9**	**98**
Weighting Commentary		All the performance indicators were given equal weighting		
3A.2.1		Is the fishery consistent with International Conventions and Agreements?	**33.3**	**100**
60	The management system operates under relevant international conventions and agreements, but some management actions may be questionable in relation to the terms of these.	The flatfish fisheries are conducted within the U.S. 200-mile EEZ. The fisheries are conducted in a manner consistent with provisions of the U.N. Convention of the Law of the Sea (UNCLOS), the Agreement for the Implementation of the Provisions of the United Nations Convention on the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks and the U.N. FAO Code of Conduct. The fisheries are also governed by the U.S. High Seas Fishing Compliance Act of 1995. This federal legislation implements the U.N. Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas. The management of the fishery complies with the Migratory Bird Act Treaty and the Council and NMFS have instituted a number of regulations to further reduce seabird interactions in the fishery that comply with the U.N. "global seabird avoidance plan." There is an international treaty organization that manages Pacific halibut resources for the U.S. and Canada. The flatfish fisheries are managed to comply with agreed upon allowable levels of by-catch of Pacific halibut according to the International Pacific Halibut Commission (IPHC).		
80	The management system is generally consistent with relevant international conventions and agreements. The management system does not operate under any controversial exemption to an international fisheries or environment-related agreement.			
100	The management system is demonstrably compliant with all relevant international conventions and agreements.			

SCORING INDICATORS		Comments	Weight	Score
3A.2.2		Is the fishery consistent with national legislation?	**33.3**	**100**
60	The management system operates under relevant national legislation, but some management actions may be questionable in relation to the terms of these.	The management system is demonstrably compliant with elements of the MSA, through content of FMPs, Council structure and operations, and through procedures for regulatory development and review by NOAA Fisheries. The normal regulatory process in fisheries legislation has in-built checks to ensure compliance. This was not the case for NEPA legislation in the past but the appointment of a NEPA specialist to each Council region has improved compliance with this legislation throughout the Council system over recent years. The Council also complies with ESA, MMPA, APA, E.O. 12866, and other applicable law.		
80	The management system makes consistent, good faith efforts to be consistent with relevant national legislation. Management organisations have not been found to be repeatedly in violation of national law.			
100	The management system is demonstrably compliant with all relevant national legislation.			

SCORING INDICATORS		Comments	Weight	Score
3A.2.3		Does the system observe the legal and customary rights of people dependent upon fishing?	**33.3**	**95**
60	The customary and legal rights of the people dependent upon fishing are known and no major conflicts have occurred.	The management system observes all legal and customary rights of people dependent upon fishing under a formal codified system. Subsistence fishing for flatfish is minimal and is accounted for in the TAC but is not a direct allocation. Licensing of vessels provides access to those participants that had a proven history in the development of the fishery. The Council has a past record of addressing the concerns of rural communities, for example through bycatch limits on salmon and herring. More recently, the Council created a halibut subsistence program. Alaska Native participation increased by the creation of a multi-species community development quota system (CDQ) in 1992. The Community Development Quota (CDQ) Program was implemented in 1992 by the North Pacific Fishery Management Council. The Program allocates 10.7% of all Bering Sea and Aleutian Islands quotas for flatfish and share of the prohibited species catch limits to eligible western Alaska communities for four major purposes: participate and invest in fisheries in the Bering Sea and Aleutian Islands Management Area; support economic development; alleviate poverty and provide economic and social benefits; achieve sustainable and diversified local economies. The CDQ allocations account for a formal codification of “rights” of people dependent on fishing, although the State allocations to gear groups change over time. Licensing of vessels provides access to those participants that had a proven history in the development of the fishery. Conflicts have occurred between community-based fishermen in the Bering Sea and the North Pacific bottom trawl fleet based on the perception that the bottom trawl fleet was encroaching into traditional fishing grounds. The Council has a past record of addressing the concerns of rural communities, for example through bycatch limits on salmon and herring. More recently, the Council created a halibut subsistence program and the CDQ program to assist residents of rural coastal villages. For the Bering Sea communities, the Council addressed the concerns expressed by subsistence users in establishing the nearshore waters closed to bottom trawling in June 2008 through closure of the northern Bering Sea to bottom trawl fishing and establishing the Northern Bering Sea Research Area. The closure was made in response to a request of the Bering Sea tribal governments and Alaska Native organizations.		
80	The system observes the legal and customary rights of people dependent upon fishing but does not necessarily have a formal codified system.			
100	The system observes all legal and customary rights of people dependent upon fishing under a formal codified system.			

SCORING INDICATORS	Comments	Weight	Score

3A.3 *(MSC Criteria 2, 5, 7)*	**The management system includes strategies to meet objectives including consultative procedures and dispute resolutions.**	**11.9**	**94**
Weighting Commentary	All the performance indicator were given an equal weighting		
3A.3.1	Does the management system contain clear short and long-term objectives?	**16.7**	**95**
60 Short and long-term resource and environment objectives are implicit within the management system 80 The management system contains clear short and long-term resource and environment objectives. 100 The management system contains clear and explicit short and long-term resource and environment objectives that can be measured by performance indicators.	The management system contains clear and explicit short and long-term resource and environmental objectives that can be measured by performance indicators. Long-term objectives for the stock are specified in the MSA (e.g. "to prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery") and short-term objectives are set in annual ABC's and TAC's. Objectives for affected ecosystems are clearly stated, principally in the PSEIS and EFH EIS. The BSAI Groundfish FMP contains 46 short-term and long-term objectives clustered in 9 categories: (1) Prevent overfishing; (2) Promote sustainable fisheries and communities; (3) Preserve food web; (4) Manage incidental catch and reduce by-catch 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. All objectives are measurable, although some require qualitative rather than quantitative, assessment. The BOF has broad long-term objectives defined by the State Legislature but does not operate under short-term objectives. Although BOF management is a minor component of the overall fishery management assessment, the absence of short-term objectives at the State level prevents this indicator from being scored 100. BOF monitoring of in-season harvest is done three times per year. The interval between state monitoring means that actions might not be taken "with immediate effect", thereby preventing the indicator from being scored at 100.		

SCORING INDICATORS		Comments	Weight	Score
3A.3.2		Do operational procedures exist for meeting objectives?	**16.7**	**95**
60	Generally adequate operational procedures exist which are applied to the meeting of objectives.	Strategies to meet objectives for the stocks are as set out under section 5 in the main text of this report and include survey, assessment and harvest control, monitoring of fishing operations, catches and landings, surveillance and enforcement, all based on precautionary management. Ecosystem objectives are being met through a thorough examination of possible sources and significance of impacts (principally now through the PSEIS and EFH EIS) and management of impacts through a series of management measures appropriate to the source of impact and nature of ecosystem receptors. This includes measures such as by-catch harvest controls, permanent and seasonal closed areas (for habitat and to avoid impacts on top predator foraging) and seabird mitigation devices. These procedures are transparent and are conducted through open meeting processes with wide dissemination of information. Discussions with Council and ASFC scientists indicate procedures and actions are in place to progress on all categories of objectives. The FMP states that the Council will maintain a continuing review of the fisheries managed under the FMP, and all critical components of the FMP will be reviewed periodically to provide feedback on the degree to which objectives are being met. The Council revised its BSAI and GOA groundfish management policy in 2004. The policy contains a management approach and 45 objectives, which are categorized by goal statements. The Council adopted a workplan of priority actions to implement the management policy, the status of which is updated at every Council meeting, presented under the Staff Tasking agenda item. The Council annually reviews the management objectives and the workplan. Progress reports for 2005 and 2006 are listed on the NPFMC website (http://www.fakr.noaa.gov/npfmc/Tasking.htm).		
80	Transparent operational procedures are applied to the meeting of objectives. These procedures can be shown to support the objectives.			
100	Operational procedures are transparent and clearly applied. There is a feedback mechanism testing effective application.			

SCORING INDICATORS		Comments	Weight	Score
3A.3.3		Are there procedures for measuring performance relative to the objectives?	**16.7**	**90**
60	Operational procedures exist which can be used to measure performance relative to the objectives.	The BSAI flatfish stocks are assessed to be in a state where it is not in danger of overfishing or approaching overfishing. Stock management is considered to be achieving its objectives in a precautionary manner. Similarly, the ecosystem is not considered to be affected by fishing operations to an extent that would adversely affect the BSAI flatfish stocks, nor are there indications that objectives for habitats, by-catch species or protected, endangered or threatened species are compromised by flatfish fisheries activity. There are procedures in place for regular measurement of performance relative to some objectives, but we were not provided information on the extent to which all objectives are regularly monitored. However, the FMP states that the Council will maintain a continuing review of the fisheries managed under the FMP, and all critical components of the FMP will be reviewed periodically: • **Management Policy -** Objectives in the management policy statement will be reviewed annually. • **Essential Fish Habitat (EFH) -** The Council will conduct a complete review of EFH once every 5 years, and in between will solicit proposals on Habitat Areas of Particular Concern and/or conservation and enhancement measures to minimize potential adverse effects from fishing. Annually, EFH information will be reviewed in the "Ecosystems Considerations" chapter of the SAFE report.		
80	There are procedures used for measuring performance relative to the objectives.			
100	Tested procedures are used for regular measurement of performance relative to the objectives.			

SCORING INDICATORS		Comments	Weight	Score
3A.3.4		Do procedures include for a precautionary approach in the absence of sufficient information?	**16.7**	**90**
60	Measures exist to implement a precautionary approach in the absence of sufficient information. There is some evidence that this is occurring.	All procedures in relation to the assessment of stocks include evaluation of uncertainty and application of precaution at an appropriate level. The National Standards provide the basic policy guidelines within the MSA, however, in recent years (1996; 2006), the MSA has been amended to require specific management actions to be taken consistent with the "precautionary principle," although this term is not used explicitly in the MSA. Objectives for the management of the flatfish fisheries are outlined in the FMP. Over recent years, all FMPs are being (or have been) amended to revise overfishing definitions to comply with the Sustainable Fisheries Act (1996) (the reauthorization of the MSA), and with the 2006 revision of the MSA. The MSA is consistent with the precautionary approach, a framework for ensuring that conservation objectives take precedence over short-term economic goals. The MSA, for example, dictates that management needs to maintain the abundance of stocks at levels capable of producing the Long Term Potential Yield (LTPY) or maximum sustainable yield (MSY). Current polices demand conservation actions occur prior to catches reaching the MSY level. Other modifications to the MSA call for protection measures for essential fish habitat (EFH) and measures to increase retention and use of by-catch. The current management of the BSAI flatfish fisheries includes a broad range of regulations designed to maintain the productivity of flatfish stocks, provide for statistically reasonable catch quotas, set area and gear restrictions, and set limits on the harvest level of the mature spawning stock. Other regulations are in place to minimize by-catch of target and non-target species and limit impacts on the traditional fisheries of the region. Observer programs are in place to document the target and non-target catches as well as to collect scientific data on target and non-target species. Vessels 60ft to 125ft must carry an observer on at-least 30 percent of their fishing days and at-all times on at least one trip per fishing quarter; vessels 125ft and larger must carry an observer at all times. Catcher processor vessels are required to carry 2 observers at all times and have each haul observed and weighed using flow scales. The PSEIS and the EFH EIS are extremely comprehensive documents. They integrate and summarize research over the past 50 years and review management practices over the last 30 years. The Council reviews at least 10 EAs/EIS's per year. Additional periodic reviews of environmental impacts are included in the annual Ecosystem Assessment report (Boldt 2007) in which ecosystem considerations are extensively addressed (e.g. Boldt 2007 is 261 pp.). The following ecosystem components/indicators are being monitored: Bering Sea trophic level of catch, Aleutian Islands trophic level of catch, Togiak age-4 herring recruits, COMU (common murre) productivity (fledglings per egg), BS diversity, BS richness, BLKI (Black-legged kittiwake) productivity (fledglings per egg) at St. Paul Island, TBM (thick-billed murres) productivity (fledglings per egg) at St. Paul Island, RLKI (red-legged kittiwake) productivity (fledglings per egg) at St. Paul Island. The OY of 2 million mt is an additional precautionary approach to BSAI fisheries management.		
80	Formalised and appropriate measures exist which implement a precautionary approach in the development and application of operational procedures in the absence of sufficient information.			
100	All procedures include for evaluation of uncertainty and application of precaution at an appropriate level.			

SCORING INDICATORS		Comments	Weight	Score
3A.3.5		Does the system include a consultative process including relevant and affected parties?	**16.7**	**95**
60	The system includes a consultative process including key stakeholders within the fishery.	The NPFMC meets five times per year and follows a pre-announced schedule. Meetings are public. Council representation at meetings includes Council members, members of the Council's SSC,AP and other advisory committees, Council staff, The NMFS Regional Administrator, who as a voting member of the Council represents the Secretary of Commerce and is responsible for the development, implementation, management and enforcement of the FMPs of the Council, fishery stakeholders, environmental NGOs, community representatives and the general public consistent with the Administrative Procedures Act and NEPA. Notice of meetings is made through the Federal Register. Meeting agendas are widely distributed before each meeting and accessible on the Council website. Following each meeting a Council newsletter summarized meeting results. Meeting agenda items are open to public comment following consistent public testimony rules. The public is also invited to provide comments to the Council in writing and is not required to attend the Council meeting to submit comments. The Council process has routinely sought diverse "outside" views nationally and internationally on controversial management topics like individual fishing quotas, by-catch management, community development quotas, and habitat protection. The process is open to peer review by industry, academia, lawyers, scientists and managers from other state and federal agencies, and a diverse environmental community. Stakeholders are aware of the procedure for decision making at the Council. Analysis and testimony presented at the Council and lobbying of individual Council members to emphasize stakeholder positions gives stakeholders access and influence in the decision-making process.		
80	The system includes an appropriate consultative process including all main public and private stakeholders and can demonstrate consideration of representations made.			
100	The system includes an appropriate consultative process including all affected stakeholders. Decisions specifically discuss and/or address stakeholder concerns.			

SCORING INDICATORS		Comments	Weight	Score
3A.3.6		Is there an appropriate mechanism for the resolution of disputes within the system?	**16.7**	**100**
60	Mechanisms are theoretically adequate but have not been consistently applied or tested.	There is an appropriate and tested mechanism within the system for the documentation and resolution of disputes. The Council component of the Council/NMFS management system resolves disputes by majority vote as required in section 302 of the MSA. Council vote is held in public session and clearly open to all in attendance. Means to resolve disputes (voting) seem effective in making reasonable progress toward achieving end goals like completion of a plan amendment. The final decision and any final dispute resolution lies with the Secretary of Commerce. All stakeholders have an opportunity for input prior to the decision by the Secretary of Commerce. Any disputes remaining following adoption of NMFS final regulations/rules can be resolved through the federal court system.		
80	There is an appropriate and established mechanism for the resolution of disputes within the system.			
100	There is an appropriate and tested mechanism within the system for the documentation and resolution of disputes of varying magnitude, which is applied as required.			

SCORING INDICATORS	Comments	Weight	Score

3A.4 *(MSC Criterion 6)*	**The management system operates in a manner appropriate to the objectives of the fishery.**	**11.9**	**97**
Weighting Commentary	All performance indicators were given equal weighting		
3A.4.1	Does the system include subsidies that contribute to unsustainable fishing?	**50.0**	**100**

60	Subsidies exist that may contribute indirectly to unsustainable fishing. These are short-term and are in the process of being removed within acceptable timescales.
80	The system is essentially free from subsidies that contribute to unsustainable fishing or ecosystem degradation.
100	The system has no subsidies that contribute to unsustainable fishing or ecosystem degradation.

The fishery is substantially free from subsidies or financial incentives that would promote overfishing or ecosystem degradation.

Questions about potentially harmful U.S. fishery subsidies are sometimes raised about the federal Capital Construction Fund (CCF) Program and its potential to contribute to overcapacity. The CCF is governed by section 607 of the Merchant Marine Act of 1936 and section 7518 of the Internal Revenue Code. The CCF program is available to U.S. citizens that own or lease fishing and other commercial vessels. and administered, in the case of fishing vessels, by the Department of Commerce. The original intent of CCF was fishing fleet improvement through allowing fishermen to accumulate funds with which to replace or improve their fishing vessels. The CCF Program enables fishermen to construct, reconstruct, or under limited circumstances, acquire fishing vessels with before-tax, rather than after-tax dollars. The benefit to the account holder is the deferral of income tax on contributions to the fund and earnings on those amounts until the funds are withdrawn. Because many U.S. fisheries are in the process of stabilizing or withdrawing capacity, a large percentage of CCF accounts for fishing vessels are inactive. Legislative proposals to allow withdrawal of the funds for other purposes (e.g., retirement, purchase of quotas under market-based limited access privilege programs) are currently before Congress. The potential for CCF to contribute to unsustainable fishing is now severely constrained by access limitations and, in the case of North Pacific fisheries, strict regulations.

In response to rising fuel costs, temporary tax relief for U.S. fishing vessels has been proposed. A Senate bill was introduced in July 2008 ("S. 3234. A bill to amend the Internal Revenue Code of 1986 to provide a temporary income tax credit for commercial fishermen to offset high fuel costs") providing a temporary income tax credit for excessive fuel costs. No legislative action has yet been taken.

SCORING INDICATORS		Comments	Weight	Score
3A.4.2		Does the system include economic/social incentives that contribute to sustainable fishing?	**50.0**	**95**
60	Measures to allocate fishing opportunities and/or entry to the fishery, or other incentives, are generally supportive of achieving fishery objectives.	The management system has implemented economic and social incentives that contribute to sustainable fishing and ecosystem management through various rationalization programs, and is working to develop more. Limited entry is effective in controlling effort. The NPFMC has made substantial investments in incentive-based fishery management programs. The License Limitation Program (LLP), limiting access to the Federal groundfish fisheries, was implemented in 2000. The LLP established criteria for issuing licenses based on fishing history of vessels. Licenses carry one or more fishing area endorsements (Bering Sea or Aleutian Islands), and also carry designations for operation type (catcher processor (CP) or catcher vessel (CV)), gear (trawl and/or fixed gear), and maximum vessel length. There are currently more than 1,800 groundfish licenses. The Council is now addressing options for removal of inactive "latent" licenses to prevent their future re-entry into the fisheries. Trawl groundfish fisheries are fully utilized in the BSAI. The proposed action would protect the current harvest share of trawl vessel participants who have made significant investments in the fisheries, and have recent harvests of BSAI groundfish, from other license holders with little or no recent history in the fisheries by establishing "recency" harvest thresholds for maintaining an active license. One of the long-term effects of removing latent licenses is hoped to be the slowing down of the fisheries, thereby increasing operating efficiency, improving safety and reducing bycatch. The Council is currently considering two separate amendments for trawl and fixed gear groundfish licenses. Amendment 80 to the BS/AI Groundfish FMP was (adopted June 2006; implemented Sept. 2007) allocates several Bering Sea and Aleutian Islands (BSAI) non-pollock trawl groundfish species among trawl fishery sectors, and facilitate the formation of harvesting cooperatives in the non-American Fisheries Act (non-AFA) trawl catcher/processor sector. Sustainable fishing is an overarching intent of this amendment. According to information posted by the NMFS Alaska Regional Office (http://www.fakr.noaa.gov/sustainablefisheries/amds/80/default.htm), Amendment 80 is designed 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 groundfish retention standard (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. In addition, Amendment 80 modifies the management of halibut and crab prohibited species catch (PSC) limits.		
80	Allocations of fishing opportunities and/or entry to the fishery, and/or other incentives, promote fishery and ecosystem management goals.			
100	The system has established economic and social incentives that contribute to sustainable fishing and ecosystem management.			

SCORING INDICATORS	Comments	Weight	Score

3A.5 *(MSC Criterion 8)*	**A research plan exists in line with the management system to address information needs.**	**11.9**	**100**
Weighting Commentary	All performance indicators were given equal weighting.		
3A.5.1	Have key research areas requiring further information been identified?	**33.3**	**100**
60 Some major areas requiring further research have been identified. 80 The key areas requiring further research have been identified. 100 A comprehensive review of necessary information requirements has been undertaken.	Fishery research in the BSAI occurs primarily through NMFS, although a small amount of research is conducted by the ADFG. The ADFG research is oriented toward habitat mapping and habitat-based stock assessments. The National Research Council (NRC) noted that Congress has supported research, but that earmarked and line item funding can result in inconsistency with research needs across regions, unpredictability from year to year, possible unfair or inequitable allocation of funding, deductions from NMFS base budget, and failure to recognize increased agency costs to implement programs. Nevertheless, the management system has a coherent and well-funded research base dedicated to support of meeting stock and ecosystem objectives. The MSA requires periodic review of research needs. A comprehensive review of information requirements for management is a standard part of the NPFMC and AFSC annual work plan. Research needs are identified by the SSC and Council each year. The list is forwarded to universities, agencies, or other groups that do research or fund research in Alaska, including ADF&G.		

SCORING INDICATORS		Comments	Weight	Score
3A.5.2		Is research planned/undertaken by the scientific advisers to meet the specific requirements of the management plan?	**33.3**	**100**
60	Research is planned for highest priority information needs.	There is an on-going, funded, comprehensive and balanced research program which is linked to the management plan. The AFSC conducts large-scale stock assessment trawl surveys and a variety of information is collected during these surveys in addition to relative stock abundance information. Non-commercial fish and invertebrate species are also assessed; biological information on age, growth, fecundity, predator-prey relations and other information is collected and added to the knowledge database for these species. The stock assessment scientists with the AFSC are constantly reviewing and testing new and innovative approaches to stock assessment modelling for flatfish to improve stock assessment estimates and more accurately project trends in abundance. Examples of NMFS/industry research include the effectiveness of seabird avoidance techniques, radio tag studies of Steller sea lion feeding migrations, and estimating and reducing mortality in by-caught Pacific halibut. NMFS is conducting on-going research in identifying areas of critical habitat to managed species and areas of special concern including AI coral gardens. Research is incorporated in management through analyses of proposed regulatory changes. Research priorities are identified and updated annually.		
80	Research is planned and undertaken to provide necessary scientific support to the plan. There are demonstrable resources to allow implementation of the programme.			
100	There is an ongoing, funded, comprehensive and balanced research programme, linking research to the management plan.			

SCORING INDICATORS		Comments	Weight	Score
3A.5.3		Is relevant research carried out by other organizations (e.g. Universities) and is this taken into consideration?	**33.3**	**100**
60	The management system is aware of research carried out by other organisations and elements of this are taken into consideration.	Relevant and co-ordinated research carried out by other organisations is taken into account for management considerations. The NPFMC conducts an annual review of research needs, as mandated under the MSA. Numerous other organizations provide funding for, or participate in, various projects: US Congress, the Council, Sea Grant, the North Pacific Research Board, the states, private foundations, and environmental groups. The AFSC is involved in a number of collaborative studies including the Fisheries Oceanography Coordinated Investigations (FOCI), a joint research program between the NOAA Pacific Marine Environmental Laboratory (PMEL) and the AFSC on oceanographic processes that affect fishery resources in Alaska. The National Science Foundation (NSF) is also funding the Bering Sea Ecosystem Study (BEST) to investigate ecosystem processes and climate change in the Bering and Chukchi Seas with funding dedicated through 2007. AFSC scientists participate in international research efforts through their participation in the North Pacific Marine Science Organization (PICES). Much of the joint research is focused on the use of ecosystem processes in fishery management. NMFS Staff Appear to be extremely well aware of other research relevant to their scientific and management functions. There is an annual Alaska science symposium (Anchorage) Funded in part by the NOAA and NPRB.		
80	Appropriate research carried out by other organisations is taken into consideration, although there is not necessarily any proactive co-ordination between organisations.			
100	Relevant research carried out by other organisations is taken into account for management considerations. This research is often co-ordinated with existing research plans of the management system.			

SCORING INDICATORS		Comments	Weight	Score
3A.6 *(MSC Criteria 7, 9, 10)*	**The management system includes measures to achieve objectives for the stock**		**11.9**	**93**
Weighting Commentary		All performance indicators were given equal weighting		
3A.6.1		Are the resource and effects of the fishery monitored?	**33.3**	**90**
60	A monitoring programme is in place that addresses some aspects of resource and effects and which can be extended.	The resource and effects of the fishery are closely monitored over appropriate geographical areas and time periods, and data are available to relevant research and management bodies. Surveys are conducted to evaluate the status of the resource, together with fishery-dependent data from vessel logbooks, observers, landings data, fish ticket (sales) records and VMS data, etc. Data collection and interpretation is considered near-comprehensive and of high quality. The BSAI groundfish observer program was authorized in 1990 under Amendment 13 to the BSAI groundfish FMP. NMFS is in charge of the observer program, providing operational oversight and management, training, specification of sampling methods and data management. Vessel and plant owners contract directly with observer companies and pay costs of observers. Program management costs are paid by the federal government. Observer coverage levels on vessels are specified by vessel length and gear type. The three resource management agencies tasked with commercial fisheries management in Alaska are the ADF&G, NMFS and the IPHC. Since 2001, ADFG, NMFS, and the IPHC have developed the collaborative Interagency Electronic Reporting System to consolidate landing, production, and IFQ reporting from a sole source. The web-based reporting component of this system is “E-Landings”.		
80	A monitoring programme is in place that addresses all key aspects of resource and effects at appropriate intervals and results are recorded.			
100	The resource and effects of the fishery are closely monitored over appropriate geographical areas and time periods. Full records are kept of monitoring results and these are made available to relevant research and management bodies.			

SCORING INDICATORS		Comments	Weight	Score
3A.6.2		Are results evaluated against precautionary target and limit reference points?	**33.3**	**100**
60	Target and limit reference points exist and some level of evaluation against these is possible. These take account of the precautionary approach, but this may not be explicit.	Results of monitoring are regularly interpreted in relation to a precautionary target or quantitatively evaluated against precautionary targets and limit reference points on a regular and timely basis. Fishery independent and dependent indices of stock status are evaluated against reference points at the NPFMC. Overfishing is defined as any amount of fishing in excess of a prescribed maximum allowable rate. This maximum allowable rate is prescribed through a set of six tiers corresponding to descending order of information availability. Arrowtooth flounder is managed under Tier 3a of the NPFMC's ABC and OFL definitions.		
80	Results of monitoring are regularly interpreted in relation to precautionary, target and limit reference points.			
100	Results of monitoring are quantitatively evaluated against precautionary target and limit reference points on a regular and timely basis.			

SCORING INDICATORS		Comments	Weight	Score
3A.6.3		Do procedures exist for reductions in harvest in light of monitoring results and how quickly and effectively can these be implemented?	**33.3**	**90**
60	Adequate procedures exist to reduce harvest. Programmes to link these with monitoring results are underway.	Practical procedures exist to reduce harvest in light of monitoring results and provide for stock recovery to specified levels within specified time frames, as required by the MSA. There are well documented procedures to implement in-season changes and these can be introduced with immediate effect. Management regulations require that the fishery closes when the TAC level is reached. The Federal fishery observer program and fishery management rules ensure accurate, real-time catch accounting and vessel monitoring. Catch of Alaska plaice in all of the BSAI fisheries is counted against the TAC. The Council management system has a substantial in-season process in place to monitor catch and to close fisheries when they reach catch limits. One of the management measures listed in the BSAI Groundfish FMP is "Flexible Authority", by which is meant the NMFS Regional Administrator is authorized to make in-season adjustments through gear modifications, closures, or fishing area/quota restrictions, for conservation reasons, to protect identified habitat problems, or to increase vessel safety. Noticed closures are enforced by the USCG and by NMFS under laws of the MSA with stiff penalties.		
80	Appropriate procedures exist to reduce harvest in the light of monitoring results and provide for stock recovery to specified levels. Measures can be implemented on an appropriate timescale.			
100	Practical procedures exist to reduce harvest in light of monitoring results and provide for stock recovery to specified levels within specified time frames. There are well documented procedures to implement changes and these can be introduced with immediate effect.			

SCORING INDICATORS	Comments	Weight	Score

3A.7*(MSC Criterion 10)*	**The management system includes measures to pursue objectives for the affected ecosystem.**	**11.9**	**92**
Weighting Commentary	Measures to avoid or minimise environmental impacts were considered to be most important within the performance indicators.		
3A.7.1	Are measures in place to address (avoid or minimise) significant environmental impacts?	**80.4**	**90**
60	Significant environmental impacts are known and measures are being applied to reduce key impacts.	Measures are in place to avoid or minimise all significant environmental impacts and are subject to monitoring and periodic review. Long-term effect indices of trawl impact on habitat in BSAI are low. Significant areas, closed to trawling, are being implemented which would mitigate such impacts. Clearly the interpretation of the importance of the short and long term impacts of trawling activity on the ecosystem and how this relates to the sustainability of the fishery is critical to the process of certification. The important factor is that information exists, both local and international to enable this to be evaluated and mitigation measures have been implemented or implementation of measures is scientifically and managerially practicable. The PSEIS has set management policies for incorporating ecosystem effects of fishing into the management system. The several ecosystem models in production and under development offer an opportunity to test the sensitivity of the ecosystem to various harvest strategies. These models suggest that productivity of flatfish stocks has not declined as a consequence of fishing. Sections 404 and 406 of the MSA set the requirements for EFH and incorporation of ecosystem principles into management, respectively. NEPA requires thorough assessment of impacts on the environment of any change to regulation of Federally managed species. The management system has expended considerable effort in the past several years in developing a strategy to manage ecological effects of fishing. The PSEIS and the EFH EIS have raised the standard for evaluating fishery management in the context of ecosystem issues, and include clear long-term objectives for managing ecosystem impacts of fishing. Furthermore, the development of the Ecosystem chapter, the inclusion of sections on flatfish species in the annual SAFE report and the SAFE report section on ecosystem effects, has generated a much more pro-active culture within the management system. NMFS recently developed a Fishery Interactions Team (FIT) to conduct research on the fishery interactions with ecosystem components. The management system has implemented a complex mosaic of seasonal and permanent area closures to protect Steller sea lions, to protect sensitive habitat, to prevent trawl expansion to un-fished areas, and to reduce by-catch. The Ecosystem SAFE also presents an impressive amount of information for ecosystem assessment (models and analyses), ecosystem status indicators (physical, habitat, and biological) and management indices (fishery related). Several models of ecosystem response to fishing (e.g., fishing impacts on habitat and mass-balance food web models) provide useful indicators for assessing impacts. The Council reviews at least 10 EAs/EIS's per year. Additional periodic reviews of environmental impacts are included in the annual Ecosystem Assessment report. The 2 million tonne OY for the BSAI, the closure of the AI to pollock fishing, and the suite of closed areas throughout the BSAI incorporate explicit precaution in recognition of ecosystem impacts. The mass-balance food web model calculates effects of removals from a fish stock by fishing and results indicate that the fishery has only minor impacts on other species.
80	Environmental impacts are known. Measures are being applied to minimise all significant ones and there is evidence that the measures are working.	
100	Measures are in place to avoid all significant environmental impacts and are subject to monitoring and periodic review.	

SCORING INDICATORS		Comments	Weight	Score
3A.7.2		Are no take zones, Marine Protected Areas or closed areas for specific periods appropriate and, if so, are these established and enforced?	**19.6**	**95**
60	Suitability of no-take zones and/or closed areas / seasons has been reviewed against objective biological criteria. Plans are in place to implement some or all of these as appropriate.	No-take zones and closed areas / seasons are established, enforced and monitored. The BSAI Groundfish FMP list area restrictions in a number of areas, some affecting all vessels (anchoring in protected areas) and others specific to gear types: • **Trawl Gear Only (**Crab and Halibut Protection Zone, Pribilof Islands Habitat Conservation Area, Chum Salmon Savings Area, Red King Crab Savings Area, Nearshore Bristol Bay Trawl Closure, Catcher Vessel Operational Area, 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, Northern Bering Sea Research Area. • **Bottom Contact Gear**: Aleutian Islands Coral Habitat Protection Areas, Alaska Seamount Habitat Protection Areas • **Mobile Bottom Contact Gear**: Bowers Ridge Habitat Conservation The Council follows a process to identify Habitat Areas of Particular Concern (HAPCs). The process begins with a determination of HAPC priorities by the Council. A call for nominations is then issued, to focus on specific sites consistent with those priorities. HAPC nomination proposals may be solicited every 3 years or on a schedule established by the Council. Twenty sites in the Gulf of Alaska and Aleutian Islands, consisting of seamounts and high density coral areas, were identified as HAPCs. To protect these sites and eliminate environmental impacts due to fishing, the Council prohibited fishing in these areas by gear types that contact the bottom. These sites and measures became effective in June 2006. The Council has created Marine Mammal Conservation Measures. Spatial and temporal areas closed to fishery operations around marine mammal rookeries and haul out sites, seabird breeding colonies, etc. The Council's groundfish policy workplan identifies the next HAPC proposal period to begin in 2009, 3 years after the implementation of HAPC measures. The SSC will develop provide criteria to the Plan Teams for their evaluation of new HAPC proposals. The Alaska State Legislature has classified certain areas as being essential to the protection of fish and wildlife habitat. These areas are designated as refuge, critical habitat area, or sanctuary. Management of these special areas is the responsibility of the ADFG. Habitat altering work, including any construction activity in a designated state refuge, critical habitat area, or sanctuary requires a special area permit. A Task Force established by the ADFG reported on MPAs and Marine Reserves to the BOF. The 2002 report reviewed the scientific basis for MPAs and MRVs and recommended a process for the review of marine reserve proposals submitted to the Board of Fisheries. Several *de facto* MPAs exist in Alaska waters, such as the Nearshore Bristol Bay Closure Area (prohibits bottom trawling to protect crab habitat) and the Sitka Pinnacles (designed to protect nest guarding lingcod), but these are "marine managed areas" rather than MPAs or marine reserves. In 2003, the Board of Fisheries declined to establish a state process for reviewing marine protected area or marine reserve proposals.		
80	Suitability of no-take zones and closed areas / seasons has been reviewed and these have been or are currently being implemented and enforced if and where appropriate.			
100	No-take zones and closed areas / seasons are established and enforced if and where appropriate and, if implemented, the consequences are being monitored.			

SCORING INDICATORS		Comments	Weight	Score
3 A.8 *(MSC Criterion 11)*	**There are control measures in place to ensure the management system is effectively implemented.**		**16.8**	
Weighting Commentary		Those performance indicators concerning monitoring were considered of greater significance.		
3A.8.1		Are information, instruction and/or training provided to fishers in the aims and methods of the management system?	**23.6**	**90**
60	Mechanisms exist for the dissemination of information, instruction and training of fishers. Implementation of these mechanisms may not be universally implemented.	There is a highly consultative management system in place involving representatives from the fishing industry at all stages. In addition, information is provided directly to fishers and is made freely available. Good communications (e.g. through NMFS offices and ADFG offices) ensure information is available and any issues resolved. Instructive documents exist to assist fishers work within the system. Formal training is largely absent from the system, except in some specific area such as working as a Council member. Some *ad hoc* training (for example, how to complete a logbook) is provided by the enforcement personnel, port samplers and observers working directly with the fisheries at sea or in port. The highly consultative public process of defining policy and management measures engages with the fishers through access to briefing information on agenda items, instructions on effective participation and opportunities to participate, to explain policy and operational measure development and as such helps promote effective implementation of fisheries and environmental measures. Fisher understanding is partially demonstrated though the high level of enforcement compliance.		
80	Information, instruction and training are provided to fishers in the aims and methods of the management system allowing effective management of the system.			
100	Information, instruction and training are provided to fishers in the aims and methods of the management system allowing effective management of the fishery and fishers demonstrate comprehensive knowledge of this information.			

SCORING INDICATORS		Comments	Weight	Score
3A.8.2		Is surveillance and monitoring in place to ensure that requirements of the management system are complied with?	**43**	**95**
60	An enforcement system has been implemented; however, its effectiveness and/or compliance has not been fully demonstrated relative to conservation objectives.	Enforcement responsibilities of the NPFMC include: • Monitoring of commercial fishing activities to estimate the total catch of each species and to ensure compliance with fishery laws and regulations; • Actions to close commercial fisheries once catch limits have been reached; and • Actions taken by NMFS Enforcement, the U.S. Coast Guard (USCG), and NOAA General Counsel to identify, educate, and, in some cases, penalize people who violate the laws and regulations governing the groundfish fisheries The ADFG, USCG and NMFS Fisheries Office of Law Enforcement (OLE) have joint responsibility for enforcement activities necessary to implement the management program. Together with at-sea and shore-side monitoring, the observer programme provides information on vessels, gear, retained and discarded catch, and interactions with marine mammals. The enforcement and observer coverage are considered to provide comprehensive and effective control in federal waters. Control in state waters is provided by the ADFG, together with shore-side observers where catches exceed a set volume. Compliance reports at each NPFMC meeting and are archived in the NPFMC website. NMFS/Alaska Region enforcement maintains approximately 36 agents and officers stationed in nine Alaskan ports for monitoring groundfish landings. Enforcement personnel regularly travel to other Alaskan ports to monitor landings and conduct investigations. Enforcement personnel associated with NMFS Northwest Region assist in the monitoring of Alaska Region groundfish harvest, primarily individual fishing quota sablefish, landed at ports in the Northwest Region. Also, USCG personnel conduct enforcement activities, monitor vessel activity, conduct at-sea boardings and aircraft overflights, and assist NMFS enforcement personnel in monitoring dockside landings. There are a limited number of landing ports, enabling effective dockside monitoring. Enforcement tools include: • VMS system to enforce closed areas (and activity in non-fishing areas or times). • Overflights to monitor IUU fishing activities (linked to VMS) and closed areas provide evidence of limited transgression. • Observer program has an enforcement role (e.g. discards). • NMFS Management, NMFS Enforcement, and the USCG all conduct extensive outreach and education programs that seek not only to explain the regulations, but to help the fishing industry understand the rationale for those regulations. Cases are prosecuted by NOAA General Counsel. NOAA and USCG give reports to the Council at each council meeting, and also discuss enforcement issues at the Council's enforcement committee.		
80	An effective enforcement system has been implemented and there is an appropriate degree of control and compliance. Enforcement systems include measures to control misreporting.			
100	An effective enforcement system has been implemented and there is a high degree of control and compliance. Robust enforcement systems are in place to control misreporting.			

SCORING INDICATORS		Comments	Weight	Score
3A.8.3		Can corrective actions be applied in the event of non-compliance and is there evidence of their effectiveness?	**33.4**	**100**
60	Mechanisms exist or are being developed which can be implemented or applied to deal with non-compliance.	Both civil and criminal penalties for violations are provided for in the MSA. Civil penalties and permit sanctions include fines up to $100,000 for each violation and prison terms of up to 6 months. Each day of a continuing violation amounts to a separate offense. Criminal penalties are defined in MSA section 309 and include fines up to $200,000 and imprisonment up to ten years, depending on the circumstances of the violation. Civil penalties include forfeiture of a fishing vessel, gear, stores and cargo, and fish. Extraordinary fines and prison terms have been applied in particularly egregious cases *Examples of penalties:* 1. In a 2006 a $254,500 civil penalty and permit sanctions were applied against the owner, manager and three captains of a catcher processor for numerous violations, including: tampering with or destroying observer's samples and equipment; failing to provide observers a safe work area; failing to notify observers prior to bringing fish aboard to allow sampling of the catch; failing to provide reasonable assistance to observers; and interfering with or biasing sampling procedure employed by observers (NOAA Office of Law Enforcement 2006). 2. In a 2005 operators of a catcher vessel pleaded guilty and were sentenced in U.S. District Court for intentionally under-reporting the amount of "by-catch" halibut brought aboard the vessel during the 1999 and 2000 groundfish seasons in the BSAI. The company was sentenced according to the terms of the plea agreement to the maximum fine of $300,000; restitution in the amount of $200,000; a 14-day suspension of fishing privileges during the January 2005 groundfish season; 18 months of probation; and a requirement that the company hire an expert to examine and correct policies which may have led to the criminal conduct (Sitnews 2005) Under Section 308 of the MSA, NOAA General Counsel develops a schedule of civil penalties for violations and attorneys are required to take into account the nature, circumstances, extent, and gravity of the prohibited acts committed and, with respect to the violator, the degree of culpability, any history of prior offenses, and such other matters as justice may require. The MSA allows attorneys to consider “any information provided by the violator relating to the ability of the violator to pay,” provided that the information is submitted at least 30 days before an administrative hearing. Judicial review may be provided by the federal district courts. NMFS Fisheries, with authority delegated by the Secretary of Commerce may: (i) revoke any permit issued with respect to such vessel or person (ii) suspend such permit for a period of time (iii) deny such permit; or (iv) impose additional conditions and restrictions on any permit The MSA gives fishery enforcement officers the power to - with or without a warrant or other process: (i) arrest any person, with reasonable cause		
80	There are set measures that can be applied in the event of non-compliance although these may not be included in a formal or codified system. These have been tested if/as appropriate and have been shown to be effective.			

SCORING INDICATORS		Comments	Weight	Score
100	Agreed and tested corrective actions can be applied in the event of non-compliance.	(ii) board, and search or inspect, fishing vessels subject to the provisions of the MSA (iii) seize any fishing vessel used or employed in a violation (iv) seize any fish taken or retained in violation of any provision of the MSA (v) seize any other evidence related to any violation (vi) access for enforcement purposes data from vessel monitoring systems, satellite-based maritime distress and safety systems, or any similar system, subject to the confidentiality provisions of the MSA (vii) execute any warrant or other process issued by any court of competent jurisdiction; and (viii) exercise any other lawful authority. The 2006 reauthorization of the MSA added penalty provisions for two additional violations: (1) importing, exporting, transporting, selling, receiving, acquiring, or purchasing in interstate or foreign commerce any fish taken, possessed, transported or sold in violation of any foreign law or regulation; and (2) using any vessel to engage in fishing in Federal or State waters, or on the high seas or in the waters of another country, that received a payment from the Secretary as part of a capacity reduction program.		

SCORING INDICATORS		Comments	Weight	Score
3 B	**Operational Criteria**		**50.0**	**90**
Weighting Commentary	All performance indicators were weighted equal.			
3B.1*(MSC Criterion 12)*	**There are measures that include practices to reduce impacts on non-target species and inadvertent impacts upon target species.**		**19.5**	**95**
3B.1.1		Do measures, principally through the use of gear and other fishing practices, include avoidance of impacts on non-target species and inadvertent impacts upon target species? These would include by-catch, discard, slippage and high grading.	**100**	**95**
60	Appropriate measures have been implemented that are intended to reduce the major impacts on non-target species and inadvertent impacts on target species, but their effectiveness is uncertain.	Measures have been implemented to avoid or reduce the major impacts on non-target species and inadvertent impacts on target species, and their effectiveness is demonstrated for some measures (e.g. 2007 Assessment Table 2.5a). Additional measures are available to fishing fleets, and implemented as appropriate to the gear used, which will minimize by-catch of non-target species, minimize mortalities of some but not all species of by-catch, and reduce the unproductive use of non-target species that cannot be released alive. The Council/NMFS management system has developed and implemented numerous programs applied to the groundfish fisheries to deal with by-catch, reduce halibut by-catch mortality, quantify mortality rates of by-catch of halibut, require full utilization of cod catches, and increase the processing and utilization of non-target species. The use of fishery rationalization programs to reducing the race for fish increases selectivity and efficiency, reducing by-catch. A comprehensive accounting of by-catch in the groundfish fisheries is achieved through the extensive monitoring and reporting program. Observers onboard vessels and at shoreside processors provide estimates of total catch and species The Improved Retention/Improved Utilization (IR/IU) program has been in place since 1998. An overall minimum groundfish retention standard became effective in January 2008, under Amendment 79 to the BSAI groundfish FMP. In the first year, 65% of all target groundfish that is caught by the head and gut sector in the BSAI must be retained, increasing over four years to 85%. Concurrently, the Council has developed a fishery cooperative for the head and gut sector (also known as the Amendment 80 sector), a program designed to provide this sector with the operational tools to adhere to the increased retention standards. 2008 is the first year this program has been operational. These measures are expected to further reduce the overall discards of groundfish.		
80	Measures have been implemented as and when appropriate to avoid or reduce the major impacts on non-target species and inadvertent impacts on target species and there is evidence that they are having the desired effect.			
100	Measures have been implemented to avoid or reduce the major impacts on non-target species and inadvertent impacts on target species, and their effectiveness is clearly demonstrated.			

SCORING INDICATORS	Comments	Weight	Score

3B.2 *(MSC Criterion 13)*	**There are systems in place that encourage fishing methods that minimise adverse impacts on habitat.**		**19.5**	**90**
3B.2.1		Do fishing operations implement appropriate fishing methods designed to minimise adverse impacts on habitat, especially in critical or sensitive zones such as spawning or nursery areas?	**100**	**90**
60	Fishing operations use measures to reduce major impacts on habitat, especially in critical or sensitive zones such as spawning or nursery areas.	Measures described as part of the management system fulfil requirements of this indicator. Gear exclusion areas listed in 3.A.7.2 are specifically designed to minimize adverse impacts on habitat. A skate nursery exclusion area and Bering Sea Submarine Canyon areas will likely receive future consideration by the Council. **Trawl Gear Only (**Crab and Halibut Protection Zone, Pribilof Islands Habitat Conservation Area, Chum Salmon Savings Area, Red King Crab Savings Area, Nearshore Bristol Bay Trawl Closure, Catcher Vessel Operational Area, 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, Northern Bering Sea Research Area **Bottom Contact Gear**: Aleutian Islands Coral Habitat Protection Areas, Alaska Seamount Habitat Protection Areas **Mobile Bottom Contact Gear**: Bowers Ridge Habitat Conservation In addition, the Council has created Marine Mammal Conservation Measures. The Council follows a process to identify HAPCs. The process begins with a determination of HAPC priorities by the Council. A call for nominations is then issued, to focus on specific sites consistent with those priorities. HAPC nomination proposals may be solicited every 3 years or on a schedule established by the Council. Twenty sites in the GOA and AI, consisting of seamounts and high density coral areas, were identified as HAPCs. To protect these sites and eliminate environmental impacts due to fishing, the Council prohibited fishing in these areas by gear types that contact the bottom. These sites and measures became effective in June 2006. The Council's groundfish policy workplan identifies the next HAPC proposal period to begin in 2009, 3 years after the implementation of HAPC measures. The SSC will develop provide criteria to the Plan Teams for their evaluation of new HAPC proposals. Spatial areas are closed to fishery operations around marine mammal rookeries and haul out sites, seabird breeding colonies, etc. Evidence of limited transgression of closed areas is obtained from overflights and VMS data.		
80	There is evidence that fishing operations are effective in avoiding significant adverse effects on the environment, especially in critical or sensitive zones such as spawning or nursery areas.			
100	There is direct evidence that fishing operations implement appropriate methods to avoid significant adverse impacts on all habitats.			

SCORING INDICATORS	Comments	Weight	Score

3B.3 *(MSC Criterion 14)*	**The management system incorporates measures that discourage destructive practices.**		**3.5**	**100**
3B.3.1		Does the fishery employ destructive fishing practices (such as poisons or explosives)?	**100**	**100**
60	The fishery does not allow any such destructive fishing practices.	Destructive fishing methods are not used. Enforcement would identify such practices if they were in use. The U.S. fishery management systems complies with the Provisions of the FAO Code of Conduct for Responsible Fishing, in particular the provision under Article 8 of the Code: "8.4.2 States should prohibit dynamiting, poisoning and other comparable destructive fishing practices".		
80	The fishery does not employ any such destructive fishing practices and enforcement is considered sufficient to prevent their use.			
100	The fishery does not employ any destructive fishing practices. There is a code of conduct for responsible fishing, prohibiting these, that is fully supported by fishers.			

SCORING INDICATORS	Comments	Weight	Score

3B.4 *(MSC Criterion 15)*	**The management system incorporate measures that reduce operational waste.**		**19.5**	**90**
3B.4.1		Do measures exist to reduce operational waste?	**100**	**90**
60	Measures/facilities are in place to reduce sources of operational waste that are known to have detrimental environmental consequences, but further reductions may be possible.	At-sea processors are subject to discharge rules and regulations issued by the U.S. Environmental Protection Agency (EPA) and the State of Alaska's Division of Environmental Conservation (DEC). Observer programs record fish waste disposal. Most catcher processors and shoreside plants turn any fish by-products (offal, racks, etc.) as well as any unmarketable species (sculpins, very small fish) into fish meal and fish oil, both of which are valuable by-products. Observers monitor total catch by species, and discards by species. Enforcement supports appropriate waste disposal (plastics, fuels etc) under MARPOL, U. S. Coast Guard regulations, Alaska Department of Environmental Conservation regulations, and National Pollutant Discharge Elimination System (NPDES) standards. As authorized by the Clean Water Act, the NPDES permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Port disposal facilities are available shoreside.		
80	Measures/facilities are in place to reduce all sources of operational waste that are known to have detrimental environmental consequences, and there is evidence they are effective.			
100	Measures/facilities are in place to reduce all sources of operational waste that are known to have detrimental environmental consequences, and there is evidence they are effective and these measures are supported by the fishers.			

SCORING INDICATORS		Comments	Weight	Score
3B.5 *(MSC Criterion 16)*	**Fishing operations are conducted in compliance with the management system and legal and administrative requirements.**		**22.1**	**86**
Weighting Commentary		Compliance was seen as being most significant.		
3B.5.1		Are fishers aware of management system, legal and administrative requirements?	**29**	**85**
60	Fishers are aware of key management and legal requirements.	Based on interviews with fishing representatives to date, the consultative nature of the management system and plentiful mechanisms for information distribution, fishermen are expected to be fully aware of management system requirements. Opportunities to become informed through interactions with fisheries officers and observers occur regularly. Published regulatory notices targeted at fishers. There is no code of conduct operating in the fishery.		
80	Fishers are aware of management and legal requirements upon them and are kept up to date with new developments.			
100	All fishers are aware of management legal requirements through a clearly documented and communicated mechanism such as a code of conduct.			

SCORING INDICATORS		Comments	Weight	Score
3B.5.2		Do fishers comply with management system, legal and administrative requirements?	**36**	**85**
60	Fishers appear generally to comply with requirements, but there is incomplete information on the actual extent of compliance.	Overall, compliance within the flatfish fleets appears to be very good. Compliance reports are given at each Council meeting that include statistics on the number of boardings, violations, violation rates, and types of violations. An annual retrospective report is developed at the end of each calendar year. Enforcement issues are highlighted for discussion at meetings of the Enforcement Committee and brought to the attention of the Council during the enforcement reports. Distribution of enforcement issues is addressed systematically through coordinated enforcement efforts. In 2005 NOAA Fisheries and USCG Enforcement developed a report for Council staff for their consideration of enforcement issues related to regulatory design, in order to maximize enforcement effectiveness. There is no code of conduct operating in the fishery.		
80	Fishers are generally compliant with relevant management and legal requirements and there are no indications of consistent violations.			
100	Fishers are fully compliant with, and fully supportive of, legal, and administrative requirements, such as through a code of conduct.			

SCORING INDICATORS		Comments	Weight	Score
3B.5.3		What is the record of enforcement of regulations in the fishery: quota control, by-catch limits, MLS, mesh regulations and closed areas?	**33.3**	**90**
60	There is information on breaches of regulations and on corrective action to prevent or curtail.	Enforcement action is carried out by NMFS, the USCG and the ADFG. Fishing effort and catch information is collected by federal observers onboard the vessels, and from shore-side observations and from processors. NMFS also requires by regulation (50 CFR 679.5) each fishing vessel to maintain a daily cumulative production logbook (DCPL). Information required in the logbook form includes information on fishing effort. Each permit holder must submit timely logbook reports to NMFS. USCG and NMFS enforcement conducts both on water and dock checks of fishing vessels to assure compliance with logbook record keeping requirements. The location of each vessel is monitored by VMS and the reliability of logbooks can be verified from the VMS data. Although the effort data are not used in the stock assessment model, they are used in-season to assure the TAC is not exceeded. See more a detailed description of monitoring, enforcement and corrective actions in 3A.8.2		
80	Evidence of rigorous monitoring of all the enforcement measures and evidence of effective actions taken in the event of breaches is available.			
100	Strong evidence of rigorous monitoring and control of the enforcement measures through for example satellite monitoring, shipboard observers and nominated landing ports. Strong evidence of firm and effective action taken in the event of breaches.			

SCORING INDICATORS		Comments	Weight	Score
3B.6 *(MSC Criterion 17)*	**The management system involves fishers in data collection.**		**16**	**85**
3B.6.1		Do fishers assist in the collection of catch, discard and other relevant data?	**100**	**85**
60	Fishers are involved in the collection of some catch, discard and other information.	Fishers regularly complete logbooks and, according to vessel size, take federal observers on a percentage of trips (trips being chosen by the skippers if less than 100% observer coverage). Observer coverage provides data on catch, bycatch and discards. Data provision appears good without any obvious issues. Fishers engage in co-operative research programs. The assessment team did not see information related to the extent of small-vessel fisher involvement in data collection on state fisheries.		
80	Fishers are regularly involved in the collection and recording of relevant catch, discard and other information.			
100	Fishers assist significantly in the collection and recording of all appropriate catch, discard and other information.			

APPENDIX B

Peer Review Reports

1. **Peer Reviewer Biographies**
2. **Peer Reviewer A Comments**
3. **Peer Reviewer B Comments**

Peer Reviewers Biographies

Milo Adkison - Milo is an Associate Professor in the Fisheries Division for the School of Fisheries and Ocean Sciences at the University of Alaska, Fairbanks. Current research interests and activities include: Pacific salmon management, esp. forecasting methodologies, implications of climate fluctuations, early marine growth and survival, the economic viability of rural fishing communities; the application of decision analysis and Bayesian statistics to resource management; selection methodologies for ecological, epidemiological and fisheries data series and conservation and dynamics of small populations.

Dr Stephen Lockwood - Stephen is an independent marine environment consultant and chairman of the Welsh Minister's fishing industry consultation group. Until 1999 he was Head of the UK Ministry of Agriculture, Fisheries and Food laboratory at Conway, which undertook research and development work in the fields of fish and shellfish cultivation, and the environmental effects of fishing. At a personal level, he was responsible for providing advice to MAFF policy divisions, and through them to ministers, across the broad field of coastal zone management. Previously, he led research and providing scientific advice on the conservation of pelagic and demersal fish stocks and the management of fisheries. He has published on stock assessment, fishery management and coastal development issues.

Peer Review Reports

PEER REVIEW 1

BSAI Arrowtooth Flounder Fishery

Accuracy of the information quoted in the report

In addition to the certification studies, I also examined the following documents:

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 Tech. Memo. NMFS-AFSC-178, 298 p.

Gauvin, J. 2008. Background information about the Alaska flatfish fishery. http://bestusecooperative.org/doc/Alaska%20flatfish%20fishery%20background%20piece.pdf

Goodman, Daniel, Marc Mangel, Graeme Parkes, Terry Quinn, Victor Restrepo, Tony Smith, Kevin Stokes. 2002. Scientific Review of the Harvest Strategy Currently Used in the BSAI and GOA Groundfish Fishery Management Plans. Prepared for the North Pacific Fishery Management Council.

Melvin, E. F., K. S. Dietrich, and T. Thomas. 2004. Pilot tests of techniques to mitigate seabird interactions with catcher processor vessels in the Bering Sea pollock trawl fishery: final report. Final Report WSG-AS 05-05, Washington Sea Grant, University of Washington

NOAA. 2005. Appendix B, Environmental Impact Statement for Essential Fish Habitat Identification and Conservation in Alaska published by National Marine Fisheries Service (NMFS) in 2005.

Wilderbuer, T.K, D. G. Nichol, and J. Ianelli. 2007a. Yellowfin Sole. *in*: 2007. Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Bering Sea/Aleutian Islands Region. Chapter 4 (Pages 447-512). Alaska Fisheries Science Center.

Wilderbuer, T.K, D. G. Nichol, and J. Ianelli. 2008. Yellowfin Sole. *in*: 2008. Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Bering Sea/Aleutian Islands Region. Chapter 4 (Pages 521-592). Alaska Fisheries Science Center.

Witherell, D. 2000. Groundfish of the Bering Sea and Aleutian Islands Area: Species Profiles 2001. North Pacific Fishery Management Council, 605 West 4th Avenue, Suite 306, Anchorage, AK 99501

Based on these other descriptions of the fisheries and the ecosystem, I found that the draft assessment reports gave an essentially accurate and complete overview of the flatfish fisheries and their context. Comments on sections 1-7 are listed below:

References. Page numbers for 2008 SAFE should be 521-592.
MML Comment - Amended

Section 3.3, Table 2. Should clarify that catches are given as tons.
MML Comment - Amended

Section 5.5. The total biomass in the 2007 SAFE (for 2008) is 2,195,300 t, not 1,928,000 t. In the 2007 SAFE, the ratio of biomass to B_{MSY} is 7.2, not 2.0.

Confusingly, there are also several discrepancies between the values reported in the 2007 SAFE and those that the 2008 SAFE states were in the 2007 SAFE (notably, in the summary tables of the executive summary F_{ABC} and F_{OFL} differ substantially among SAFEs). This may be related to the switch from a lumped- to a split-sex assessment, although this should not have changed the values ascribed to the 2007 assessment.

Section 7.4. First sentence should clarify that Aydin et al. also modeled the EBS.
MML Comment - Amended

Section 8. The BSAI Pacific cod fisheries are also in the MSC process.
MML Comment - Amended

Criterion 1.1.3. I don't understand the sentence, "Overfishing limits are based on F's less than the corresponding Fabc"; it can be interpreted to mean that F_{OFL} is less than F_{ABC}, which is not correct.

Criterion 2.2.1.1. typo – should be four species, not three
MML Comment - Amended

Whether the information has been applied appropriately to the scoring indicators

In general, the background information has been appropriately applied to the scoring indicators.

Whether the interpretation of the information justified the decision made on whether to certify the fishery

The information presented supports the decision to certify the fishery. The assessment and management process is strong, and the targeted fish stock appears healthy and lightly harvested. In a bottom trawl fishery, there are always concerns about effects on the ecosystem either through bycatch or physical damage to the habitat. There appears to be good evidence that these effects aren't severe and are adequately regulated (e.g., NOAA's 2005 EFH EIS).

The suitability of the conditions attached to certification

Condition 1. Criterion 1.3.1.2 was assigned a score of 75 because "analyses have not been conducted for these species that would permit structural change to be observed". The condition was "by the second annual audit …evaluate the evidence of change in the stock structure… (identify) gaps in required data … if required, an appropriate data collection program … appropriate remedial measures … should be defined and implemented by the fourth annual audit".

This condition is not too onerous, but because of the low harvest rates in this fishery a problem of this type seems unlikely.

Condition 2. Criterion 2.1.3.2 was assigned a score of 75 because no system exists for recording lost gear. The condition was to design (w/in one year) and implement (w/in two years) a lost gear recording system.

This condition seems appropriate.

Condition 3. Criterion 2.2.1.2. was assigned a score of 75 because "…bird strikes in gears and

vessels by species are incompletely recorded (PSEIS). The interactions of the trawl fisheries with seabirds needs better quantitative definition, especially in the extent of the net sonde (third) cable in causing injury and mortality". The condition was to "…review … the state of knowledge of both the impacts of the fishery on seabirds and the adequacy of both current and future approaches to mitigation needs", with an emphasis on mortality caused by the third wire.

This condition is not too onerous. I am not familiar enough with this field to know whether bird strikes on the third wire is likely to be a problem. It would be helpful for the basis for this focus on the third wire (e.g., reports of a high incidence of bird strikes in fisheries elsewhere) to be identified in the background information provided in this report (e.g., section 7.2.2 and the text for criterion 2.2.1.2).

I found no other criterion that I felt deserved a score lower than 80, meriting an additional condition.

PEER REVIEW 2

BSAI Arrowtooth Flounder Fishery

Preamble

There are five flatfish species taken in the Bering Sea and Aleutian Islands mixed, demersal trawl fishery. Although the fishery is as likely to take one species as another, the MSC process requires that separate certification is sought for each species. Therefore, there are five separate reports but each is identical other than the species name and species-specific details (growth parameters, annual landings etc) change from report to report. The style and general content of each report, and everything relating to Principles 2 and 3 are identical. This being the case, and although all five reports have been reviewed, there is no need for five separate reviews – each would be identical. Thus, the review that follows applies equally to all five species submitted for assessment by the client. In addition, the five Bering Sea and Aleutian Islands species assessments are virtually identical to the five species assessments for the Gulf of Alaska fishery. Inevitably, therefore, there is much commonality between this review and that for the Gulf of Alaska fishery; the two reviews should be read together as a complementary pair.

Overall Assessment

Each species' assessment contains most, but certainly not all, of the information that is required to make a judgement with respect to the assessment team's conclusions. There is a fundamental flaw in the presentation of the information, however; too much of the key information appears in the scoring table comments rather than in the narrative report where it belongs. The reader expects to be presented with the whole story in the narrative report and with only pointers to the relevant information given in the scoring tables. Once an author finds that they are having to provide substantial explanatory text as evidence in the scoring table they should be aware that they have omitted such information from the narrative report, which is where it belongs. To omit significant and fundamental information from the narrative text and pack it into the scoring table makes it very much more difficult for the reader to gain an overall impression and form a balanced opinion.

Additional to this stylistic shortcoming, each of the major sections (P1, P2, P3) have major omissions that must be rectified. It is fundamental to reaching a judgement on the sustainability of any fishery that one views current status with respect to past events and prognoses; this information omitted (P1). The only time-series data given are past landing.

The fact that the current stock status is good is not evidence of a sustainable fishery; we need to see the (recent) history of stock biomass, fishing mortality rates and recruitment indices to put current status in context. We are assured that these data are available – we must see them.

Within P2, the major omission is any meaningful discussion of the physical interaction between this fishery, the habitat and biota upon which the target species depend. Insofar as there is discussion, it focuses on PET species while the prey communities and their habitat – arguably or greater immediate importance – are ignored. If there have been no fishery-specific studies, there have been plenty of relevant studies which can be cited, reviewed and conclusions inferred. Also under P2, there are no data presented summarising discarding, either qualitative or quantitative, yet with the most intense observer programme possible one can only assume that these data are available.

The observers are an integral part of the fishery monitoring and management framework yet there is no clear statement as to their exact role, activities or to whom it is they report. No doubt this information is buried in the report (scoring table, perhaps) but it should be part of a clear but simple explanation within P3 of the respective role and responsibilities of all the key players – NMFS, Coastguard, state agencies etc – and who it is has overall responsibility and decision making powers.

There is no reason to believe that the final conclusions, conditions and recommendations put forward by the assessment team are wrong but they are expecting us to take it too much on trust rather than presenting a firm foundation for a well-argued case.

MML assessment team comment – With respect to the stylistic comments, the MSC provide guidance on the content of the assessment report. This report follows that guidance. The report consists of the preamble and the scoring table. They should be read together. We accept that, in some instances, additional information should and, indeed, has subsequently been provided where the assessment team consider appropriate. The BSAI fisheries are supported and backed with considerable and detailed information, perhaps more so than any other fisheries in the world. If all the relevant information was to be included in this report it would be significantly bigger and not easily accessible. For this reason and where possible we have provided URLs to the appropriate documents.

Specific examples follow in the review below.

Client Report

1.3 Full details for Dernie *et al*. reference required.

MML assessment team comment - Amended

Gauvin (2008), and several others, falls into the category of what my PhD supervisor used to call 'gossip'. If I want to check that this reference actually supports what the authors claim it supports, how do I find it? If it's available on the web or through inter-library loan, give the details; if it's no more than a 'pers. comm.' then it should be listed as a per. comm. The entire reference list needs to be looked at once more with a more critical eye to be certain that the interested reader could actually trace and obtain a copy of the reference using the information presented here. For example, most (if not all) of the NPFMC references are publicly available on the web; eg

NPFMC. 2007b. Navigating the North Pacific Council Process. 605 West 4th Ave., Suite 306, Anchorage, AK 99501is available at:
http://www.fakr.noaa.gov/npfmc/misc_pub/Navigating_NPFMC.pdf
And
NPFMC. 2008a. Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area. North Pacific Fishery Management Council, 605 West 4th Ave., Suite 306, Anchorage, AK 99501. June 2008, is available at:
http://www.fakr.noaa.gov/npfmc/fmp/bsai/BSAI.pdf

This being the case, the authors should provide the FULL reference information, not expect the reviewer or any other reader to track it down themselves

MML assessment team comment - Amended

2 **Glossary of acronyms** (and Abbreviations)[4]

This almost perfect list of abbreviations that is very helpful, but there are two omissions:
CQ – community quota, or was 'development'(CDQ) omitted from the table of conditions.
AWT – Alaska Wildlife Trooper.

This section might also be a useful place to put a small conversion table of imperial–metric measures. One has to remember that these reports are intended to be understood by any interested reader in any

[4]Not all abbreviations are acronyms: an acronym is an abbreviation that can be pronounced as a word, e.g. scuba, radar, sonar, FAME, NOAA. A series of letters (NMFS, NPMFC) are abbreviations.

part of the world and it is only the first-language Anglophone and Nordic (*sic*) fishing countries that use fathoms, feet and inches. Everyone else (and many Anglophone countries) uses the metric system. (1 inch = 25.4 mm; 1 foot = 305 mm; 1 fathom – 1.829 m.)

MML assessment team comment - Amended

The information on species biology is minimal, particularly relative to the description of environment in §7. It would be helpful to have a chart showing spawning grounds, planktonic drift, nursery grounds, fishing grounds for each species.

The fact that northern rock sole does not mature until it is 9 – 10 years of age highlights the importance of giving more detail on age structure of these populations. It is a very high age of first maturity for a non deep-water species that potentially makes it very vulnerable to over fishing. The reader needs to see a comprehensive set of time-series data to be reassured that it is being fished sustainably.

3.2 In this section, and in many others throughout the report there are references to fish species by common name only. For consistency with the target species, the scientific names for all fish species should be given.

MML assessment team comment - Amended

Spelling query – UK licence (noun) and license (verb) differ; is it the same in US English (in which case there are numerous spelling errors), or is 'license' the universal spelling.

MML assessment team comment – 'License' in the US is universal

Gulf of Alaska (GOA) should be given in full on first mention rather than in § 3.2.

MML assessment team comment - Amended

Table 2 What are the units of catch – number of fish, pounds, kg, tons? Such a fundamental omission raises questions about the rigour applied to other sections of the report.

MML assessment team comment – The table has been amended, the units did appear in the title to the table.

3.4 If a simple drawing of a typical trawl is available, it would not go amiss here. The description meets the needs of those of us who are familiar with trawl gear but do not assume that every interested reader has that degree of technical knowledge.

4 Administrative Context
This sets out who has overall command – the NPFMC, reporting to the Secretary – but what is never particularly clear is how all the other players interact; how is compliance monitored, who is responsible for day-to-day enforcement, who imposes the penalties – what are the penalties, etc?

MML assessment team comment – Section 4 and 5 have been switched with the intention of improving clarity and further text on compliance has been added to section 6.8.4

5 Stock Assessment – too often in these assessment reports, this section gets unduly technical and detailed. In this instance, however, the pendulum has swung too far the other way – not by being non-technical (not at all) but by providing too little data.

5.2 "Monitoring of the status of the stocks is done through the normal accumulation of fishery monitoring data of catch, catch at size/age, growth data and through periodic surveys" *tells the reader virtually nothing about relevant data acquisition. Are the data gathered at sea or on the dockside? Are stocks sampled by research vessel survey alone or are samples taken of commercial catches? If commercial catches are sampled, is this done by the crew, the observers or NMFS scientists? What surveys are carried out and by who; US alone or in collaboration with Canada or Japan or Russia or North Korea? Are they trawl surveys, plankton surveys, acoustic surveys? How are the survey data integrated with the commercial fishery data for the purposes of the stock assessment? Are they fundamental to the basic fishery assessment or are they reference points against which the assessment estimates are compared?*

"*The data are integrated into population assessment models which indicate trends in biomass, fishing mortality rates, catches and recruitment*" – but at no stage are we shown any of these trends. We are simply informed that "*there is no overfishing and the stock is not in an overfished state*" (Alaska plaice, § 5.5). This is not good enough. We need to see these trends, we need to be reassured that the current status of the stock is not an ephemeral (and fortuitous with respect to certification) anomaly but is indicative of a stock exhibiting long-term stability supporting sustainable exploitation. Without figures illustrating these trends in catch, mortality, biomass and recruitment, how are we to know that the current status is not simply dependent on a single year class that has been the only decent year class for 50 years?

5.3 The assessment modelling paragraph is a brief aide memoir to anyone who has familiarity with this particular approach – or possible stock assessment in general, but it will almost certainly be opaque to the interested layman. Without going into reams of detail, the author should be able to outline what is actually meant by "*automatic differentiation software allowing numerous parameters to be estimated efficiently. A Monte Carlo Markov Chain (MCMC) algorithm is used to obtain estimates of parameter uncertainty*". Similarly, it might not go amiss to make it explicit that the 95% confidence intervals apply to the data processing procedures and are not true confidence estimates of actual stock size. More fundamentally, it is not irrelevant to ask what "*survey estimates of biomass and age composition*" are used and how they are applied as "*as auxiliary information*".

MML assessment team comment – Additional text provided in this section. The MML chose to keep specific jargon because it is informative to stock assessment readers, additional text, tables, and figures were added to better inform the reader about the data, and to provide the basic assessment results (biomass trends, recruitment time series, fishing mortality time series, and biomass relative to reference points)

6 Management

6.1 As the description of the fishing gear refers to 'otter boards' and 'trawl doors' I am at a complete loss as to what the 'sideboards' (Table 5) might be (a piece of dining room furniture in the UK) and hence, have no feel for the relevance of Amendment 61. This ignorance might be eased by the inclusion of a trawl diagram (as suggested above).

MML assessment team comment – Section 3.2 does say that sideboard limits are catch limits, however further explanation has been added to this section.

6.4 The multiplicity of management objectives is commendably aspirational (and very informative) but is there any delivery; are any objectives met?

MML assessment team comment – Additional text has been provided

Nowhere in section 6 are we given an overview of how fishery management compliance is monitored and enforced.

MML assessment team comment – There is a section on enforcement. Additional text has been added to this section (6.8.4).

We know that there are one or two observers on the vessels over a threshold size but we are not told (apart from sketchiest details in § 6.8.2) what their duties are. Do they just stand and watch or do they keep records? Do they just record details of landed catch or do they sample discarded catch or record sightings of birds and mammals or even large iconic fish? Tell us about the observer system; it's a key feature of fishery management in this area, we need to know. We also need to know how compliance is monitored and enforced.

MML assessment team comment – Additional text has been added to sections 6.8.2 and 6.8.4

6.6.2 Alaska Natives and Communities
Who exactly are the 'Alaska Natives'; why do they merit special consideration? It would seem that the authors are so familiar with the subject that they see no need for explanation. They should remember, however, that this report is available for reading and comment worldwide but someone on the Baltic, for example, may be no more familiar with the Alaska Natives' needs than this report's authors might be with the justification for the Shetland Box (a fishery management measure in the North Sea).

MML assessment team comment – Additional explanatory text has been provided.

6.7.2 TAC Reserve
"*15% of the TAC for each target species (except Aleutian Islands Pacific ocean perch, Atka mackerel, flathead sole, Pacific cod, rock sole, yellowfin sole, pollock and fixed gear sablefish) and the "other species" category is set aside to form the "TAC Reserve", which is used for correcting operational problems of the fleets, adjusting species TACs for conservation, or apportionments*." Is this a significant measure? If it is, surely we should have it explained more fully and at the very least be enlightened as to why flathead sole, rock sole and yellow fish sole (three of the species covered by this group of assessments) are exempt from inclusion.

MMLComment – This section has been removed as it is not considered significant for this assessment

6.7.3 Bycatch and Retention Policies
We are never shown any of the actual data so we have no idea how extensive a problem this represents, although we are told that bycatch is monitored and data collected. What happens to these data; are they included in the stock assessments; do they provide any basis for assessing the environmental interactions of these trawl fisheries?

MML assessment team comment – Table 8 provides an example of the bycatch data. Additional text has been provided in 6.8.2.

"*To meet the Councils and MSA goals of reducing bycatch, minimise waste and improve utilisation of fish resources to the extent practicable the Council initiated Amendment 79 in 2002 to establish a minimum groundfish retention standard (GRS). In January 2008 an overall minimum GRS was implemented under Amendment 79 to the BSAI Groundfish FMP. It requires that between 2008 and 2012 vessels ≥ 125 feet LOA have to increase their target groundfish catch to ≥85%.*" How is this goal implemented? One assumes that it is through some form of gear modification (mesh size, square mesh panels, sorting grids) but we can only speculate as no information is provided on any of this. Tell us about it.

MML assessment team comment - Additional text has been provided in 6.7.3 and 6.7.4

Table 6. Catch monitoring requirements for the catcher/processor fleet.

Who receives the VMS data; what use do they make of it; does it provide the basis for a targeted, risk-based approach to monitoring and surveillance or is it no more than a record of who was where and when?

MML assessment team comment - Additional text has been provided in sections 6.8.3 and 6.8.4.

§ 6.7.8 There may be a requirement to return protected species to the sea but what measures are there to avoid their capture? Are there any gear restrictions or modifications (mesh size, sorting grids) aimed at reducing bycatch?

MML assessment team comment – This section refers to prohibited species catch and not protected species. Additional text has been added to indicate measures that are used to reduce their bycatch.

§ 6.7.9 Is there any reason why there should not be a chart(s) showing where these conservation areas are and, more particularly, how big they are. Just naming them gives the reader no feel for their relevance and potential efficacy.

MML assessment team comment – The areas are extensive and numerous. We did find a chart for each area; we did not find one chart that covered each. In the interests of minimising the number of pages in the report we consider a reference and URL are the best way to handle this.

6.8.2 Observer program

"*Under this program, NMFS provides operational oversight, certification training, definition of observer sampling duties and methods, debriefing of observers, and management of the data.*" Maybe so, but what data; how are they collected; where do they go; what use is made of them?

6.8.3 Similarly, what is the purpose of the VMS; to whom does the information go; what use is made of it? Is it merely to check who is at sea or is it the basis for a risk-based, i.e. targeted, rather than random vessel monitoring by the Coastguard or other enforcement agencies?

MML assessment team comment – Additional text has been provided.

§ 6.8.4 Enforcement

"*Enforcement of BSAI management measures entails a complex and extensive system. ---To do this adequately requires the use of increasingly sophisticated catch-monitoring tools, such as observer coverage, electronic reporting, vessel monitoring systems, and the use of at-sea scales*." Is it too '*complex and extensive*' to be told more than there are 36 inspectors plus the Coastguard monitoring activity? What about the VMS system; how is that used? What about the observers; what data do they collect and how is that used? What are the penalties for non-compliance and how great a problem is (international) non-compliance?

MML assessment team comment – Additional text has been provided.

§ 7 **Ecosystem**

There is a great deal of fascinating information about the current system, plankton and mass-balance models but precious little information about how this fishery interacts with the ecosystem. Flatfish are demersal species for which benthic species form an important part of their diet. This is a trawl fishery where the trawls have a lot of ground gear in contact with the seabed with the potential to cause significant changes to the seabed structure and associated communities. It would be far more relevant to give details of what studies have been carried out in this respect and what conclusions have been reached. In other words, is this particular fishery environmentally sustainable? If no fishery, site-specific studies have been carried out, what conclusions might be inferred from studies elsewhere on comparable gear in similar environments?

MML assessment team comment – Additional text has been provided in section 7.3.

§ 7.4.1 & 2 Again, all interesting stuff but what evidence is there of interaction between this fishery and marine mammals? It is universally the case that "*fisheries could potentially decrease the density of prey fields or cause changes in the distribution of prey such that the foraging success of the marine mammals [or birds] is affected*" but there are few other fisheries for which there can be such a wealth of authenticated evidence that fishing does or does not catch marine mammals. What is the annual catch of Steller's sea lions across the (client) fleet, for example? Similarly, how many birds (by species) are drowned each year by being trapped in the net during hauling or shooting? There may be none, but surely the observer programme records such data and a summary of these data should be presented here. There are many potential readers of these MSC assessments who are more interested in the physical interaction between fishing gear and iconic species than they are of the more esoteric minutiae of food-webs and mass-balance models.

MML assessment team comment – Additional text has been provided. As highlighted above the preamble and scoring table are part of the same report and so should be read together, for example, the reviewer asks about Steller sea lion mortality as a result of the fishery the narrative associated with Performance Indicator 2.2.1.3 reports "*No mortalities were recorded between 2002 and 2005 (TM-180)*".

Table 8 Why do the authors expect the reader to know what the 'Urochordata' are when they refer to brittle stars rather than 'Ophiuroidea'. Many readers may be none the wiser if they are called 'sea squirts' but at least it shows a greater consistency of nomenclature.

MML assessment team comment – The information presented in the table is taken directly from NMFS data and uses their nomenclature. The text has been amended.

Conditions & Recommendations: fair, balanced and reasonable; I agree.

Comments specific to the scoring table follow below.

Principle 1	A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery.	33.3	87

1.1.1.3	Is the geographical range of the target stock known and any seasonal migration described?	14.6	85

The geographical range of the Arrowtooth flounder stock and seasonal migration are broadly understood. Stock assessment and management units are consistent with their distribution (Wilderbuer, Nichol and Spencer. 2007).
NOT EVEN A SUMARY CHART IS PROVIDED IN REPORT; WE ARE EXPECTED TO TAKE IT ALL ON TRUST

MML assessment team comment – Additional text and figures provided in section 3.

1.1.1.4	Is there information on fecundity and growth?	14.6	85

Growth information is used as a surrogate for fecundity in the stock assessment and there is also adequate time-series of growth (Wilderbuer, Nichol and Spencer. 2007).

NO EVIDENCE PRESENTED IN TEXT REPORT

MML assessment team comment – Additional text provided in section 4.

1.1.1.5	Is there an understanding of the relationship of recruitment to parental stock?	14.6	80

NO EVIDENCE PRESENTED IN TEXT REPORT NO EVIDENCE PRESENTED IN TEXT REPORT

MML assessment team comment – Additional text and figures provided in section 4.

1.1.1.6	Is information collected on the abundance/density of the stock?	14.6	90

Information is collected on the abundance/density of Arrowtooth flounder from fishery dependent and independent sources. EVIDENCE?

Indices are used in the assessments to generate trends through full analytic assessments of tier 3a leading to confidence in the trends (Wilderbuer, Nichol and Spencer. 2007). WHICH INDICES; HOW ARE THEY USED?

MML assessment team comment –Additional text has been added.

1.1.1.7		Is information available on environmental influences on the stock dynamics?	12.5	90

Substantial environmental information has been and is collected, including both biological and physical data. VIRTUALLY NO DESCRIPTION IN TEXT REPORT.

These data provide a significant resource for application in defining environmental influences on the stock dynamics. NEITHER DISCUSSED NOR DESCRIBED

With the exception of considering periodic regime shifts that affect recruitment, physical factors have not been used. Biological factors, such as predation, have been sufficiently studied to be used in assessment. HOW?
The effect of spatial distributions and other physical factors are monitored for the other species WHICH; RLEVANCE?

MML assessment team comment – Additional text provided in section 3, 4 & 7.

1.1.2		There should be sufficient information on the fishery to allow its effects on the target stock to be evaluated	**16.7**	**93**
1.1.2.1		Are all major sources of fishery related mortality recorded/ estimated, including landings, discards and incidental mortality?	**25**	**90**

Landings and discards are accurately recorded and monitored, including the sizes (age) of the fish, fisheries observers and the in-season TAC monitoring process. NO ADEQUATE DESCRIPTION IN TEXT
Discards are reported TO WHOM? by fishers and monitored by the observer program with post–report analysis NOT DESCRIBED for input into the stock assessment process. The Hiatt et al (2007) contain discard rates for the period 2002 to 2006 THEN WHY NOT INCLUDE A SUMMARY TABLE?

MML assessment team comment – Table 10, Section 7 provides information on discards. Additional text provided in Section 4 and 6.8.2

1.2.3		Is gear selectivity known for the fishery?	**22.8**	**85**

Selectivity for species is estimated within the assessment models, both seasonal and annual. HOW? Current assessment methods can indicate changes over time. Spatial trends in selectivity do not appear to have been examined fully. However, size/age frequency data do not indicate major shifts (Wilderbuer, Nichol and Spencer. 2007). NOT DISCUSSED NOR EVIDENCE SHOWN IN TEXT

MML assessment team comment – Additional text added to section 5.3

1.1.2.4		Is the target species taken in other fisheries in the area that are not subject to this certification, and are such catches recorded or estimated?	**25**	**90**

Arrowtooth flounder are taken in a number of other fisheries (e.g. the pollock trawl fishery). The catches (landings and discards) are all recorded as part of the normal State and Federal monitoring of the fisheries sector and are used in the stock assessment. There is substantive and effective surveillance of fishing operations in this area and together with the monitoring of catches and the observer program. None of this discussed in text report.
IUU fishing is reliably estimated to be negligible relative to the impacts on the stock assessments. IUU! IT DOESN'T EVEN GET A MENTION IN THE REPORT LET ALONE ANY CONSIDERATION OF ITS SIGNIFICANCE TO THE STOCK OR ITS ASSESSMENT (MISREPORTING)

MML assessment team comment – Additional text added has been added to Section 6.8.4 on enforcement.

1.4.1		Is there a mechanism in place to contain harvest as required?	**33.3**	**90**

Harvest is controlled through the OFL, ABC and TAC setting procedures. TACs are specified such that it is unlikely that either the ABC or the OFL will be exceeded. Furthermore, catches are monitored and results indicate that TACs are not being exceeded (Wilderbuer, Nichol and Spencer. 2007).
PRECIOUS LITTLE DETAIL ON MONITORING PROCEDURES AND NOTHING GIVEN ON MECHANISMS FOR HALTING THE FISHERY WHEN TACs ARE FULLY TAKEN.

MML assessment team comment – Additional text added to section 5 and 6.7.6

1.4.2		Are clear, tested decision rules set out?	**33.3**	**90**

Clear, documented decision rules are fully implemented and have been fully reconciled with reference points and the data and assessment limitations, and have been periodically evaluated, most recently for the 2007 assessment. The decision rules have been tested within the Tier system in general but not specifically for this stock. Given the status of the BSAI flatfish stocks, management strategy evaluations are limited to projections of future biomass at the current F_{ABC}. The definition of the tiers is given in Amendment 56 of the Fishery Management Plan. The assignment of tiers was based upon the availability of data and, in particular, the ability to estimate reference points directly or indirectly using analytic models or trend analysis. The initial selection was done by the SSC and they review this annually when reviewing the assessments and the SAFE reports.
MINIMAL DESCRIPTION OF HOW THIS SYSTEM OPERATES

MML assessment team comment – Additional text added to section 5.

1.1.4.3		Are appropriate management tools specified to implement decisions in terms of input and/or output controls?	**33.3**	**90**

A range of management tools are in place and are monitored and updated regularly. Most tools are directed at output controls (e.g. catch restrictions) but input controls also exist, such as gear restrictions NEITHER DESCRIBED NOR DISCUSSED, seasonal and area closures AREAS NAMED BUT NO CHART, THEREFORE, NO INFORMATION GIVEN ON THEIR SIZE OR EFFICACY. The tools used are appropriate, responsive and can be changed in a timely fashion as required. WH BY; HOW? Given the status of the Arrowtooth flounder and other flatfish stocks, there has not been a lot of interest NONE OF WHICH COMES OUT IN THE REPORT in changing the control measures (current methods are working from a management standpoint and are evaluated through comparison of empirical results with conservation and management standards, the stocks are not overfished and are not undergoing overfishing). However, alternatives which might be used in the future are not adequately evaluated.

MML assessment team comment – Table Additional text and figures added to show area closures.

1.1.5.5		Does the assessment include the consequences of current harvest strategies?	**20.0**	**90**

The assessment outputs include the consequences of current harvest strategies and forecasts NEITHER SHOWN NOR DISCUSSED future consequences NOT DISCUSSED of those strategies and also evaluate stock trajectories NEITHER SHOWN NOR DISCUSSED under the operating decision rules (Hiatt et al, 2007).

1.3.1.1		Is the age/sex/genetic structure of the stock monitored so as to detect any impairment of reproductive capacity?	**50**	**90**

Data are available on the sex and size structure, based on adequate sampling and verification from the observer program for these stocks, and the relationship of these to reproductive capacity. NEITHER DISCUSSED NOR DEMONSTRATED The data are included in the assessment models to indicate changes in recruitment age-structure and reproductive output, culminating in stock-recruitment relationships NEITHER DISCUSSED NOR DEMONSTRATED. Spatial attributes NEITHER DISCUSSED NOR DEMONSTRATED of the stock from the survey NEITHER DISCUSSED NOR DEMONSTRATED and fishery data does not suggest distinct genetic sub-populations. Monitoring is continuing to collect such information NEITHER DISCUSSED NOR DEMONSTRATED on a time scale appropriate to the species and fishery. Observed survey and age frequency data are compared to the estimates from the population models to indicate the uncertainty in understanding of these factors (Wilderbuer, Nichol and Spencer. 2007).

MML assessment team comment – Additional text added, additional recruitment trend figures have been added.

1.3.1.2		Does information indicate any changes in structure that would alter reproductive capacity?	**50.0**	**75**

Baseline and subsequent routine stock structure analyses have not been conducted for these species that would permit structural change to be observed.
Any changes in growth within part or all of the area may affect reproductive capacity; however, no temporal change in growth has been reported to date. Also, although seasonal selectivities NEITHER DISCUSSED NOR DEMONSTRATED are fitted, they are treated as constant over the period of the assessment model suggesting a fairly stable size/age structure in terms of proportions at age.
The score would have been higher if there was an evaluation to show that the fishery had no harmful effects on stock structure in relation to reproductive capacity. NOT DISCUSSED IN RERPORT

MML assessment team comment – Additional text added, additional recruitment trend figures have been added.

Principle 2				
2.1.1.1		Are the nature, sensitivity and distribution of habitats relevant to the fishing operations known?	**33.3**	**90**

The nature, sensitivity and distribution of habitats relevant to the fishing operations are well known for Arrowtooth flounder
Comprehensive substrate data sets do exist for the BSAI. BSAI bathymetry is also well understood. The nature, sensitivity, and distribution of these habitats relevant to fishing operations are known – BUT ARE NEITHER DISCUSSED EXPLICITLY NOR ILLUSTRATED IN THE REPORT (EIS EFH). MML Comment – Additional text and figure provided
The distribution of each species of the flatfish species in the environment and in relation to fishing effort and catch distribution is known in some detail– BUT ARE NEITHER DISCUSSED EXPLICITLY NOR ILLUSTRATED IN THE REPORT, e.g. BSAI SAFE 2007 (chapter. 7: Witherell & Nichol).
Evidence is available to demonstrate the substrate and water column preferences of each species of flatfish at their different life history stages (eggs, larvae, early juveniles, late juveniles and adults) in the different areas of the – BUT ARE NEITHER DISCUSSED EXPLICITLY NOR ILLUSTRATED IN THE REPORT BSAI (BSAI FMP 2005).
The distribution and effort of the trawl fishery is recorded by fishers and monitored through the Observer Program, logbook recording scheme and VMS data collection– BUT ARE NEITHER DISCUSSED EXPLICITLY NOR ILLUSTRATED IN THE REPORT. MML Comment – Additional text provided

2.1.1.2		Is information available on the trophic position, status and relationships of the target species within the food web?	**33.3**	**90**

Qualitative and some quantitative information is available on the diet of Arrowtooth flounder and how this changes with age/size.
The trophic position of Arrowtooth flounder is generally good. WHAT DOES THIS SENTENCE MEAN? AN ORGANISM 'TROPHIC POSITION IS WHAT IT IS – PERIOD. MML Comment – additional text provided. There is scope to improve the detail in a number of areas. For example, Arrowtooth flounder juvenile diet is rather poorly understood but the adult diet is well understood and the position of this species in the wider trophic framework is also relatively well understood with Arrowtooth flounder forming a small component of the diets of Pacific cod, Pacific halibut and yellowfin sole compared to the other flatfish (NPBSAI SAFE, 2007).
The SAFE document series provides some time-series of information on the understanding of flatfish in the ecosystem. BUT IS NEVER DISCUSSED IN THIS CONTEXT – MML Comment – the following sentence and reference provides this information.
These and other data have been used to estimate trophic positions and the relative ecological importance of the various flatfish, including Arrowtooth flounder, as a target species, within the food web (Aydin *et a*l. 2007, NOAA TM 178).

2.1.1.3		Is there information on the potential for the ecosystem to recover from fishery related impacts?	**33.3**	**90**

Ecosystem models of the BSAI have been constructed using data from a wide variety of sources. These models provide the basis for our understanding of the main elements of the structure and functioning of the ecosystem relevant to the fishery (Aydin *et al.* 2007). Essential fish habitat analyses have provided preliminary estimates of the recovery potential of soft and hard bottom habitats. BUT NONE OF THIS IS DISCUSSED IN THE REPORT MML Comment – Additional text added EFH studies and review of other work elsewhere in relation to bottom damage by trawls and recovery. BUT NONE OF THIS IS DISCUSSED IN THE REPORT MML Comment – Additional text added

2.1.2	**General risk factors are adequately determined.**		**20**	**81**
2.1.2.1		Is information available on the nature and extent of the by-catch (capture of non-target species)?	**30**	**80**

The Observer Program routinely collects quantitative information on non-target species directly affected by the fishery, especially the fish and shellfish. BUT NONE OF THIS IS PRESENTED IN THE REPORT MML Comment – Additional text added

For the more frequently affected non-target species, data from sampling is considered sufficient to estimate by-catch rate with reasonable precision. BUT NONE OF THIS IS DISCUSSED IN THE REPORT

There have been a number of *ad hoc* studies by, for example, Melvin *et al*. on various Alaskan fisheries that provide considerable information about seabird by-catch and mitigation. BUT NONE OF THIS IS DISCUSSED IN THE REPORT MML Comment – Additional text added

A higher score is achievable through, for example, improving the range and quality of the information available about by-catch species, especially those where fishery related impacts may be expected to be greatest, such as with the elasmobranches – AGREED, BUT IT SHOULD BE DISCUSSED IN THE REPORT.

Research is underway to identify seabirds from body parts, which will assist in reducing the unidentified component of seabird mortalities.

Impacts and acceptable limits have been estimated for protected species, such as short tailed albatross, but have not been determined for other impacted birds such as the Northern fulmar.

2.1.2.2		Is information available on the extent of discard and slippage (where a part or the total catch may be deliberately released without being hauled aboard due to, for example, the catch of the wrong species or high grading)?	**30**	**90**
The Observer Program allows routine estimates of discards in the flatfish trawl fisheries. BUT NONE OF THIS IS DISCUSSED IN THE REPORT MML Comment – Additional text added Compliance is monitored through the Observer Program. The high level of knowledge has enabled regulatory controls to be implemented to monitor and control the most important aspects of by-catch in the flatfish fisheries of invertebrates, fish, marine mammals, reptiles, and birds. BUT NONE OF THIS IS DISCUSSED IN THE REPORT MML Comment – Additional text added There appears to be no information about the levels of slippage in the fishery. Anecdotal reports suggest that slippage does not occur to any significant extent within the fishery. BUT NONE OF THIS IS DISCUSSED IN THE REPORT MML Comment – The team has made a recommendation to gain further information on this.				

2.1.3.1		Is there adequate knowledge of the physical impacts on the habitat due to use of gear?	**50**	**85**
NO DISCUSSION OF THIS TOPIC IN THE REPORT AT ALL MML Comment – Additional text added				

2.1.4.1		Levels of acceptable impact are determined and reviewed.	**50**	**80**
NO DISCUSSION OF THIS TOPIC IN THE REPORT AT ALL MML Comment – Additional text added				

2.1.4.2		Are management strategies in place to address impact identification and avoidance/reduction?	**50**	**85**
NO DISCUSSION OF THIS TOPIC IN THE REPORT AT ALL MML Comment – Additional text added				

2.1.5.1		Does the removal of target stocks have unacceptable impacts on ecosystem structure and function? **If there is evidence of depletion of non-target species, then Criteria 2.3 should also be addressed.**	**25**	**90**
NO DISCUSSION OF THIS TOPIC IN THE REPORT AT ALL - MML Comment – Additional text added				

2.1.5.2		Does the removal of non-target stocks have unacceptable impacts on ecosystem structure and function? **If there is evidence of depletion of non-target species, then Criteria 2.3 should also be addressed.**	**25**	**85**
There is no general evidence of significant depletion of non-target species by the fishery based on the observed levels of by-catch and both ecosystem and by-catch studies. Specific species of concern, due to low population numbers, restricted breeding sites, low reproductive rates and/or slow growth rates would typically include deepwater species of fish and large, late maturing seabirds. Adequate information is available for most of these species e.g. grenadiers, which are defined as not depleted in the SAFE 2007. Some species may be being more impacted than desirable (e.g. some seabirds, some sharks rays and sculpin) and further data and analyses on these would be desirable but there is no suggestion that the fishery impact on these species is adversely affecting ecosystem structure or function. For example, the annual by-catch of sculpin in the BSAI ranges between 1-4 percent of annual survey biomass estimates, however little is known of the species breakdown of this by-catch (BSAI FMP 2005), such losses do, however, need to be balanced against, the reduced predation of these species by some of the flatfish species as a direct effect of the removal of flatfish in the trawl fishery. WHY IS THIS NOT INCLUDED IN THE NARRATIVE REPORT? MML Comment – The report and table should be read together				

2.1.5.3		Does the fishery have unacceptable impacts on habitat structure? **(Management measures related to habitat are considered under Principle 3)**	**25**	**90**
NO DISCUSSION OF THIS TOPIC IN THE REPORT AT ALL MML Comment – Additional text added				

2.1.5.4		Are associated biological diversity, community structure and productivity affected to unacceptable levels? **If there is evidence of depletion of non-target species, then Criteria 2.3 should also be addressed.**	**25**	**80**
Based on substantive and extensive ecosystem studies, supported by the overall 2 million mt regional removals cap, secondary removal limits (ABCs & TACs) as well as a extensive network of MPAs, trophic impacts are not considered unacceptable. Benthic communities are not indicative of significant impacts NOT DISCUSSED, with on-going monitoring NOT DESCRIBED through the research surveys NOT DESCRIBED but some elements require further determination . MML Comment – Additional text added There is extensive protection of benthic habitats through the application of MPAs and closed areas both for protection of the benthic communities and also for crab, other fish, bird and mammal species. By-catches (including non-target species) NO DETAILS PROVIDED MML Comment – Details are provided in table 10 are not indicative of significant impacts, but some elements require further determination. Modelling studies (Aydin *et al.* (2007) indicate that other predators are not significantly affected by changes in the survival of most prey species. Impacts on biological diversity, community structure and productivity appear acceptable and reversible.				

2.2.1.1		Is there information on the presence and populations of protected, endangered or threatened (PET) species?	**33.3**	**90**
NO DISCUSSION OF THIS TOPIC IN THE REPORT AT ALL MML Comment – Additional text added				

2.2.1.2		Are interactions of the fishery with such species adequately determined?	**33.3**	**75**
NO DISCUSSION OF THIS TOPIC IN THE REPORT AT ALL MML Comment – Additional text added				

2.2.1.3		Do interactions pose an unacceptable risk to such species?	**33.3**	**85**
ALL THIS TEXT SHOULD BE IN THE NARRATIVE REPORT MML Comment – Additional text added				

2.2.2.1		Are management objectives and accompanying strategies in place in relation to impact identification and avoidance/reduction?	**100**	**90**
There is a well developed approach to the management of interaction between the fishery and PET species. This includes for example, the very clear objectives in this regard in the FMP; the detailed objectives of the Observer Program – WHICH IS NEVER PRESENTED TO THE READER MML Comment – Additional text added; the development and application of seabird by-catch and incidental catch reduction actions (e.g. tori lines) NOT DISCUSSED; on–going seabird take reduction research (Dietrich *et al.* 2007) NOT DESCRIBED; MPAs and closed areas around sea lion rookeries; and seabird research plans under the PSEIS.				

Principle 3			**33.3**	**93**
3A.1.1		Are organisations with management responsibility clearly defined including areas of responsibility and interactions?	**25.8**	**100**
THE BODIES UNDOUBTEDLY EXIST BUT THE REPORT ONLY GIVES A MINIMALIST OUTLINE OF WHO IS RESPONSIBLE TO WHOM AND HOW MML Comment – Section 6 clearly sets out the organisations and management responsibilities and interactions.				

3A.2.1		Is the fishery consistent with International Conventions and Agreements?	**33.3**	**100**
NO DISCUSSION OF INTERNATIONAL CONVENTIONS, AGREEMENTS OR INTERACTIONS IN NARRATIVE REPORT. MML Comment – As stated previously, the narrative of the report and the scoring table should be read together. There is little merit in replicating text in what is already a lengthy document				

3A.3 *(MSC Criteria 2, 5, 7)*	**The management system includes strategies to meet objectives including consultative procedures and dispute resolutions.**		**11.9**	**94**
3A.3.1		Does the management system contain clear short and long-term objectives?	**16.7**	**95**
NO EXPLICIT DESCRIPTION IN REPORT MML Comment – Section 6.4 clearly sets out the objectives within the management system. These constitute both short and long term objectives				

3A & B		ALL THIS TEXT GIVEN UNDER 3A SHOULD BE IN THE NARRATIVE REPORT, NOT HERE. MML – Some but not all of the text is provided in the narrative of the report. This is a stylistic point and one that has been dealt with earlier in the response to the peer reviewer.	**16.7**	**90**

APPENDIX C

Client Action Plan

Draft Client Action Plan for Meeting the Conditions For Certification of the Bering Sea/Aleutian Islands (BSAI) Trawl Flatfish Fisheries

The Best Use Coalition (BUC) submits this Action Plan for Meeting the Conditions for Certification of the Bering Sea/Aleutian Islands (BSAI) trawl flatfish fisheries for northern Rocksole, Yellowfin sole, Arrowtooth flounder, and Flathead sole. The BUC agrees to make a good faith effort to meet the intent of the Conditions set forth in the certifier's May 2009 Draft Report determining that the BS/AI trawl flatfish fisheries listed above are sustainably managed under the MSC Principles and Criteria. Furthermore, BUC recognizes its responsibility as the Applicant/Licensee in the certified fishery to comply with annual surveillance audits by an accredited MSC certification body. Pursuant to an understanding between BUC and the certification body, Moody Marine Ltd., and consistent with MSC policy, BUC is willing to assign MSC logo and labeling rights to BSAI flatfish trawl fishery participants who agree to share (pro-rata) in the cost of obtaining and maintaining the certification and to join in good faith efforts to meet the Conditions.

Best Use Coalition's Approach to Meeting the Conditions for Certification.
BUC will work with BSAI flatfish fishery participants assigned to use the MSC logo and labeling rights to give effect to this Action Plan for meeting the Conditions for the BSAI flatfish trawl fisheries listed above. BUC will also work closely with other North Pacific fishery science and management institutions such as the NOAA Fisheries' Alaska Region office (AKR) and Alaska Fisheries Science Center (AFSC), the North Pacific Fishery Management Council (NPFMC), and other important elements of the federal fishery science and management process, as necessary, in an effort to meet the Conditions established by the certification body. BUC may also enlist outside experts to assist with tasks needed to meet obligations under the Action Plan.

Proposed BUC Activities to Meet the Conditions.
Following a restatement of each proposed condition, our plan for addressing each of the three Conditions is explained.

Condition 1 - Stock Structure
The following is the narrative used for the performance indicator (PI) that was considered to be deficient (i.e. scored 75) in this area of the assessment and the associated 80 scoring guidepost (SG): **PI 1.3.1.2** - Does information indicate any changes in [stock] structure that would alter reproductive capacity? **SG 80** - Evidence exists that the fishery has not caused changes in stock structure that would affect recruitment, or, potentially adverse changes in structure are clearly identified and effective remedial measures are in place. The assessment team concluded that the score would have been higher if there was an evaluation to show that the fishery had no harmful effects on stock structure in relation to reproductive capacity. In order that this deficiency is resolved the following Condition of Certification has been set: *The client is required to provide evidence of the affect of the fishery on stock structure and whether this has had an adverse affect on recruitment. It is required that this part of the Condition is met by the second annual surveillance audit. If the evidence suggests recruitment has been adversely affected remedial measures must be implemented by year four of the certification.*

Condition 1 - Stock Structure
In order to achieve this outcome it is recommended that the client: a) Evaluates the evidence of change in the stock structure in relation to reproductive capacity and relate this to the activities of the fishery. b) If there is evidence of a potentially damaging change in stock structure caused or assumed to be caused by the fishery, appropriate remedial measures should be defined and implemented by year four of the certification.

BUC's Plan for Condition #1.

We have engaged in extensive discussions with stock assessment scientists at the AFSC and they have agreed to evaluate the stock structure of the Bering Sea flatfish species proposed for certification in relation to reproductive capacity and then relate this to the activities of the fishery. Their approach for this analysis is as follows: Using existing data and within the timeline specified in the above Condition, AFSC will examine several indices of reproductive capacity for the Bering Sea flatfish stocks proposed for certification. These are: 1) Fishery selectivity and age-at- first-capture to examine the fraction of the stock that has an opportunity to spawn before being harvested; 2) The relative degree to which fishing takes place on spawning fish for each flatfish target fishery; 3) Where data are available, age composition of stocks to evaluate the percentage of each stock that is comprised of fish of 20+ years; and 4) The degree to which the exploitation rate of each flatfish species is estimated to be over or under the F 50% (a fishing rate that is generally accepted to be conservative for North Pacific sub-Arctic fishes). BUC and AFSC expect that these indices will provide much of the necessary information to meet the Condition. For stocks where examination of these indices may not be conclusive, NMFS has agreed to consider implementing special projects for gonad collections for reproductive studies. Recognizing that this is an ambitious undertaking, NMFS prefers to prioritize flatfish species of the highest commercial and management interest (i.e. where exploitation rates are also likely to be the highest). NMFS will also consider a system of rotating collections to cover the other species during the five year time frame. In this manner, we agree with NMFS that it is reasonable to complete studies on the highest priority species and make significant progress on the other species.

Condition 2 – Effects of the Gear
The following is the narrative used for the performance indicator (PI) that were considered to be deficient (i.e. scored 75) in this area of the assessment and the associated 80 scoring guidepost (SG): **PI 2.1.3.2** - Is any gear lost during fishing operations and can 'ghost fishing' occur? **SG80 -** There is knowledge of the type, quantity and location of gear lost during fishing operations. Estimates can be made on the extent of adverse effects, including 'ghost fishing'. In order that this deficiency is resolved the following Condition of Certification has been set: *The client is required to quantify and identify the location of lost trawl fishing gear and assess the extent of adverse effects, including "ghost fishing". If significant adverse effects are identified identify ways of reducing gear loss and must be described and a program to monitor improving performance implemented. It is required that this Condition is met by the second annual surveillance audit.* It is recommended that in order to achieve this Condition the client develops a standard lost gear

Condition 2 – Effects of the Gear
reporting and recording scheme so that the potential impact of lost gear can be better evaluated.

BUC's Plan for Condition #2.
BUC will work with fishing companies and fishing associations involved with BS/AI flatfish to initiate a program to record trawl gear loss in the BSAI flatfish fisheries. Information on this program will be provided to the certifier within the first 12 months of certification. Some information on gear loss may be grouped so that confidentiality of sensitive location information cannot be traced to individual vessels.

BUC will also, in conjunction with flatfish fishing companies and fishing associations, implement a program to record trawl gear loss in the BSAI flatfish fisheries within the second year of certification. Given the overlap in trawl fisheries targeting flatfish and cod for some sectors of the Bering Sea trawl fleet, the program developed for flatfish will be designed to work cooperatively with the one being developed for the Bering Sea trawl cod fishery which is also responding to the same certification Condition.

Condition 3 – Protected, Endangered and Threatened (PET) Species
The following is the narrative used for the performance indicator (PI) that were considered to be deficient (i.e. scored 75) in this area of the assessment and the associated 80 scoring guidepost (SG): **PI 2.2.1.2 -** Are interactions of the fishery with such [PET] species adequately determined? **SG80 -** Adequate quantitative estimates are made of the effects of interactions directly related to the fishery. The assessment team recognised that much effort has been directed at understanding the interactions of seabirds with other fisheries in the region but considered that the interactions of the trawl fisheries with seabirds requires better quantitative definition, especially in the extent of the net sonde (third) cable in causing injury and mortality. In order that this deficiency is resolved the following Condition of Certification has been set: *The client is required to provide adequate quantitative estimates of the effects of the fishery on seabirds by the first annual surveillance audit.* It is recommended that in order to achieve this Condition the client reviews the state of knowledge of both the impacts of the fishery on seabirds and the adequacy of both current and future approaches to mitigation needs to bring together the large but fragmented literature and associated data. Such a review could also specifically assess (i) the desirability or need for additional data; and (ii) the impact of the 'third wire' in species specific seabird mortality.

BUC's Plan for Condition #3:
Based on information from the NPFMC and NOAA/NMFS website and discussions with Ed Melvin of Washington Sea Grant, a leading researcher on both longline and trawl fisheries seabird impact, BUC believes that the current flatfish trawl fisheries in the Bering Sea may already meet this condition. Data on seabird bycatch has been collected to the species level or species group level in the Alaska trawl fisheries since 1993. Gulls, alcids and some other species are lumped, because in

the case of gulls, particularly juveniles, specific species ID's are difficult even for experts. It is our understanding that shearwaters are collected by species, but are not broken out by species in the SAFE reports - this is also true of alcids - few are caught so they are lumped. The "unidentified" category results largely from sampling at night when a dark bird is taken in less than prime condition - difficult to tell a fulmar from a shearwater, but observers should always be able to tell an albatross from either of these. It is important to get the albatross ID's correct, since they are the species most vulnerable to impacts from fishing.

BUC will provide the terms of reference specified within the first 6 months as directed, and begin a review of the current and "in publication" literature on the impacts of the Bering Sea flatfish trawl fishery on seabird mortality. If the certifier decides that there are any significant gaps or insufficient information on impacts to specific species, BUC will work with the National Marine Fisheries Service (NMFS) to see if additional information can be gathered. The current estimated sea bird interactions and mortalities from the sea bird experts at NMFS AFSC along with information on the current state of knowledge regarding effects of trawl fisheries in the Bering Sea and Aleutian Islands can be found at:

http://www.afsc.noaa.gov/refm/reem/doc/Seabird%20bycatch%20tables%201993-2004_13April2006.pdf - (please see Tables 7 and 8 and Figures 10-13 for historical data on trawl seabird mortalities through 2004.

http://www.afsc.noaa.gov/refm/reem/doc/Alaska_2006seabirdbycatch.pdf - (please see Tables 4-6 for estimated sea bird mortalities in trawl fisheries in 2006).