

## MOODY MARINE LTD

Authors: Bob Mohn, Geoff Tingley, Susan Hanna, Paul Knapman

Final Report for

### **THE GULF OF ALASKA PACIFIC COD TRAWL FISHERY**

Client: Alaska Fisheries Development Foundation, Inc (AFDF)

**Certification Body:**

Moody Marine Ltd  
Moody International Certification  
28 Fleming Drive  
Halifax  
Nova Scotia  
Canada  
B3P 1A9

Tel: +1 (902) 489 5581

**Client Contact:**

Jim Browning  
Executive Director  
Alaska Fisheries Development Foundation  
431 West Seventh  
Suite 106  
Anchorage  
Alaska, 99501

+1 (907) 276-7315

# CONTENTS

<b>SUMMARY .....</b>	<b>4</b>
<b>1. INTRODUCTION .....</b>	<b>6</b>
1.1 THE FISHERY PROPOSED FOR CERTIFICATION .....	6
1.2 REPORT STRUCTURE AND ASSESSMENT PROCESS .....	7
1.3 INFORMATION SOURCES USED.....	8
<b>2 GLOSSARY OF ACRONYMS AND ABBREVIATIONS USED IN THE REPORT.....</b>	<b>12</b>
<b>3 BACKGROUND TO THE FISHERY .....</b>	<b>14</b>
3.1 BIOLOGY OF THE TARGET SPECIES .....	14
3.2 HISTORY OF THE FISHERY .....	15
3.3 PACIFIC COD FISHING .....	17
<b>4 FISHERY LOCATION, ADMINISTRATIVE BOUNDARIES AND RESPONSIBILITY.....</b>	<b>24</b>
4.1 ADMINISTRATIVE CONTEXT AND LEGISLATION.....	24
4.2 GOA MANAGEMENT AREAS.....	24
4.3 INTERNATIONAL WATERS.....	24
4.4 FOREIGN FISHING .....	25
4.5 STATE WATERS .....	25
<b>5 STOCK ASSESSMENT.....</b>	<b>26</b>
5.1 STOCK DEFINITION .....	26
5.2 FECUNDITY AND GROWTH.....	26
5.3 ABUNDANCE INFORMATION .....	27
5.4 UNCERTAINTY .....	28
5.5 STOCK RECRUIT RELATIONSHIP.....	28
5.6 SELECTIVITY .....	28
5.7 ASSESSMENTS AND STOCK STATUS .....	29
5.8 HARVEST REFERENCE POINTS .....	29
5.9 HARVEST CONTROL RULES .....	<b>ERROR! BOOKMARK NOT DEFINED.</b> 30
<b>6 FISHERIES MANAGEMENT FRAMEWORK, PROCESSES AND INTERACTIONS .....</b>	<b>32</b>
6.1 THE GROUND FISH FISHERY MANAGEMENT PLAN FOR THE GULF OF ALASKA MANAGEMENT AREA.....	32
6.2 NATIONAL STANDARDS FOR FISHERY CONSERVATION AND MANAGEMENT .....	32
6.3 THE NPFMC MANAGEMENT APPROACH.....	32
6.4 MANAGEMENT OBJECTIVES .....	33
6.5 ADVISORY COMMITTEE ROLES.....	35
6.6 CONSULTATIONS.....	37
6.7 ALASKA STATE WATERS MANAGEMENT .....	38
6.8 FISHERIES MANAGEMENT METHODOLOGY .....	39
6.9 CONSERVATION, PROTECTION, AND COMPLIANCE.....	42
<b>7 ECOSYSTEM CHARACTERISTICS.....</b>	<b>47</b>
7.1 INTRODUCTION .....	47
7.2 THE FOOD WEB .....	48
7.3 BY-CATCH AND DISCARDING .....	50
<b>8 OTHER FISHERIES RELEVANT TO THIS ASSESSMENT .....</b>	<b>52</b>
<b>9 STANDARD USED .....</b>	<b>53</b>
9.1 PRINCIPLE 1 .....	53
9.2 PRINCIPLE 2 .....	53
9.3 PRINCIPLE 3 .....	54
<b>10 BACKGROUND TO THE EVALUATION.....</b>	<b>56</b>

10.1	EVALUATION TEAM.....	56
10.2	PREVIOUS CERTIFICATION EVALUATIONS .....	57
10.3	INSPECTION OF THE FISHERY .....	57
<b>11</b>	<b>STAKEHOLDER CONSULTATION .....</b>	<b>59</b>
11.1	STAKEHOLDER CONSULTATION .....	59
11.2	STAKEHOLDER ISSUES.....	59
<b>12</b>	<b>OBSERVATIONS AND SCORING .....</b>	<b>64</b>
12.1	INTRODUCTION TO SCORING METHODOLOGY .....	64
12.2	EVALUATION RESULTS .....	64
<b>13</b>	<b>LIMIT OF IDENTIFICATION OF LANDINGS FROM THE GOA PACIFIC COD TRAWL FISHERY .....</b>	<b>65</b>
13.1	TRACEABILITY .....	65
13.2	TRACEABILITY REQUIREMENTS WITHIN THE FISHERY .....	65
13.3	AT-SEA PROCESSING.....	65
13.4	POINTS OF LANDING .....	65
13.5	ELIGIBILITY TO ENTER CHAIN OF CUSTODY.....	65
13.6	TARGET ELIGIBILITY DATE .....	65
<b>14</b>	<b>CERTIFICATION RECOMMENDATION .....</b>	<b>66</b>
14.1	CERTIFICATION RECOMMENDATION .....	66
14.2	SCOPE OF CERTIFICATION.....	66
14.3	CONDITIONS AND RECOMMENDATIONS ASSOCIATED WITH CERTIFICATION .....	66
<b>15</b>	<b>APPENDICES.....</b>	<b>69</b>
APPENDIX A:	SCORING TABLE .....	69
APPENDIX B:	PEER REVIEW REPORTS .....	69
APPENDIX C:	CLIENT ACTION PLAN .....	69
<b>APPENDIX A</b>	<b>.....</b>	<b>70</b>
<b>APPENDIX B</b>	<b>.....</b>	<b>150</b>
<b>APPENDIX C</b>	<b>.....</b>	<b>163</b>
<b>APPENDIX D</b>	<b>.....</b>	<b>168</b>

## SUMMARY

The Alaska Fisheries Development Foundation Inc., on behalf of its members engaged in the Pacific cod fisheries in the Gulf of Alaska (GOA) and Bering Sea and Aleutian Islands (BSAI), contracted Moody Marine Ltd to undertake a Marine Stewardship Council (MSC) fisheries assessment of their trawl longline, pot and jig fisheries against the MSC environmental standard for sustainable fishing.

Eight units of certification were identified, four in the GOA (i.e. reflecting the four different methods of fishing) and, similarly four in the BSAI. This report sets out the results of the assessment of the Alaska Fisheries Development Foundation GOA Pacific Cod Trawl Fishery.

The assessment was 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:

- Dr. Bob Mohn - a Research Scientist with the Canadian Department of Fisheries and Oceans, specialising in fisheries assessment and ecosystem modelling.
- 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 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 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 despite the stock suffering poor recruitment in recent years. 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 GOA 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 Alaska Fisheries Development Foundation Gulf of Alaska Trawl Fishery be certified according to the MSC Principles and Criteria for Sustainable Fisheries subject to the following Conditions of Certification:

The Alaska Fisheries Development Foundation is required to:

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

*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 implement a program to monitor improving performance. It is required that this Condition is met by the second annual surveillance audit.*

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

The AFDF 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 Gulf of Alaska (GOA) Pacific Cod Trawl Fishery against the Marine Stewardship Council (MSC) Principles and Criteria for Sustainable Fishing.

The trawl fishery is one of four gear types used to catch Pacific cod (*Gadus macrocephalus*) in the GOA that are being assessed against the MSC Principles and Criteria. The other gears are longline, jig and pot.

For the purpose of this MSC assessment each gear type 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.

Given that the stock assessment for each fishing method and management framework for each of the four gear types is the same the structure of each report will be the same as will much of the content. Any differences in the content will be associated with section 2 of the scoring table in Appendix A.

## 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:

<b>Species:</b>	Pacific cod ( <i>Gadus macrocephalus</i> )
<b>Geographical Area:</b>	Gulf of Alaska (GOA)
<b>Method of Capture:</b>	Trawl
<b>Stock:</b>	Gulf of Alaska (GOA)
<b>Management System:</b>	Federal and state management: <ul style="list-style-type: none"><li>• National Marine Fisheries Service (NMFS)</li><li>• North Pacific Fishery Management Council</li><li>• US Coast Guard</li><li>• Alaska Department of Fish and Game (ADF&amp;G)</li><li>• Alaska Department of Public Safety</li></ul>
<b>Client Group:</b>	Successful certification of the fishery will apply to the following Alaska Fisheries Development Foundation Inc. (AFDF) members and their vessels: <ul style="list-style-type: none"><li>• United Fishermen's Marketing Association</li><li>• Peter Pan Seafoods</li><li>• Alaska Crab Coalition</li><li>• Aleutian Spray Fisheries, Inc.</li><li>• Alaska Jig Association</li><li>• Alaska Fresh Seafoods</li><li>• Jubilee Fisheries</li><li>• Glacier Fish Company</li><li>• Cape Romanzof Fisheries, B/C</li><li>• American Seafoods Company</li><li>• United Catcher Boats Association</li><li>• Trident Seafoods</li><li>• Best Use Coalition</li></ul>

- Alaska Whitefish Trawlers Association
- International Seafoods of Alaska, Inc.
- Pacific Seafood Group (dba Island Seafoods)
- North Pacific Seafoods (dba Alaska Pacific Seafoods)
- Ocean Beauty Seafoods, LLC.
- K-Bay Fisheries Association, Inc.
- Western Gulf of Alaska Fishermen
- Bering Select Seafoods
- Prowler Fisheries
- Blue North Trading Company
- Alaskan Leader Seafoods

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

The Pacific cod trawl fishery in the Bering Sea and Aleutian Islands (BSAI) and operated by AFDF members is also under assessment by Moody Marine Ltd. Both of the fisheries have been identified as separate units of certification. This means that separate reports will be produced for each of them.

## **1.2 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 Pacific cod 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 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.

The intention of the earlier sections of the report is to provide the reader with background information to interpret the scoring commentary in context.

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 is 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.

### **1.3 Information sources used**

Information used in the main assessment has been obtained from interviews and correspondence with stakeholders in the Pacific cod 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 – AFDF.

#### **Other information sources**

Published information and unpublished reports used during the assessment are:

Alaska Department of Fish and Game. 2008. Pacific Cod Fisheries in Alaska.  
<http://www.cf.adfg.state.ak.us/geninfo/finfish/grndfish/pcod/pcodhome.php>

Alaska Department of Fish and Game. 2009a. Division of Commercial Fisheries News Release: 2009 Aleutian Islands District State-Waters Pacific Cod A Season Opening Announced.  
<http://www.cf.adfg.state.ak.us/region4/finfish/grndfish/2009/nr090319.pdf>

Alaska Department of Fish and Game. 2009b. Division of Commercial Fisheries News Release: 2009 Aleutian Islands District State-Waters Pacific Cod A Season Reopening Announced, Emergency Order #4-GF-09-09.  
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## 2 GLOSSARY OF ACRONYMS AND ABBREVIATIONS USED IN THE REPORT

ABC	Acceptable Biological Catch
ACRs	Agenda Change Requests
ADF&G	Alaska Department of Fish and Game
ADMB	Auto-differentiator Model Builder
AFA	American Fisheries Act
AFDF	Alaska Fisheries Development Foundation
AFSC	Alaska Fisheries Science Center
AI	Aleutian Islands
AP	Advisory Panel
B	Biomass
B <sub>40%</sub>	Biomass equal to 40% of the equilibrium spawning biomass that would be obtained in the absence of fishing
BOF	Board of Fisheries
CDQ	Community Development Quota
CIE	Center for Independent Experts
CV	Catcher Vessel
CP	Catcher Processor
CRP	Comprehensive Rationalization Program
cv	Coefficient of variation
EBS	Eastern Bering Sea
EEZ	Exclusive Economic Zone
EFH	Essential Fisheries Habitat
ESA	Endangered Species Act
F	Fishing mortality
F <sub>40%</sub>	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 <sub>ABC</sub>	Fishing mortality rate used to set ABC – Acceptable Biological Catch
FIT	Fishery Interactions Team
FMP	Fishery Management Plan
FOB	Free on Board
F <sub>OFL</sub>	The fishing mortality rate used to set OFL
GHL	Guideline Harvest Level
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
ITAC	Initial total allowable catch
IUU	Illegal, unreported unregulated
JEP	Joint Enforcement Program
LAPP	limited access privilege program
LEI	Long-term Effects Indices
LCP	Longline Catcher Processors
LCV	Longline Catcher Vessels
LLP	Longline Processor
LLP	Licence Limitation Program

LOA	Length Overall
M	Natural mortality rate
MFMT	Maximum Fishing Mortality Threshold
MMPA	Marine Mammal Protection Act
MPA	Marine Protected Area
MSA	Magnuson Stevens Act
MSC	Marine Stewardship Council
MSY	Maximum Sustainable Yield
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
OFL	Overfishing level
OIG	Office of the Inspector General
PCP	Pot Catcher Processors
PCV	Pot Catcher Vessels
PDF	Probability Density Functions
PI	Performance Indicator
PPM	Parts Per Million
PPT	Parts Per Thousand
PSC	prohibited species catch
Q	catchability coefficient
RSW	Refrigerated Salt Water
SAFE	Stock Assessment and Fisheries Evaluation
SG	Scoring Guidepost
SLP	Sea-level pressure
SOPPs	Statement of Organization, Practices and Procedures
SS1	Stock Synthesis 1
SSB	Spawning Stock Biomass
SSC	Scientific and Statistical Committee
TAB	Technical Advisory Board (for the MSC)
TAC	Total Allowable Catch
TALFF	Total Allowable Level of Foreign Fishing
TCP	Trawler Catcher Processors
TCV	Trawler Catcher Vessels
USCG	US Coast Guard
USFWS	U.S. Fish and Wildlife Service
VMS	Vessel Monitoring System

### 3 BACKGROUND TO THE FISHERY

#### 3.1 Biology of the target species

The most recent Stock Assessment and Fishery Evaluation (SAFE) document) and Thompson et al. (2007) provides the following summary of the GOA Pacific cod resource:

*“Pacific cod (Gadus macrocephalus) is a transoceanic species, occurring at depths from shoreline to 500m. The southern limit of the species’ distribution is about 34°N latitude, with a northern limit of about 63° N latitude. Pacific cod is distributed widely over the eastern Bering Sea (EBS) as well as in the Aleutian Islands (AI) area. The resource in these two areas (BSAI) is managed as a single unit. Tagging studies (e.g., Shimada and Kimura 1994) have demonstrated significant migration both within and between the EBS, AI, and Gulf of Alaska (GOA). Although at least one previous genetic study (Grant et al. 1987) failed to show significant evidence of stock structure within these areas, current genetic research underway at the Alaska Fisheries Science Center may soon shed additional light on the issue of stock structure of Pacific cod within the BSAI (M. Canino, AFSC, pers. comm.). Pacific cod is not known to exhibit any special life history characteristics that would require it to be assessed or managed differently from other groundfish stocks in the EBS or AI areas.”*

In the late winter, Pacific cod converge in large spawning masses over relatively small areas. Spawning takes place in the sublittoral/bathyal zone near the bottom. In the GOA, this habitat occurs along the continental shelf and slope, between about 40 to 290 m. The eggs sink to the bottom and are somewhat adhesive (Hirschberger and Smith 1983). Optimal temperature for incubation is 3 to 6° C, optimal salinity is 13 to 23 ppt, and optimal oxygen concentration is from 2 to 3 ppm saturation. Little is known about the optimal substrate type for egg incubation.

The larvae are epipelagic, occurring primarily in the upper 45 m of the water column shortly after hatching, and they move downward in the water column as they grow. Adults occur in depths from the shoreline to 500 m. Average depth of occurrence tends to vary directly with age for at least the first few years of life, with mature fish concentrated on the outer continental shelf. Preferred substrate is soft sediment, from mud to clay sand.

Pacific cod are omnivorous. In terms of percent occurrence, the most important food items in the BSAI and BSAI are polychaetes, amphipods, and crangonid shrimp. In terms of numbers of individual organisms consumed, the most important items are euphausiids, miscellaneous fishes, and amphipods. In terms of weight of organisms consumed, the most important items are pollock, fishery offal, and yellowfin sole. Small Pacific cod were found to feed mostly on invertebrates, while large Pacific cod are mainly piscivorous (Livingston 1991b). Predators of Pacific cod include halibut, salmon shark, northern fur seals, Steller sea lions, harbor porpoises, various whale species, and tufted puffins (Westrheim 1996).

Although maximum ages from the surveys are not reported, the 2008 assessment (Thompson et al. 2008) shows the age composition from surveys from 1987 to 2005. The oldest group is 12+ and it shows that fish in this group are quite rare ranging from 0% in 1987 to 0.27% in 2005. Stark (2007), reports that the age of 50% maturity is 4.4 years which corresponds to a length of 50 cm. The size of maturity may be compared to the size of first capture by the various gears. However, this selectivity has changed over time, so for simplification they will be taken from the most recent period, 2005 (Thompson et al 2008, Table 2.18a). For the trawl fishery, although seasonal, the size of first capture (defined as 5% selectivity) is about 40 cm. The longline and pot fisheries first

capture is larger, 48 cm. These sizes correspond to age 3 fish. No separate jig information was reported, but as it is also a hook and line gear, selectivity is similar to that of longline.

### 3.2 History of the fishery

Pacific cod is the oldest groundfish fishery off Alaska. The oldest fisheries in the GOA are the native subsistence fisheries for Pacific halibut, cod, herring, and other species. Catches were traded or sold to the Russians and later to the Americans after the purchase of Alaska by the United States in 1867. Groundfish and herring are still important sources of food to many groups of Alaskan natives, although these subsistence harvests are now dwarfed by commercial operations. Of the groundfish species, cod and rockfish are the most extensively utilized, with flounders and greenling as lesser contributors. Southcentral Alaska has a much lower level of subsistence use than other areas of the GOA (NOAA 2004a).

Subsistence resource use by residents of groundfish communities in the Alaska Peninsula and Aleutian Islands (Unalaska, Akutan, Sand Point, and King Cove) ranges from about 200 to over 450 pounds per capita. Groundfish ranges from about 4 to 9 percent of total subsistence resource consumption, primarily cod and rockfish. Residents of the City of Kodiak are reported to harvest and consume about 151 pounds of subsistence resource per capita, and groundfish average about 8 percent of the total per capita subsistence consumption (12 pounds per capita), with cod, rockfish, and greenling as primary species. In Southeast Alaska, specifically the communities of Petersburg, Sitka, and Yakutat, total subsistence resource consumption ranges between about 200 and 400 pounds per capita, with groundfish ranging between 1 and 5 percent of the total annual consumption, and the primary species flounder, cod, rockfish, and greenling (NOAA 2004a).

Relatively minor recreational fisheries for flounder, Pacific cod, and greenling exist near coastal population centers in the Southeast and Southcentral regions of Alaska. Recreational use of rockfish and Pacific cod accounted for 4 percent of all sport fish harvest in Alaska (Walker *et al.* 2005).

The first commercial groundfish fishery in the GOA was an 1867 American setline fishery for cod. Later U.S. fisheries developed on halibut, sablefish, and other groundfish. Canadians were involved in fisheries in the GOA from the beginning of this century and directed most of their effort on halibut (NPFMC 2008a).

The commercial fishery for halibut began in coastal waters off Washington and British Columbia and expanded from there into the GOA after World War I. In 1923 the United States and Canada ratified a halibut conservation treaty to regulate the fishery and to conduct research. The convention established the International Fisheries Commission, which was changed to the International Pacific Halibut Commission in 1953 (NPFMC 2008a).

The early domestic fishery for Pacific cod peaked at about 1920 and then declined. In the 1970s, foreign fleets fished Pacific cod in the GOA. During the early 1980s U.S. domestic trawl fishery and joint venture fisheries began playing an increasingly prominent role, and by 1991 the Pacific cod fishery was a completely domestic fishery (NPFMC 2004, cited in Woody *et al.* 2005).

In 1993, the Council apportioned 90 percent of GOA Pacific cod TAC to the inshore<sup>1</sup> sector and 10 percent to the offshore sector. State water fisheries for pot and jig gear began in 1997, and guideline harvest levels (GHLs) have since been set at a percentage of the federal GOA quota in each regulatory area. Beginning in 1998, the Improved Retention/Improved Utilization (IR/IU)

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<sup>1</sup> The terms “inshore” and “offshore” refer to processing sectors and are explained in more detail in section 3.3.2:

program was implemented, requiring full retention of all Pacific cod caught. Cod harvests by trawl fisheries in the exclusive economic zone (EEZ) have been constrained by halibut bycatch limits (NPFMC 2008a).

State-waters fisheries for Pacific cod began in 1997 in the Prince William Sound, Cook Inlet, Chignik, Kodiak, and the South Alaska Peninsula districts of the Gulf of Alaska. Management plans approved by the Alaska Board of Fisheries for all five districts have some common elements focused on gear and area limitations (ADFG 2008).

The Asian trawl fisheries on GOA groundfish began in 1962 when a Soviet fleet of 70 trawlers and support ships targeted on Pacific Ocean perch, an abundant groundfish of the outer continental shelf and upper slope. Foreign fisheries expanded rapidly in the 1960s, targeting Pacific Ocean Perch and later pollock, sablefish, flounder, rockfish, Pacific cod, Atka mackerel, and squid.

With the implementation of the 1976 Fishery Conservation and Management Act of 1976 (later amended to the Magnuson-Stevens Fishery Conservation and Management Act (MSA)), the exploitation and management of the fisheries resources of the GOA began to change. The enactment of the MSA in 1976 established NPFMC and gave it 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. Domestic commercial groundfish fisheries steadily increased after 1978. Between 1978 and 1990, joint venture partnerships between U.S. catcher vessels and foreign processing vessels helped to build up U.S. capacity. Since 1991, the entire GOA groundfish harvest and processing has been entirely domestic (NPFMC 2008a).

By 1988 domestic capacity was sufficient to harvest the groundfish TAC and was still expanding rapidly. In 1996, NPFMC enacted the License Limitation Program (LLP), a more restrictive form of limited access. This in turn allowed in more vessels than were necessary to prosecute the fisheries, leading to several amendments to the BSAI and GOA groundfish fishery management plans (FMPs) focusing on limiting catches to sustainable levels and the various user groups to focus on securing shares of the TAC. The FMP amendments have included direct allocations of quotas for particular species or species groups to groups of vessels as delineated by gear type, vessel size, mode of operation (NPFMC 2004a).

In October 1998, Congress enacted the American Fisheries Act (AFA) which has had a profound effect on the management of groundfish fisheries in the BSAI and, to a lesser extent, the groundfish fisheries in the GOA. The AFA changed the inshore/offshore allocation of pollock and allowed the formation of cooperatives among factory trawlers and catcher vessels. Sideboard limits were put in place to prevent AFA participants from catching more than their traditional levels of other groundfish, including Pacific cod (NOAA 2004a; NPFMC 2008d).

In response to the rapid Americanization, NPFMC initiated a Comprehensive Rationalization Program (CRP) in 1992 to "maintain the health of the marine ecosystem to ensure the longterm conservation and abundance of the groundfish and crab resources.

In the years following Americanization of the fisheries and initiation of the CRP, several amendments were approved that have resulted in limiting the number of participants and the types of groundfish harvest activities in which they engage, some of which specifically affect Pacific cod. A moratorium on new harvesting vessels entering the groundfish fisheries was implemented through GOA Amendment 28. The moratorium reduced the possibility of significant increases in

the number of large-capacity harvesting vessels actively participating in the groundfish fisheries. In 1992 Amendment 23 to the GOA Groundfish FMP allocated 90 percent of the GOA Pacific cod TAC to vessels catching Pacific cod for processing by the inshore component, and 10 percent of the GOA Pacific cod TAC to vessels catching Pacific cod for processing by the offshore component. The inshore and offshore allocations reduced the possibility that processing by one sector could negatively affect harvesting and processing by the other sector. However, open access conditions and excess capacity continued in both the inshore and offshore sectors resulting in intense competition and potential economic instability (NOAA 2004a).

Pacific cod is now the second most dominant species in the commercial groundfish catch off Alaska. About 80% of the total commercial Pacific cod catch off Alaska is harvested in the BSAI, with the remaining 20% from the GOA (Hiatt et al. 2007). The GOA Pacific cod resource is targeted by multiple gear and operation types, principally by pot, trawl, and hook-and-line catcher vessels and hook-and-line catcher processors. Smaller amounts of Pacific cod are harvested by other sectors, including catcher vessels using jig gear. Separate TACs are identified for Pacific cod in the Western, Central, and Eastern GOA management subareas, but the TACs are not divided among gear or operation types. This results in a derby-style race for fish and competition among the various gear types for shares of the TACs (NPFMC 2008g).

Since the 1992 Pacific cod allocation, the FMP has been amended several more times to include a variety of measures that affect the GOA Pacific cod fishery: revise Pacific cod gear allocations (Amendments 40, 51 ); create limited license program (Amendment 41); create more conservative definition of overfishing (amendment 44); Implement an Increased Retention/Increased Utilization program for pollock and Pacific cod (Amendment 49); implement Essential Fish Habitat (EFH) provisions (Amendment 55); revise the overfishing definition (Amendment 56); change licensing requirements (Amendment 58); close areas to groundfish fishing (Amendments 58, 60); establish new habitat areas of particular concern (HAPCs) and revised identification processes (Amendment 65); revised management policies and objectives (Amendment 74) (NPFMC 2008a).

### **3.3 Pacific cod fishing**

The NPFMC designates five management categories of finfish and invertebrate species: prohibited (must be returned to the sea when caught), target (individual TAC), other (aggregate TAC), forage (targeted harvest is prohibited; maximum of 2 percent retainable bycatch), and non-specified (all species not included in one of the other categories). Pacific cod is designated a target species (NPFMC 2007).

Pacific cod is the second major species (after pollock) in the commercial groundfish catch in the GOA. Pacific cod is one of the most valuable species targeted by the remaining open access fisheries in the GOA. The GOA Pacific cod resource is fished by multiple gear and operation types, principally trawl, pot and hook-and-line catcher vessels, and hook-and-line catcher processors. Smaller amounts of cod are taken by other sectors, including catcher vessels using jig gear. Pot trawl and longline are used predominantly in federal waters; pot and jig are only allowed to be used in the state water fisheries (NPFMC 2008d). The following sections provide a description of the gear types and their operation (Hiatt et al 2007).

#### **3.3.1 The fishing gears and their operation**

##### **3.3.1.1 Trawl**

The Pacific cod bottom trawl fishery in the GOA takes place at very low effort levels (fewer than 25 hauls/25 km<sup>2</sup> summed over the 1990 to 2002 period) on the east and south side of Kodiak Island in the central GOA and throughout the eastern portion of the western GOA. Concentrations of

effort (more than 105 hauls/25 km<sup>2</sup> summed over the 1990 to 2002 period) occur on the southern and eastern sides of Kodiak, as well as to the east of Sanak Island. No trawling is permitted within state waters.

The inshore fishery is prosecuted by non-pelagic bottom trawls. Vessels participating in this fishery are shore-based catcher vessels from 58 to 125 feet and ranging from 350 to 1,600 hp. The gear used includes many different types of bottom trawls, most typically having a headrope to footrope vertical distance rise of 2 to 5 fathoms. Typical footrope length is from 90 to 120 feet. Wing-end spread is typically 12 fathoms with a 120 foot footrope. Net mesh gets smaller towards the intermediate and codend, with the codend typically having 5½ to 8 inch stretched mesh, hung either square or diamond. Otter board or doors are used to spread the net and keep it open during towing. Low aspect doors are made of steel and range in size from 2.5 to 6 m<sup>2</sup> with a typical horizontal length of 6 to 9 feet. Bottom contact usually is about one half or less of the horizontal length of the door. Sweeps are typically 45 fathoms. Contact with the seafloor is primarily from doors, sweeps, and footropes. Sweeps are made of wire and covered with rubber bobbins and disks ranging from 2½ to 4 inches in diameter. Footropes are covered with rubber discs and bobbins, which are 8 to 24 inches in diameter. The larger diameter bobbins are spaced at intervals of 12 to 48 inches.

The offshore fishery is also prosecuted by non-pelagic bottom trawls. Vessels participating in this fishery are catcher-processors between 98 and 200 feet LOA, with 900 to 3,500 hp. The gear used includes many different types of bottom trawls, most typically having a headrope to footrope vertical distance rise of 2 to 5 fathoms. Typical footrope length is from 120 to 190 feet. Net mesh gets smaller towards the intermediate and codend, with the codend typically having 5½ to 8 inch stretched mesh, hung either square or diamond. Otter board or doors are used to spread the net and keep it open during towing. Low aspect doors are made of steel and range in size from 5½ to 9 m<sup>2</sup> with a typical horizontal length of 9 to 12 feet. Bottom contact usually is about one half or less of the horizontal length of the door. Door spread is typically 45 fathom. Contact with the seafloor is primarily from doors, sweeps, and footropes. Sweeps are made of wire and covered with rubber bobbins and disks ranging from 2½ to 4 inches in diameter. Footropes are covered with rubber discs and bobbins, which are 8 to 24 inches in diameter. The larger diameter bobbins are spaced at intervals of 12 to 48 inches.

Trawls may be fitted with sonar systems designed to monitor net performance remotely. These third wire systems may improve catching efficiency and help vessel operators avoid net damage.

### **3.3.1.2 Trawl operation**

Fishing predominantly occurs during daylight hours. 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, and the winches are tightened. Tow duration in this fishery is variable, ranging from 1 to 4 hours depending upon catch rates, at a speed of 2.5 to 4 knots. Typically, this is done two to three times a day with the number of tows depending on catch rates. Catcher-processors may occasionally make more tows per day to keep on-board factories operating. Tows may be in a straight line, or they may be adjusted to curve around depth contours or to avoid hangs and fixed gear. They may also be pushed by current, or for other reasons. Quite often, vessels will turn around 180° while towing, making several passes in the same general area. The rough substrate in the GOA damages nets, creating an incentive to avoid rough bottom. At haulback, the setting procedure is reversed, and the codend is dumped into the fish-hold below decks.

The length range of cod retained in trawls is generally 30-110 cm (Mattes and Stichert 2008).

### **3.3.1.3 Longline**

This fishery is prosecuted by catcher vessels (ranging from 30 to 60 feet in length) and a small number of freezer longliners (catcher-processors) from 58 to 125 feet long using stationary lines. Freezer longliners use 9 mm groundline employed with 10 to 14-inch gangions spaced 3 ½ feet apart, and No. 6 to 14 modified “J” or full circle hooks. Most vessels use swivel gear and set through autobaiting equipment. For catcher vessels, the gear is similar to that described above, except that it is generally hand-baited and sets are shorter in length (1 to 3 miles). Sets are weighted to minimize movement of the groundline on the sea floor. Sets are anchored at each end with an anchor weighing 30 to 60 pounds. Many of these vessels use snap-on gear with 5/16-inch groundline. Circle hooks are typically used and are spaced 36 to 42 inches apart. Gear components that contact the bottom include the anchors, groundlines, intermediate weights, gangions, and hooks. Two to four sets are made each day. Longline vessels may deploy seabird bycatch avoidance mechanisms, including streamers, paired streamers, or other devices. This equipment is deployed along with the longline equipment to frighten seabirds away from gear. The A season cod longline fishery generally occurs in the western and central GOA, opening on January 1st and lasting until early March. The B season fishery opens September 1 and can be expected to last 6 weeks or less. The fishery is sometimes curtailed by halibut PSC.

### **3.3.1.4 Longline operation**

For catcher vessels, the first anchor is set, and the boat steams ahead with the groundline and baited hooks being set off the stern of the boat. The set is not made in a straight line; instead the boat will steer to ensure that the groundline is set in the preferred areas based on depth contour and bottom structure. The second anchor is deployed, and the line is left to fish for 2 to 24 hours depending upon the catch rates. Upon haulback, the groundline is fed through a hauler, and the fish are stripped off the hooks.

Freezer longliner gear is normally set through autobaiting equipment, which adds tension to the groundline and, thus, minimizes the movement of the groundline on the seafloor. Normally a GPS plotter is used to determine the exact trackline of the set, enabling the vessel to retrieve the gear without dragging it across the bottom. It is in the best interest of the fishing operation to do this in order to avoid gear damage. Generally the gear is set in a straight line, the average set being 8 miles long. Such a set would deploy 12,320 hooks at a depth of about 30 to 80 fathoms, with an occasional set as deep as 120 fathoms. Often two sets are made, parallel to one another and between ½ and ¾ of a mile apart. The total time the gear is in the water ranges from 4 to 20 hours. Vessels do not usually set back in the same place, but leapfrog. About four sets are made in a day. Gear is set with an anchor at each end and sometimes with an anchor in the middle of the set. Some vessels use intermediate weights of about 3 to 10 pounds, and most use swivel gear, which adds weight to the line.

The length range of Pacific cod caught using longline is generally 42-110 cm (Mattes and Stichert 2008).

### **3.3.1.5 Pot**

Vessels used in the inshore fishery are all catcher vessels of small (less than 60 foot LOA) and medium size (60 to 125 foot LOA). The offshore fishery includes some catcher-processors ranging from 90 to over 125 feet. Pots used in a directed cod fishery are modified crab pots, which are constructed with a steel bar frame (1¼ inch-diameter) and covered with tarred nylon mesh netting (3½ inch stretched mesh). Pot sizes range from 6 to 8 foot diameter square, with the average vessel using 6 by 6 foot pots. Each pot has two or three tunnel openings on opposite sides, with plastic finger funnels to retain the fish. The tunnel eye cannot be greater than 9 inches in any one

dimension. An escape panel of untreated cotton must be sewn into the mesh. The pot is attached with a 6 to 8 foot bridle, generally constructed of 1-inch-diameter poly line. A 30 to 60 foot surge, constructed of heavy duty line, is attached to the bridle. The lower shots (33 fathoms each) of line are made of 3/4-inch floating poly, and the upper shot of line is made of 5/8 inch sinking line. Attached to the line is a plastic buoy (bag) with an auxiliary buoy attached on a tether line. The A season fishery begins on January 1st and concludes in early March. The B season fishery opens September 1 and can be expected to last 6 weeks or less. There is also a state-managed fishery in state waters.

### **3.3.1.6 Pot operation**

Pots are baited with chopped herring placed in hanging bait buckets or sacks in the centre of the pot. Pots are fished as singles. On most vessels, the pot is tipped into the sea with a pot launcher. The shots of line are thrown overboard, followed by the buoys, and the pot sinks to the bottom. The pot rests directly on the bottom. The pot remains stationary on the bottom (except during extreme weather) until it is retrieved, generally about 12 to 48 hours later. Pots are retrieved as follows: the crewman throws a grappling hook between the buoys to retrieve the line. The line is fed into the hauler, and the pot is brought aboard by a crane or picking boom and placed on the pot launcher. Pacific cod are dumped into totes and bled. The fish are put on ice or into refrigerated saltwater (RSW) tanks below decks. The pots are re-baited and reset, or they are stored if they are being moved or it is the end of the trip.

The length range of Pacific cod caught using pots is 45-10 cm (Mattes and Stichert 2008).

### **3.3.1.7 Jig**

Vessels participating in this fishery include small (less than 60-foot) catcher vessels. This fishery is prosecuted with actively fished vertical lines onto which baited hooks are attached. Gear components include an 8 pound jig weight, a 400-pound test monofilament mainline, and long shank 10/0 J-hooks or 10/0 circle hooks that are looped directly onto the mainline. Vessels employ two to four jig machines per vessel. Hooks are dressed with colourful segments of rubber surgical tubing and may be baited with strips of herring or other fish.

### **3.3.1.8 Jig operation**

The vessels look for concentrations of Pacific cod, position vessels to drift over the fish, and may occasionally anchor. The jig machines drop the jig weight to the bottom and may move the jigs up and down slightly to entice the fish into biting. Each jig machine is adjusted to haul back when there is the right amount of tension on the line (amount of fish). The jig machines haul up the fish, which are then manually removed. The vessels move often to stay over fish concentrations. The A season fishery opens January 1st and closes in early March due to the quota being taken. The B season fishery opens September 1 and can be expected to last 6 weeks or less. A state-managed fishery also occurs in state waters.

The length range of Pacific cod caught using jig is considered to be similar to longline, 42-110 cm (Mattes and Stichert 2008).

## **3.3.2 Pacific cod catch**

The total commercial groundfish catch off Alaska was 2.2 million t in 2006, approximately the same as in 2005. The gross value of the 2006 catch after primary processing was approximately \$2.0 billion (F.O.B. Alaska). The groundfish fisheries accounted for the largest share (56%) of the ex-vessel value of all commercial fisheries off Alaska in 2006. Total Pacific cod catch in 2006 was

239,400 t, 11.0% of the total groundfish catch (Hiatt et al 2007) of which 47,758 was taken from the GOA with 37,807 t coming from the fisheries under federal jurisdiction and 9,949 t from state waters (Thompson et al 2008, Table 2.1b).

Pacific cod catch in the GOA region is primarily commercial. A small amount of nearshore subsistence fishing exists. A minor amount of recreational catch may take place in state waters under the classification of subsistence or personal use fisheries as regulated by Alaska state law (NPFMC 2008a).

In federal waters GOA Pacific cod is allocated by areas and on the basis of processor component (inshore/offshore) and season. The terms “inshore” and “offshore” refer to processing sectors:

- *Inshore* is defined to consist of three components of the industry: 1. All shoreside processors as defined in federal regulations; 2. All catcher/processors less than 125 ft LOA that have declared themselves to be “inshore”; 3. All motherships or floating processors that have declared themselves to be “inshore”.
- *Offshore* is defined as all processors not included in the definition of inshore component (NPFMC 2008).

In state waters Pacific cod is allocated between the pot and jig sectors – only these methods are permitted in the state water fishery. The state fishery generally opens when the federally controlled fisheries close.

Within the GOA commercial fisheries, pot gear accounted for the largest proportion of the Pacific cod catch in 2006 (~14,500 t), followed by trawl (~13,000 t), longline (~10,000 t) and then jig (~100 t) – see (Table 1).

**Table 1.** Total GOA Pacific cod catch by gear sector in federal and state waters between 2002 and 2006.

Jurisdiction	Method	2002	2003	2004	2005	2006
<b>Federal</b>	Trawl	19,809	18,799	17,351	14,513	13,111
	Longline	14,666	9,475	10,377	5,756	10,167
	Pot	7,694	12,675	13,671	14,684	14,411
	Other*	176	88	310	203	118
<b>State</b>	Pot	10,423	8,031	10,117	9,712	9,259
	Other*	1,714	3,429	2,804	2,673	690

\*the majority of the catch is taken by mechanised jig but can include handlines.

Source: (Thompson et al 2008. Table 2.1b)

Pacific cod is processed as headed and gutted (H&G), fillet blocks, or individually frozen fillets, which are either individually quick-frozen (IFQ) or processed into shatterpack (layered frozen fillets that separate individually when struck upon a hard surface) or layer pack. The H&G product form accounted for 75% of Alaska Pacific cod production in 2006 (Northern Economics 2007).

The ex-vessel revenue from Pacific cod in the GOA region is broken down by gear sector in Table 2.

In response to declines in Atlantic cod (*Gadus morhua*) harvests Pacific cod harvests have in recent years represented about one-fourth to one-third of total world cod supply (Knapp 2006). Pacific cod now accounts for more than 95% of the U.S. domestic cod harvest, and more than 99% of this harvest is from Alaska waters (Knapp 2006).

**Table 2.** 2006 Ex-vessel revenue from Pacific cod in the GOA region by gear type. (NB Because of the relatively small amounts of jig caught cod the catches are sometimes combined with longline and referred to as “hook and line”.)

<b>Gear Type</b>	<b>Catcher (million US \$)</b>	<b>Catcher Processor (million US \$)</b>	<b>Total (million US \$)</b>
Trawl	8.9	0.8	9.7
Hook and Line	5.6	3.3	9.0
Pot	18.6	0.2	18.8

Source: Hiatt et al 2007 Table 19.

### 3.3.3 Pacific cod fleets

Residents of Washington, Oregon and Alaska, participate in the BSAI Pacific cod fisheries. In contrast to the BSAI, the residency of vessels fishing in the GOA is predominately Alaskan. Between 2002 and 2006 approximately 60% of the GOA catch was harvested by vessels owned by residents of Alaska. This percentage has remained stable since 2002 (Hiatt et al 2007, Table 5).

All vessels participating in the GOA Pacific cod fisheries require a Federal groundfish license, except for:

- vessels fishing only in State of Alaska waters
- vessels less than 26' LOA
- jig gear vessels less than 60' LOA that meet specific effort restrictions.

Licenses are endorsed with area, gear, and vessel type and length designations. Fixed gear vessels engaged in directed fishing for Pacific cod must qualify for a Pacific cod endorsement. Fishing permits may be authorized, for limited experimental purposes, for the target or incidental harvest of groundfish that would otherwise be prohibited (NPFMC 2008a).

While catch levels of BSAI cod far exceed those in the GOA, the number of catcher vessels operating in each area is nearly equivalent. This is due to the difference in vessel size and season length, e.g., between the years 2002 and 2006 only 1 trawl vessel greater than 234 ft in length fished in the GOA compared to approximately 15 trawl vessels of this size in the BSAI:

- **Trawl:** The number of catcher vessels targeting Pacific cod in the GOA declined from 83 to 59 vessels from 2002-2006. Catcher/processors targeting Pacific cod in the GOA fluctuated between 6 and 3 over the same period (Hiatt et al 2007; Table 41)
- **Longline:** The number of catcher vessels using longline gear to target Pacific cod in the GOA declined from 243 to 172 between 2002 and 2006.
- **Pot:** The number of catcher vessels using pot gear to target Pacific cod in the GOA region increased from 129 to 143 between 2002 and 2006, (Hiatt et al 2007).

The size distribution of vessels fishing GOA Pacific cod from 2002 to 2006 has remained relatively stable for all gear types. By length class, trawl vessels range from <125 to >260 feet, although only a single vessel in the largest size class has operated in the GOA during this time period. Since 2003 pot vessels have clustered in the <125 LOA size category. Longline vessels range from <125 ft. to 234 ft. (Hiatt et al 2007, Table 44).

Many of the catcher processors that target GOA Pacific cod also target flatfish, Atka mackerel and

rockfish. From 2002-2006 catches of flatfish species ranged between 52-75% of Pacific cod caught by this fleet. For Pacific cod landed onshore, most are landed in Kodiak (277 vessels landing 23,000 t in 2006), followed by “other” ports (565 vessels landing 16,200 t), and Dutch Harbor/Akutan (58 vessels landing 2,200 t in 2006). In that same year catcher processors (32 vessels) accounted for 4,900 t, and factory processors (24 vessels) accounted for 1,100 t. (Hiatt et al 2007, Pacific cod Tables 8 and 9).

## 4 FISHERY LOCATION, ADMINISTRATIVE BOUNDARIES AND RESPONSIBILITY

### 4.1 Administrative context and legislation

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) is the primary domestic legislation governing management of the United States' marine fisheries. It was most recently reauthorized in 2006. Under the Magnuson-Stevens Act, the North Pacific Fishery Management Council (Council) is authorized to prepare and submit to the Secretary of Commerce for approval, disapproval or partial approval, a FMP and any necessary amendments, for each fishery under its authority that requires conservation and management.

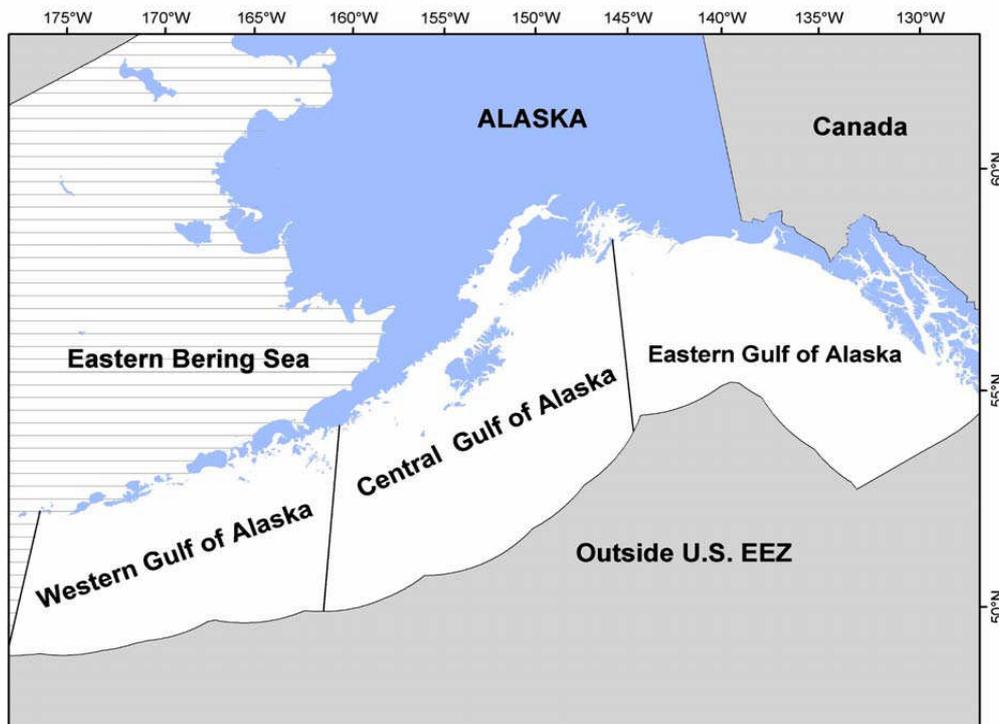
### 4.2 GOA management areas

The GOA Management Area is the United States (U.S.) exclusive economic zone (EEZ) of the North Pacific Ocean, exclusive of the Bering Sea, between the eastern Aleutian Islands at 170°E W. longitude and Dixon Entrance at 132°E40' W. longitude (Figure 1).

Three regulatory areas are defined in the Gulf of Alaska:

- Eastern, extending from Dixon Entrance to 147°E W. longitude
- Central, extending between 147°E W. and 159°E W. longitude
- Western, extending between 159°E W. and 170°E W. longitude

**Figure 1.** NMFS groundfish management areas of the Gulf of Alaska.



Source: NPFMC 2007.

### 4.3 International waters

International waters are those outside the 200 mile boundary of the Federal EEZ, the bottom border in Figure 1. The international convention that directly or indirectly addresses conservation and

management needs of groundfish in the GOA management area is the Convention for the Preservation of the Halibut Fishery of the North Pacific Ocean and the Bering Sea (basis for the International Pacific Halibut Commission – IPHC). Many of the management measures contained in the GOA groundfish FMP are for the purpose of mitigating a severe crisis in the domestic halibut fishery by recognizing a situation in which the trawl fishery or sablefish setline fishery could contribute to declining halibut abundance (NPFMC 2008a).

#### 4.4 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 (NPFMC 2008a).

#### 4.5 State waters

ADFG manages GOA groundfish in three regions of the state: Southeast, Central and Westward regions within which 5 districts are identified: South Alaska Peninsula, Chignik, Kodiak, Cook Inlet, Prince William Sound and Eastern Gulf of Alaska (see Figure 2).

**Figure 2.** ADFG groundfish registration areas and regions



(Source: Mattes and Stichert 2007)

## 5 STOCK ASSESSMENT

This section is designed to provide background for the detailed scoring in Appendix A under Principle 1.

### 5.1 Stock definition

Many factors are included in the definition of a stock including presence of geographically-discrete and temporally-persistent spawning aggregations, stock structure, tagging studies, and variation in seasonal migrations, parasite incidence, growth rate, length and age-at-maturity, length frequency, fecundity, meristics and morphometrics, and genetic population structure. Gustafson et al (2000) states that definitive stock structure analysis of Pacific cod in Alaska has not occurred, although separate Gulf of Alaska and Aleutian Islands/East Bering Sea stocks are recognized for management purposes (Westrheim 1996). Wilimovsky et al. (1967) tentatively identified four separate stocks, based on meristic measurements: southern British Columbia, southeastern Alaska/northern British Columbia, eastern Aleutian Islands/Bering Sea, and western Aleutian Islands

The timing of spawning for Pacific cod is described in Gustafson et al (2000) which states that over the North Pacific Ocean as a whole, Pacific cod spawn within the period from December to May. Spawning seasons appear to be somewhat earlier for Pacific cod in higher latitudes and later in lower latitudes. However, in the eastern Bering Sea, spawning Pacific cod have been taken in fisheries along the continental slope south of the Pribilof Islands in late January through March and in bays and nearshore waters in the eastern Aleutians and along the north side of Unimak Island to False Pass, from late December to April (Fredin 1985). In the western Bering Sea, Pacific cod spawn from January to May in various locations from Anadyr Bay south westerly to the Commander Islands (Moiseev 1953, Musienko 1970, Vinnikov 1996)

Grant et al. (1987) performed a genetic analysis on the ocean-wide populations of Pacific cod (*Gadus macrocephalus*) using electrophoretically detectable population markers at 41 protein loci. Their results show that there are two genetically distinct groups of Pacific cod in the North Pacific Ocean; a North American group extends from the eastern Bering Sea to at least Washington State (but most likely to the southern limit of distribution off southern California), and an Asian group includes at least Korean and Japanese populations. In contrast to their findings on Asian stocks, there was virtually no regional genetic differentiation among North American stocks of Pacific cod.

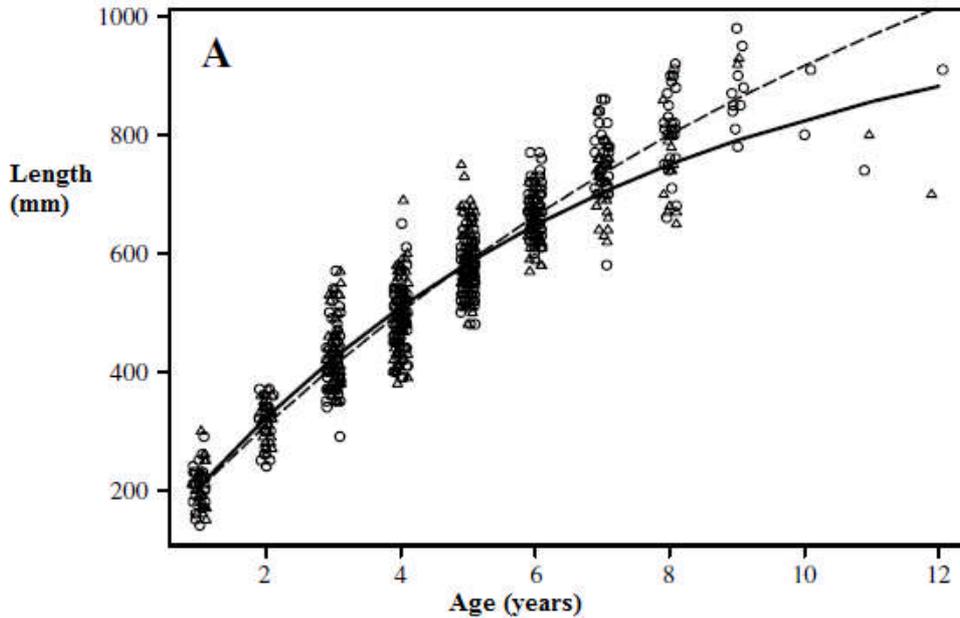
### 5.2 Fecundity and growth

Growth information comes mainly from surveys. Thompson et al. (2007) state that following a decade-long hiatus in production ageing of Pacific cod, the Age and Growth Unit of the Alaska Fisheries Science Center began ageing samples of Pacific cod from shelf bottom trawl surveys a few years ago (Roberson 2001, Roberson et al. 2005). To date, the otolith collections from the 1987-2006 surveys have been read. These are not annual surveys and the number of fish aged for each of these years is shown below:

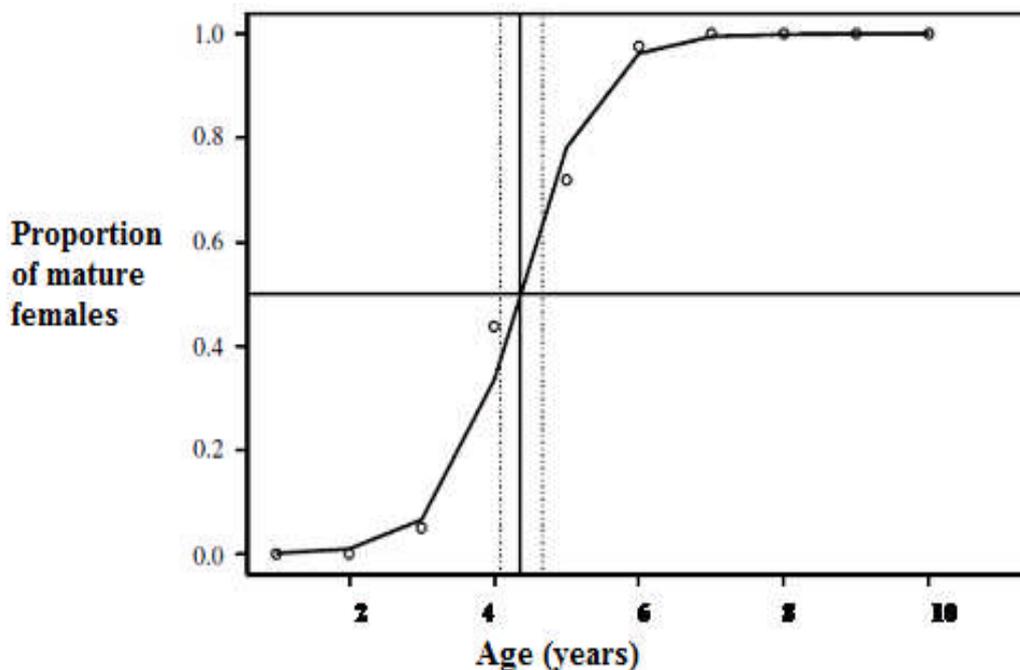
Year:	87	90	93	96	99	99	01	03	05
N:	140	499	869	776	635	688	767	737	545

Stark's (2007) recently published growth and maturation studies for Pacific cod were cited. They used monthly samples through the winter (Oct - Mar) to get a full seasonal progression of maturation. The growth information for Bering Sea and GOA Pacific cod is summarized in figures 3 and 4 below.

**Figure 3.** Total length (mm) at age of Pacific cod (*Gadus macrocephalus*) males (n=684) and females (n=676) based on area wide groundfish assessment surveys conducted by the National Oceanic and Atmospheric Administration, Alaska Fisheries Science Centre during 2003 (Stark et al 2007).



**Figure 4.** The proportion of mature female Pacific cod (*Gadus macrocephalus*) by age based on the January 1999 and 2004 (n=154) collection. The mean age at 50% maturity is 4.4 years and the 99% confidence intervals are represented by the dotted lines (Stark et al 2007).



### 5.3 Abundance information

Research surveys of the Shelf in the GOA are used as the basis for abundance information in assess this stock. Unlike the annual BSAI surveys, these surveys were triennial from 1984 to 1999 and then biennial thereafter. As well as the total numbers or biomass of fish for each year, these surveys

also are the source of length frequency and age frequency information.

#### **5.4 Uncertainty**

There are many aspects of uncertainty that need to be considered in the assessment of a resource and the provision of advice for management purposes: uncertainty in the measurements themselves (for example, indices of abundance or size at age) and subsequently in the processes described in the assessment model such as recruitment. When performing the fitting of the data to the model, assessment software calculates how well the observations agree among themselves and within the model. A number of ways are commonly used in assessments. The most common are the Hessian approximation, bootstrapping and the estimation of posterior distributions.

For this assessment, uncertainties were estimated within the model program using a well accepted approximation called the Hessian. The model seems to be sufficiently developed to estimate the more descriptive probability density functions (pdf's) but these are quite computer intensive and have not been reported. Pdf's would be necessary were the model to be elevated to higher tiers.

Uncertainty in the projections incorporates uncertainty in recruitment and covers a range of management scenarios. The uncertainty in the starting numbers for the projections is not included in the calculations. For each scenario, the projections begin with an estimated vector of 2007 numbers at age. This vector is then projected forward to the beginning of 2008 using the schedules of natural mortality and selectivity described in the assessment and the best available estimate of total (year-end) catch for 2007. In each subsequent year, the fishing mortality rate is prescribed on the basis of the spawning biomass in that year and the respective harvest scenario. In each year, recruitment is drawn from an inverse Gaussian distribution whose parameters consist of maximum likelihood estimates determined from recruitments estimated in the assessment. Spawning biomass is computed in each year based on the time of peak spawning and the maturity and weight schedules described in the assessment. Total catch is assumed to equal the catch associated with the respective harvest scenario in all years. This projection scheme is run 1000 times to obtain distributions of possible future stock sizes, fishing mortality rates, and catches.

#### **5.5 Stock recruit relationship**

The stock recruit relationship is based on the results of model described in the 2007 SAFE document and shown in Figure 5 below.

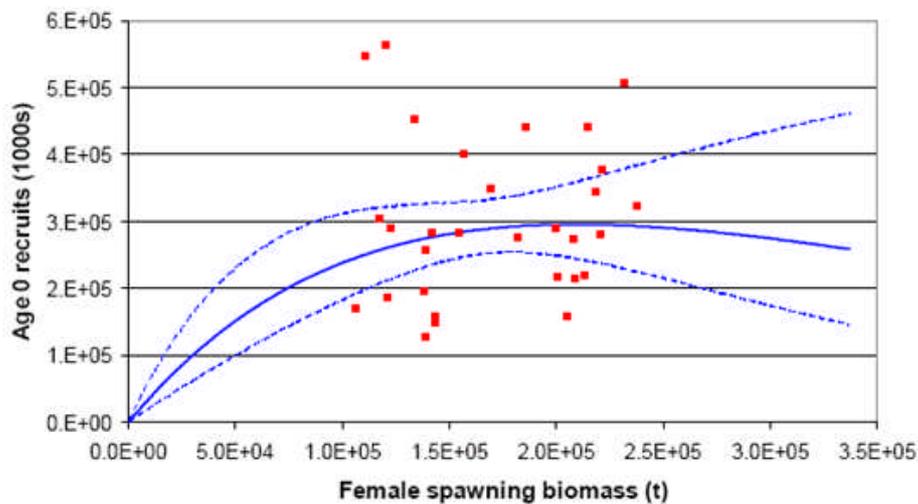
The relationship is seen to be quite noisy without much slope or structure. The descending limb to the origin does not show any data points. Biomass is not a good determinant of recruitment, even within the current (post 1977) regime.

The estimates of biomass have a coefficient of variation (cv) ranging from about 10 to 15% while the recruits have a cv of about 10 to 20% (approximated from tables 2.1 and 2.2 of Thompson et al. 2007). This could be considered a measurement error associated with the SSB and recruitment. The error in fitting the points to the curve was not reported but the scatter around the relationship suggests that it is considerably larger than the measurement errors.

#### **5.6 Selectivity**

In the GOA Pacific cod model, each year has traditionally been partitioned into three seasons: January-May, June-August, and September-December (these seasonal boundaries were suggested by industry participants). Selectivities are estimated in the assessment model for each of the trawl, longline and pot fisheries for each season. All of these are as a function of length. The trawl survey is fit as a function of age and there is annual variation in its ascending.

**Figure 5.** Age 0 recruitment versus female spawning biomass for Pacific cod during the years 1977-2006, with Ricker stock recruitment curve (for illustrative purposes only).



## 5.7 Assessments and stock status

The cod resource is assessed using a stock synthesis model. The general approach of stock synthesis is to model an exploited population using information about the catch and indices of abundance, usually from survey or fishery catch rate data. The model allows for observation error in both the catch and the indices of abundance. Using formal statistical procedures which weight the data inversely with the amount of noise associated with each sort, a best fit in terms of maximum likelihood is obtained. These models have been widely tested and used for stock assessment. More detail on the model, its data inputs and outputs is available in the SAFE document. The model was developed from the earlier versions written in the SS1 assessment program (Methot 1986, 1990, 1998, 2000) and is based largely on length-structured catch and abundance data.

The last full assessment of the GOA stock in 2005 used the SS1 assessment software and several models were considered. In 2007 most of the emphasis was on the development of the BSAI assessment with dozens of models examined. Time was not available to give GOA similar analysis. Therefore, the GOA Pacific cod assessment was based on the preferred model from BSAI (Model 1). This model is developed within the standard and well-tested SS2 assessment environment. It fits length and age frequency data as well as abundance data. Survey indices were used as abundance data although CPUE abundance indices, though not used in fitting the model, were used for comparison later. The principal differences between the two models are that for GOA:

- Natural mortality is fixed at a value of 0.38
- Catchability is fixed at a value of 0.92.
- Trawl survey selectivity is based on length rather than age.
- Trawl survey selectivity is constrained to be asymptotic.
- All fishery selectivities are unconstrained.
- Mean-length-at-age data are included.

## 5.8 Harvest reference points

The NPFMC Groundfish FMP defines three quantities associated with establishment of levels of acceptable harvesting levels:

1. Optimum yield (OY)

2. Acceptable Biological Catch (ABC)
3. Overfishing Level (OFL)

In the GOA the OY falls within a range, (116,000 - 800,000 mt)<sup>2</sup> of groundfish, OFL is an annually set limit stock reference point; and, ABC is an annual harvest target reference point which is set below the OFL. OFL and ABC are catch levels associated with specific fishing mortality rates ( $F_{OFL}$  and  $F_{ABC}$ ).  $F_{OFL}$  is the “limit” fishing mortality rate, and  $F_{ABC}$  is the target fishing mortality rate. In addition, the Council typically sets the total allowable catch (TAC) equal to or less than the recommended ABC. Adjustments to TAC take into account social/political and economic considerations that control the complex of fisheries regulated by the Council.

The OFL and ABC set for groundfish species is based on a 6 tier set of decision rules developed by Goodman et al. (2002) and was then adopted into the FMP in Amendment 56. The tier system is described in the introduction to the annual SAFE. The fishing mortality rate associated with ABC is based either on maximizing yield for stocks with a known reliable spawner/recruit relationship, or maximizing yield per recruit when there is no reliable spawner/recruit relationship.

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, Pacific cod in the GOA are managed under Tier 3 of Amendment 56.

Tier 3 uses the following reference points:

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

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, 3c is has no ABC and 3b has a fishing target that is related to the amount of depletion:

**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:  $B/B_{40\%} < 0.05$**

$$F_{OFL} = 0$$

$$F_{ABC} = 0$$

When the estimated (modeled) current stock biomass is greater than  $B_{40\%}$  then OFL is set at  $F_{35\%}$  and ABC at  $F_{40\%}$ . If the current stock biomass is less than  $B_{40\%}$  an adjustment proportional to the ratio of current stock biomass and  $B_{40\%}$  is made to the maximum permissible ABC. The effect of

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<sup>2</sup> For the minimum value, 116,000 mt was approximately equal to the lowest historical groundfish catch during a 21-year reference period 1965-1985. The upper end of the OY range, 800,000 mt, was derived from MSY information for all species of groundfish (excluding the other species category) between 1983 and 1987. As a result TACs are set within the OY range.

this is to lower the exploitation rate when the stock falls below  $B_{40\%}$ .

The adjustment generates a linear decrease in the allowed ABC fishing mortality rate as stock biomass declines. This decrease is intended to result in a more rapid recovery to the biomass level supporting maximum sustainable yield.

GOA Pacific cod spawning biomass for 2008 is estimated at a value of 108,000 t. This is about 11% below the  $B_{40\%}$  value of 121,000 t, thereby placing Pacific cod in sub-tier “b” of Tier 3.

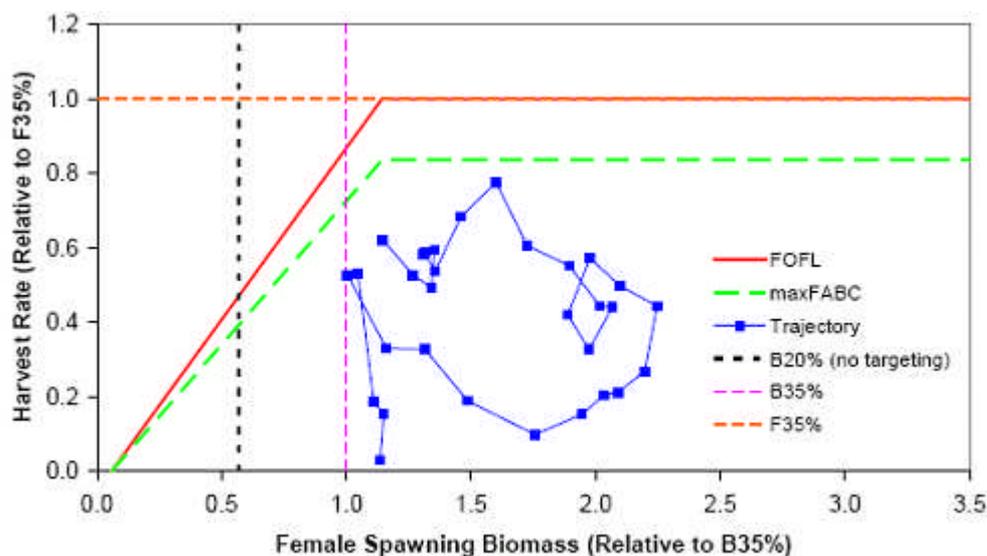
## 5.9 Harvest control rules

The Council’s adopted harvest control rule (HCR) sets the upper bound on ABC. Stock analysts and the Council’s SSC may recommend lower ABCs dependent upon exigent circumstances. In summary, the HCR setting process for Pacific cod is established by defining a maximum fishing mortality threshold (MFMT) and deliberately setting an acceptable level of fishing mortality below the MFMT. The Council will apply further reductions in the  $F_{ABC}$  if, based on stock assessment and/or SSC advice, stock biomass falls below target biomass thresholds. Furthermore, once the ABC is set, the Council may limit total allowable catch to maintain overall compliance with limits on OY.

HCRs show the relationship between the stocks biomass and the agreed upon resultant harvest rate. The following figure shows the trajectory of the cod female spawning stock biomass and the harvest rate it experienced as the blue line. At the beginning of the assessed period, 1977, the stock was just to the right of  $B_{35\%}$  and had a very low harvest rate. It rose to a maximum biomass in 1990. Since then the stock has been falling and it terminates at a biomass slightly higher the  $B_{35\%}$  reference – see Figure 6.

The red line is the target harvest rate as a function of the biomass. Harvest rates which have been somewhat lower than the rule would indicate while the SSB remains in a healthy region (i.e. compare the blue line to the red).

**Figure 6.** Trajectory of the GOA Pacific cod fishing mortality and female spawning biomass as determined by final parameter estimates, 1977-2006. Because Pacific cod is a key prey of Steller sea lions harvests of Pacific cod would be restricted to incidental catch in the vent that spawning biomass fell below  $B_{20\%}$ . The values for 2007 are  $F/F_{35\%} = 0.621$ ,  $B/B_{35\%} = 1.146$ .



## **6 FISHERIES MANAGEMENT FRAMEWORK, PROCESSES AND INTERACTIONS**

### **6.1 The groundfish fishery management plan for the Gulf of Alaska management area**

The GOA groundfish fishery management plan (FMP) was first implemented in 1979 and most recently updated in 2008. As of January 2008, 75 amendments had been developed for the FMP, although some are still in development and 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, is contained in NMFS 2004. Over its history the focus of the FMP has changed from the regulation of mainly foreign fisheries to the management of fully domestic groundfish fisheries (NPFMC 2008a; 2008b).

### **6.2 National standards for fishery conservation and management**

The Magnuson-Stevens Act contains ten national standards (16 U.S.C. § 1851), with which all fishery management plans (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 (cf. NPFMC 2008c). 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:
  - 35. Continue to incorporate local and traditional knowledge in fishery management.
  - 36. Consider ways to enhance collection of local and traditional knowledge from communities, and incorporate such knowledge in fishery management where appropriate.
  - 37. 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 North Pacific Fishery Management Council makes active use of fishery advisory committees in its management of Pacific cod.

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. Membership varies, and the Council appoints membership every year, varying from 20-23 members representing all aspects of Alaska's fisheries: the seafood processing industry, CDQ groups, environmental interests, commercial fishermen, recreational fishermen and others. Regional membership is also considered, to ensure full representation of Alaska fisheries. AP meetings are open to the public.

The AP advises the Council on the effect fishery management alternatives will have on the industry and local economies, on potential conflicts between user groups, and on the extent to which the United States will utilize resources managed by the Council's fishery management plans.

The SSC is appointed by the Council yearly, and is made up of state, federal and university scientists in the fields of biology, economics, and sociology to provide recommendations and assist the Council on scientific data and analysis. The SSC comments to the North Pacific Council on all scientific matters on the Council's agenda. The SSC meetings are open to the public and public testimony is heard on all action items. (<http://www.fakr.noaa.gov/npfmc/membership.htm>)

The SSC assists the Council in the development, collection, and peer review of statistical, biological, economic, social, and other scientific information related to FMPs and their amendments. It peer reviews scientific information used to advise the Council about the conservation and management of the fishery. The SSC provides recommendations related to acceptable biological catch, overfishing, maximum sustainable yield and stock rebuilding. It reports on stock status and health, bycatch, habitat status, social and economic impacts of management measures, and sustainability of fishing practices.

The GOA Groundfish FMP Plan Team includes scientists from a wide range of disciplines, includes NMFS scientists, Council staff, and state and university scientists. The Plan Team is responsible for developing the annual GOA Groundfish Stock Assessment and Fishery Evaluation (SAFE) Report, a requirement of the Guidelines for Fishery Management Plans (602 Guidelines) published by the National Marine Fisheries Service (NMFS).

Plan Teams exist for each fishery management plan. Plan Teams review stock assessment information and assist in the preparation of the annual Stock Assessment and Fishery Evaluation (SAFE) documents including formulation of recommendations on annual Acceptable Biological Catch (ABC) levels. Plan Teams may also prepare and/or review plans, amendments and supporting analytical documents for the Council, SSC and AP; aggregate and evaluate public/industry proposals and comments; summarize and evaluate data related to the biological, economic and social conditions of the fishery; conduct and evaluate analyses pertaining to management of the fisheries; evaluate the effectiveness of management measures in achieving the plan's objectives; and recommend when and how management measures need to be changed. Each Plan Team has Terms of Reference approved by the Council.

The SAFE report summarizes the best available scientific information concerning the past, present, and possible future condition of the stocks, marine ecosystems, and fisheries that are managed under federal regulation. It provides information 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 GOA groundfish FMP, the SAFE report is published in three sections: a "Stock Assessment" section, and "Economic Status of Groundfish Fisheries off Alaska" and "Ecosystem Considerations" sections, which are bound separately (NPFMC 2007a; Hiatt et al. 2007).

The SAFE report for GOA groundfish fisheries is compiled by the Plan Team from chapters contributed by scientists at NMFS' Alaska Fisheries Science Center & and the Alaska Department of Fish and Game (ADF&G). SAFE reports include separate stock assessment and fishery evaluation sections. The stock assessment section includes recommended acceptable biological catch (ABC) levels and overfishing limits (OFLs) 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.

([http://www.fakr.noaa.gov/npfmc/membership/plan\\_teams/plan\\_teams.htm](http://www.fakr.noaa.gov/npfmc/membership/plan_teams/plan_teams.htm))

In addition to the AP, SSC and Plan Team, the Council uses several other standing committees in its management of GOA Pacific cod.

- Council/Board of Fisheries Joint Protocol Committee
- Ecosystem Committee
- Enforcement Committee
- GOA Community Committee
- Non-Target Committee
- Observer Advisory Committee

- Steller Sea Lion Mitigation Committee ([www.fakr.noaa.gov](http://www.fakr.noaa.gov))

## **6.6 Consultations**

### **6.6.1 State of Alaska**

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

### **6.6.2 Alaska natives and communities**

Objectives 35-37 of the GOA 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 two community conferences in 2005 and 2006 to address two needs:

- assess impacts of fishery management actions on fishing communities
- 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 is 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 ([www.fakr.noaa.gov](http://www.fakr.noaa.gov)):

- 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 a twenty-one member Advisory Panel (AP) representing major segments of the fishing industry; catching and processing, subsistence and commercial fishermen, observers, consumers, environmental/conservation, and sport fishermen. 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 MSFCMA, 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 GOA 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 MSFCMA, enabling stakeholders to legally challenge a Secretarial action.

## 6.7 Alaska state waters management

The Alaska Board of Fisheries (BoF) is responsible for conserving and developing the fishery resources of the state, i.e. within the 0 -3 nautical mile zone. BoF actions include setting seasons, bag limits, and other regulations for the state’s subsistence, commercial, sport, guided sport, and personal use fisheries. Responsibilities also include setting policy for the management of the state’s fishery resources. The board is charged with making allocative decisions, and ADFG is responsible for implementing those decisions.

The BoF comprises seven members serving three-year terms. Members are appointed by the governor and confirmed by the legislature. Members are appointed on the basis of interest in public affairs, good judgment, knowledge, and ability in the field of action of the board, with a view to providing diversity of interest and points of view in the membership.

The BoF meets four to six times per year in communities around the state to consider proposed changes to fisheries regulations. Decisions are informed by biological and socioeconomic information provided by the ADFG, public comment and guidance from the Alaska Department of Public Safety and Alaska Department of Law. (<http://www.boards.adfg.state.ak.us/fishinfo/index.php>)

For the Pacific cod fishery conducted in the U.S. Exclusive Economic Zone (EEZ; 3–200 nm offshore), ADFG issues emergency orders for state waters that duplicate NMFS management actions, except that gear or other restrictions may vary, e.g. trawling in state waters for Pacific cod is not permitted. These orders establish “parallel fisheries” allowing vessels to fish for Pacific cod in state waters with the same seasons and bycatch levels as the federal fisheries. Parallel fisheries for GOA Pacific cod occur in state waters at the same time as the federal fisheries in the GOA (Failor-Rounds 2004). The TAC set by the NPFMC applies to both the federal and parallel fisheries (Mattes and Stichert 2008).

State-waters fisheries for Pacific cod began in 1997 in the Prince William Sound, Cook Inlet, Chignik, Kodiak, and the South Alaska Peninsula districts, and these are distinct from the parallel fisheries. Management plans approved by the Alaska Board of Fisheries for all five districts have some common elements focused on gear and area limitations. Vessels participating in the South Alaska Peninsula and Chignik areas are limited to no more than 58 feet in length. Catches are allocated on a percentage basis to various gear types. Guideline harvest limits (GHLs) for each of the 5 state-waters district are set by ADFG as a percentage of the GOA Pacific cod allowable biological catch (ABC) (Ruccio et al. 2004).

State-waters Pacific cod harvest is monitored via log books, landing tickets and through daily radio or via an electronic fish ticket system, called “Elandings” which is accessible and monitored by both state and federal management staff on a daily basis. Dockside sampling in which port

samplers conduct confidential interviews with vessel operators to obtain information on catch location, catch per unit effort, bycatch, and fishing effort also takes place. Electronic landing reports are filed by processors enabling cross referencing with landing statistics. Samplers record data on fish length, reproductive status, and average weight and remove otoliths for later analysis in the aging laboratory. ADFG personnel are also opportunistically placed on commercial vessels as observers to collect biological data and bycatch information (Mattes and Stichert 2008).

## **6.8 Fisheries management methodology**

### **6.8.1 TAC setting**

Based on the annual Stock Assessment and Fishery Evaluation (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 will be 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).

20% of the TAC for pollock, Pacific cod, flatfish, and the “other species” category is set aside to form the reserve, used for correcting operational problems of the fleets, adjusting species TACs for conservation, or apportionments. The reserve is not designated by species or species groups. It may be reapportioned to these fisheries at any time and in any amount by the Regional Administrator (NPFMC 2008a).

The attainment of a TAC for a species results in the closure of the target fishery for that species. Further retention of that species is prohibited (NPFMC 2008a).

### **6.8.2 Harvest allocation**

The Pacific cod TAC for the GOA region is allocated among the state and federal fisheries and across areas and sectors. Currently, separate TACs are identified for Pacific cod in the Western, Central, and Eastern GOA regulatory areas (NPFMC 2008a):

- **Area allocation:** The 2008 FMP divides the GOA Pacific cod TAC (excluding CDQ) allocation among regulatory areas as follows:
  - Central Gulf 54%
  - Western Gulf 39%
  - Eastern Gulf 7%
- **Sector allocation:** The Pacific cod TAC is apportioned 90% to the inshore sector and 10% offshore.
- **Seasonal allocation:** The Pacific cod TAC is apportioned seasonally, with 60% allocated to the A season (January 1 –June 10) and 40% to the B season (September 1 - December 31). The A and B season apportionments were implemented in 2001 as a Steller sea lion protection measure. Concerned that competition among sectors in the fishery may contribute to higher rates of bycatch, discards, and out of season incidental catch of Pacific cod, as well as for the economic uncertainty this competition creates, the Council is considering Amendment 80 to the GOA FMP that would divide the Western and Central Gulf of Alaska Pacific cod TACs among gear and operation types, based on historic dependency and use by each sector. The Council is also considering options that may create additional entry-level opportunities within the jig sector. Sector allocations are seen as potentially a first step toward stabilizing the GOA Pacific cod fishery, and may enable the Council to begin developing a series of management measures to address mitigation issues associated with Steller sea lion protection measures, and bycatch reduction. (NPFMC 2008d).

- **State water fisheries:** Parallel fisheries for Pacific cod occur in state waters at the same time as the federal fisheries in Prince William Sound, Cook Inlet, and in the vicinities of Kodiak Island, Chignik and the South Alaska Peninsula. For these parallel fisheries, NMFS management, allowable gear, bycatch levels, and fishing season actions are also “paralleled” for Pacific cod in state waters (Ruccio et al. 2004). The total allowable catch (TAC) set by the NPFMC applies to both the federal and parallel fisheries. Pacific cod are also harvested under state regulations in Southeast Alaskan waters independent of the federal fishery. In general, once the federal and parallel fisheries close, the state water fisheries are opened and these are not currently subject to limits on the number of licensed fisherman who can participate.  
(<http://www.cf.adfg.state.ak.us/geninfo/finfish/grndfish/pcod/pcodhome.php>)

Since 1997 guideline harvest levels (GHLs) for the state fisheries have been set for pot and jig gear at between 10 percent and 25 percent of the federal GOA quota. The state GHLs are not allowed to exceed 25 percent of the total federal quota (NPFMC 2008a).

### 6.8.3 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).

All vessels participating in the GOA groundfish fisheries, other than fixed gear sablefish and demersal shelf rockfish in Southeast Outside district, require a federal groundfish license, except for: vessels fishing in State of Alaska waters and vessels less than 26' LOA. Fishing permits may be authorized, for limited experimental purposes, for the target or incidental harvest of groundfish that would otherwise be prohibited.

The LLP established criteria for issuing licenses to persons, based on fishing history of vessels. Licenses carry one or more fishing area endorsements (Central GOA, Western GOA, Southeast GOA), and also carry designations for operation type (catcher processor (CP) or catcher vessel (CV)), gear (trawl and/or fixed gear), and maximum vessel length.

The Council is also considering adding GOA Pacific cod endorsements to fixed gear licenses, similar to the BSAI fixed gear licenses implemented in 2003. Such endorsements would further limit entry to the GOA cod fishery and would create a defined group of licenses eligible to fish each of the fixed gear cod allocations (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 GOA groundfish. GOA 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 GOA groundfish, from other license holders with little or no recent history in the fisheries.

The proposed action would remove the area endorsements (excluding Southeast GOA) on trawl CV and CP licenses if the license does not meet specified harvest thresholds. In effect, if the trawl license at issue has only one area endorsement and it does not meet the landing threshold selected,

the entire license is extinguished. If the license has multiple area endorsements and it does not meet the landing threshold for a specific area, the license would be reissued with only the area endorsements for which it qualifies.

The GOA groundfish fisheries are among the few remaining unrationalized limited access fisheries in Alaska. Of these fisheries, Pacific cod is the predominant groundfish species targeted by the fixed gear sectors in the GOA. The proposed action would extinguish GOA fixed gear licenses that do not meet minimum groundfish landings thresholds during a specific qualifying period, which would potentially reduce the number of fixed gear licenses with Western GOA or Central GOA endorsements by up to 75%.

As part of the amendment, the Council may create gear-specific (pot or hook-and-line) Pacific cod endorsements on fixed gear licenses, which would be required to participate in directed Western and Central Gulf Pacific cod fisheries. Because Pacific cod is the predominant groundfish species targeted by the fixed gear sectors in the Western and Central GOA, fixed gear licenses without cod endorsements would have access to only a limited number of remaining open access fisheries (NPFMC 2008d).

#### **6.8.4 Prohibited and incidental species**

Both the GOA and BSAI FMPs have prohibited species catch (PSC) limits in place. The PSC limit is the amount of non-retainable fish allocated to a fishery for bycatch purposes. These species must be avoided by the groundfish fishing fleet and must be returned to the sea with minimum injury unless another law is applicable. Should the PSC limit be reached for a species, this will result in the closure of the appropriate fishery as determined by the NPFMC. Pacific salmon and Pacific halibut can be donated to economically disadvantaged individuals through the rules in place in the Prohibited Species Donation Program. GOA prohibited species are Pacific halibut, Pacific herring, Pacific salmon, steelhead trout, king crab, and Tanner crab

#### **6.8.5 Bycatch and retention policies**

The Council has a history of regulations to control bycatch. These include:

- time and area closures
- prohibited species catch limits and area closures
- biodegradable panels on pots to permit juvenile escapement
- minimum mesh size requirements for trawl codends)
- legal gear
- legal fishing practices
- rationalization programs (NPFMC 2008d)

In 1998 the improved retention/improved utilization (IR/IU) program was initiated, requiring 100 percent retention of pollock and Pacific cod in the GOA and the BSAI as well as shallow water flatfish in the GOA. “All vessels participating in the groundfish fisheries are required to retain all catch of pollock, Pacific cod, and shallow water flatfish (GOA only) when directed fishing for those species is open, regardless of gear type employed and target fishery. When directed fishing for pollock, Pacific cod, or shallow water flatfish is prohibited, retention of those species is required up to any maximum retainable amount in effect for these species, and these retention requirements are superseded if retention of pollock, Pacific cod, or shallow water flatfish is prohibited by other regulations. No discarding of whole fish of these species is allowed, either prior to or subsequent to that species being brought on board the vessel, except as permitted in the regulations. At-sea discarding of any processed product from pollock, Pacific cod, or shallow water flatfish is also prohibited, unless required by other regulations” (NPFMC, 2008a).

Bycatch is monitored by observers onboard vessels and at shoreside processors. All permitted catcher vessels equal to or greater than 60 ft in overall length 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.

### **6.8.6 Habitat conservation restrictions**

A number of time and area restrictions are specified for habitat conservation purposes. These restrictions are specified by gear type (NPFMC 2008a):

- *All vessels:* Fishing or anchoring within the Sitka Pinnacles Marine Reserve is prohibited at all times.
- *All trawl:* Use of trawl gear is prohibited at all times in the Southeast Outside district.
- *Non-pelagic trawl:* The use of non-pelagic trawl is prohibited in Cook Inlet. Three types of closure areas are designated around Kodiak Island. Type I areas prohibit non-pelagic trawling year-round; Type II prohibit non-pelagic trawl from February 15 to June 15; adjacent areas designated as Type III may be reclassified by the Regional Administrator as Type I or Type II following a recruitment event. The GOA Slope Habitat Conservation Area is closed to non-pelagic trawling year-round.
- *Bottom contact gear:* The use of bottom contact gear is prohibited in the GOA Coral and Alaska Seamount Habitat Protection Areas year-round.
- *Anchoring:* Anchoring by fishing vessels in the Gulf of Alaska Coral and Alaska Seamount Habitat Protection Areas is prohibited.
- *Marine mammal measures:* Regulations implementing the FMP may include conservation measures that temporally and spatially limit fishing effort around areas important to marine mammals.
- *Gear test area exemption:* Specific gear test areas for use when the fishing grounds are closed to that gear type, are established in regulations that implement the FMP.

## **6.9 Conservation, protection, and compliance**

### **6.9.1 FMP evaluation and review**

The GOA 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:

- *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.

### **6.9.2 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 18 to the GOA 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. Owners of vessels and processing plants contract directly with observer companies and pay for the cost of the observers, and the costs associated with managing the program are paid for by the Federal government.

The 1989 Observer Program established coverage levels in federal regulations for most vessels and processors based on vessel length and amount of groundfish processed, respectively. Coverage levels have been increased to implement certain limited access programs with increased monitoring needs, such as the Western Alaska Community Development Quota 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 US. 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](http://www.afsc.noaa.gov/FMA))

**Table 3.** General observer coverage requirements

Vessel length/type	Observer coverage
Vessels < 60 ft LOA (and halibut vessels)	None
Vessels ≥60 ft but <125 ft LOA	30% of fishing time
Vessels ≥125 ft LOA	100% of fishing time
Processing plants	100% of time
Dedicated access privilege programs	Additional coverage requirements

(Source: NPFMC 2008d)

In 2004 the Office of the Inspector General (OIG) recommended the development of improved vessel selection procedures for observer coverage. NOAA Fisheries concurred with this recommendation and indicated it would work with the NPFMC to implement change. The Council issued and subsequently revised a “problem statement” describing the situation, “...the design of the programme is driven by coverage levels based on vessel size that, for the most part, do not include observer requirements for either the <60’ groundfish sector or the commercial halibut sector. As a result the quality and utility of observer data suffer because coverage levels and deployment patterns cannot be effectively tailored to respond to current and future management needs and circumstances of individual fisheries. In addition, the existing program does not allow fishery managers to control when and where observers are deployed. This results in potential sources of bias that could jeopardize the statistical reliability of catch and bycatch data. The current program is also one in which many smaller vessels face observer costs that are disproportionately high relative to their gross earnings. Furthermore, the complicated and rigid coverage rules have led to observer availability and coverage compliance problems. The current funding mechanism and program structure do not provide the flexibility to solve many of these problems, nor do they allow the program to effectively respond to evolving and dynamic fisheries management objectives.” (December 2008 Council Motion).

The Council and NMFS are currently developing FMP amendments to restructure observer program coverage in the groundfish and commercial halibut fisheries. In December 2008 Council staff prepared a discussion paper on issues related to observer program restructuring. Also in December 2008 the NPFMC passed a motion directing staff to prepare an analysis of restructuring alternatives, and that the first component of the analysis should be an agency implementation plan,

which includes sample design under a restructured program. The primary purpose of restructuring is to institute a fee mechanism and an observer sample design that allows NMFS to determine when and where to place observers in the sectors that require less than 100% observer coverage.

In 2007, NMFS analysed the 2004-2006 Alaska groundfish fisheries for the percent of observed catch. NMFS calculated the total catch, observed catch, and percent observed by year, FMP area, processing sector, gear type, trip target fishery, and vessel length. NMFS obtained total catch data from the NMFS Alaska Region catch accounting system and rounded to the nearest metric ton. Table 4 presents a summary of the findings for all groundfish taken from the GOA and Table 5 shows the findings for the Pacific cod trawl sector.

**Table 4.** The total groundfish catch (mt), observed and percent observed catch in the Central, Eastern and Western Gulf of Alaska (CGOA, EGOA, WGOA) between 2004 and 2007

Year	Area	Total Catch (mt)	Observed	Percent
2004	CGOA	108,707	37,744	35%
	EGOA	7,610	2,911	38%
	WGOA	50,853	14,414	28%
Total		167,170	55,069	33%
2005	CGOA	120,030	41,586	35%
	EGOA	8,709	3,072	35%
	WGOA	53,142	13,195	25%
Total		181,881	57,853	32%
2006	CGOA	131,271	42,349	32%
	EGOA	8,712	3,292	38%
	WGOA	51,944	17,523	33%
Total		191,927	63,164	33%
2007	CGOA	118,871	44,113	37%
	EGOA	4,274	3,225	75%
	WGOA	46,968	16,882	36%
Total		170,113	64,220	38%

(Source – adapted from [http://www.fakr.noaa.gov/npfmc/current\\_issues/observer/percent\\_observed.pdf](http://www.fakr.noaa.gov/npfmc/current_issues/observer/percent_observed.pdf) )

Vessels that fish exclusively within state waters are not required to carry observers. According to Mattes and Stichert (2008) ADFG personnel are opportunistically placed on commercial vessels as observers to collect biological data and bycatch information. However, vessels that hold a Federal fisheries permit must comply with groundfish observer program regulations and with NMFS recordkeeping and reporting requirements while fishing in the state-managed fishery (NPFMC 2009).

When the state water fishery was established in 1997 observers were placed on pot and jig vessels. Results from the observed trips confirmed the low incidence of bycatch by jig gear and the relatively low bycatch of pot gear and so carrying an observer was not made a mandatory requirement. However, in order to take account of bycatch in the pot sector, observed bycatch from federal data is extrapolated and applied to vessels fishing in state waters (J. Browning pers. comm.).

**Table 5.** The Pacific cod trawl sector in the Central and Western GOA (2005 - 2007) total reported catch, observed and percentage observed catch. (NB. There was no reported trawling data in the Eastern GOA during this period).

Area	Sector	Length	2005			2006			2007		
			Total	Observed	%	Total	Observed	%	Total	Observed	%
CGOA	CP	≥60 ≤ 125	x	x	0	565	411	73	0	0	0
		≥125	x	x	100	0	0	0	0	0	0
	S	≤60	x	x	0	x	x	0	x	x	0
		≥60 ≤ 125	7,376	2,185	30	4,861	1,152	24	8,377	2,216	26
WGOA	CP/M	≥60 ≤ 125	x	x	625	x	x	0	x	x	39
	S	≤60	3,554	0	0	5,144	0	0	x	x	0
		≥60 ≤ 125	783	392	50	x	x	25	x	x	77

(Source – adapted from [http://www.fakr.noaa.gov/npfmc/current\\_issues/observer/percent\\_observed.pdf](http://www.fakr.noaa.gov/npfmc/current_issues/observer/percent_observed.pdf))

CP = Catcher Processor, S = Shoreside, CP/M = Catcher Processor/Mothership

Values where total and observed are represented by “x” indicate confidential data as less than 3 vessels fished in this area during the year.

### 6.9.3 Vessel Monitoring Systems (VMS)

The Council has adopted VMS requirements for different fisheries at different points in time to meet specific objectives.

- 2002 – Required for federally permitted vessels fishing cod, pollock and Atka mackerel (Steller sea lion protection).
- 2006 – Required on all federally permitted vessels in the Aleutian Islands, and bottom-tending gear vessels in the GOA (essential fish habitat conservation).
- 2008 – Required for vessels in the Amendment 80 sector

In the GOA VMS is required on any federally-permitted vessel using mobile bottom contact gear (i.e., bottom trawls, dinglebar gear, or scallop dredges), and on vessels that target pollock or Pacific cod using pelagic trawls, bottom trawls, longlines, or pots (jig gear is exempted), and on vessels participating in the central GOA rockfish cooperative program. For the most part, the only federally permitted vessels catching Pacific cod that do not have VMS are smaller vessels using jig gear. Vessels fishing only in state waters are not required to have VMS.

### 6.9.4 Enforcement

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 (NPFMC 2008a)

Enforcement of GOA management measures entails a complex and extensive system. TAC for target species and PSC for species that may not be retained are further subdivided by gear type, area, and season. 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 observer coverage, electronic reporting, vessel monitoring systems, and the use of at-sea scales (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 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 (NPFMC 2008a).

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).

The Joint Enforcement Program (JEP) of the Alaska Wildlife Troopers (AWT) and NMFS is a coordinated program updated biennially. As part of the JEP, AWT conducts boardings of vessels during the parallel fishery and AWT vessels inspect pot gear on the fishing grounds. Boardings are conducted both at sea and dockside. Preseason courtesy inspections of vessels are also conducted to promote compliance (J. Browning 2008).

## 7 ECOSYSTEM CHARACTERISTICS

### 7.1 Introduction

Physical and biological characteristics of the GOA are summarized in great detail in several comprehensive documents (Final Alaska Groundfish Fisheries Programmatic Supplemental Environmental Impact Statement (PSEIS) June 2004; Final Environmental Impact Statement (EIS) for Essential Fish Habitat (EFH) April 2005, Appendix C; Ecosystem Considerations for 2008; Aydin et al. 2007, GOA FMP 2008). The following text is largely based on these sources.

The GOA is a relatively open marine system and the dominant circulation is characterized by the cyclonic flow of the Alaska gyre. The circulation consists of the eastward-flowing Subarctic Current system at approximately 50° N and the Alaska Coastal Current (Alaska Stream) system along the northern GOA. Large seasonal variations in the wind-stress curl influence nearshore flows and eddies which in turn affect much of the region's biological variability. Bottom sediments include gravely sand, silty mud, and muddy to sandy gravel, and areas of rock. The dominant shelf sediment is clay silt. In contrast, the shelf near Kodiak Island consists of flat relatively shallow banks cut by transverse troughs.

Temperature anomalies in the GOA illustrate a relatively warm period in the late 1950s, followed by cooling (especially in the early 1970s), and then by a rapid temperature increase in the latter part of that decade. The GOA also experiences high latitude temperature responses to El Niño southern oscillation events. There is evidence also for larger scale, biological responses in the GOA to decadal-scale climate changes.

Evidence suggests there were climate regime shifts in 1977 and 1989 in the North Pacific. Ecosystem responses to these shifts in the GOA were strong after the 1977 shift, but weaker after the 1989 shift. Variation in the strength of biological responses to climate shifts may be due to the geographical location of the GOA in relation to the spatial pattern of climate variability in the North Pacific. Prior to 1989, climate forcing varied in an east-west pattern, and the GOA was exposed to extremes in this forcing. After 1989, climate forcing varied in a north-south pattern, with the GOA as a transition zone between the extremes in this forcing. The 1989 regime shift did not, therefore, result in strong signals in the GOA. After 1989 water temperatures were cooler and more variable in the coastal GOA, suggesting production may have been lower and more variable.

There were both physical and biological responses to both regime shifts in the GOA; however, the primary reorganization of the GOA ecosystem occurred after the 1977 shift. After 1977, the Aleutian Low intensified resulting in a stronger Alaska current, warmer water temperature, increased coastal rain, and increased water column stability. The strong 1997/98 El Niño southern oscillation event significantly changed the distribution of fish stocks off Alaska. There were marked changes in diet composition of five seabird species collected in the GOA from 1975 to 1978 (capelin dominated) and from 1988 to 1991 (capelin virtually absent).

The winter of 2006/07 featured anomalous south westerly winds, which given the prevailing seasonal winds, meant enhanced wind mixing and enhanced positive wind stress curl and hence upward Ekman pumping. The net effect was relatively shallow mixed layer depths in the central Gulf, and deep mixed layer depths close to the coast, at the end of winter of 2007 as compared with the previous year. Physical data collected on the NMFS GOA bottom trawl survey support this and indicate that summer bottom temperatures in 2007 at shallow depths (<200 m) were colder and temperatures at depth were warmer than they have been in the recent past.

## 7.2 The food web

Aydin et al. (2007) presented the first comprehensive mass balance models for the GOA. Of the 132 biomass pools in the GOA model, unmodified input data resulted in “balanced” biomass pools (where consumption and fishery removals did not exceed production) for 80 of them, over 60% of model biomass pools. Of the 52 groups which did not immediately balance, 47 had inadequate survey information to determine biomass. These groups shared the characteristics with those in the EBS model in that they are either not sampled or are generally thought to be poorly sampled by NMFS trawl surveys. They found that the GOA appears balanced between benthic and pelagic pathways, but is notable in having a relatively smaller “biomass” of fisheries (catch) relative to the two other systems, and a high biomass of fish predators above trophic level 4; arrowtooth flounder and halibut. Thus, in the GOA, consumption of plankton and detritus are nearly balanced. In the GOA and AI the primary forage fish, capelin and myctophids, are both given protected status by the NPFMC forage fish FMP amendment, which prohibits directed fishing for all species in the forage fish category.

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%). In the GOA, the vast majority of early 1990s adult pollock predation mortality was caused by three groundfish predators: arrowtooth flounder (32% of total mortality), halibut (22%), and cod (15%) according to the food web model.

### 7.2.1 Marine mammals

Marine mammals occur in diverse habitats, including deep oceanic waters, the continental slope, and the continental shelf. In the areas fished by the federally managed groundfish fleets, 26 species of marine mammals are present from the orders Pinnipedia (seals, sea lion, and walrus), Carnivora (sea otter and polar bear), and Cetacea (whales, dolphins, and porpoises). Angliss and Outlaw (2008) summarize the most recent assessment of marine mammal species in Alaskan waters. Most species are resident throughout the year, while others seasonally migrate into and out of Alaskan waters. Marine mammal species differ greatly from one another in their prey requirements and feeding behaviors, leading to substantial differences in their responses to changes in the environment. For some species, such as the baleen whales, diets consist largely of planktonic crustaceans or small squid and have no overlap of prey with species that are targeted or taken as bycatch in the groundfish fisheries. For other species, notably Steller sea lions and Northern fur seals, there is a high degree of overlap between their preferred size and species of prey and the groundfish catch. Other species are in between, perhaps feeding on the same species but smaller sizes of fish than what is typically taken in the fisheries. Although they may take a wide variety of prey species during the year, many species may depend on only one or a few prey species in a given area and season. In addition, the prey requirements and foraging capabilities of nursing females and sub-adult animals may be much more restricted than for non-breeding adults, with implications for reproductive success and survival.

Commercial fisheries effects on the availability of prey to marine mammals have been addressed by examining the degree of direct competition (harvest) of prey and indirect or cascading effects of the fisheries on the food web of the mammals. For marine mammals whose diets overlap to some extent with the target or bycatch species of the fisheries, fishery removals 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 is affected. If alternate prey is not available or is of poorer

nutritional quality than the preferred species, or if the animal must spend more time and energy searching for prey, reproductive success and/or survival can be compromised. In the case of marine mammals that do not feed on fish or feed on different species than are taken in the fisheries, the removal of a large number of target fish from the ecosystem may alter the predator and prey dynamics and thus the abundance of another species that is eaten by marine mammals. The mechanisms and causal pathways for many potential food web effects are currently poorly understood.

### 7.2.2 Seabirds

Over 70 species of seabirds occur over waters off Alaska and could potentially be affected by direct and indirect interactions with the GOA and BSAI groundfish fisheries. Thirty eight of these species regularly breed in Alaska and waters of the EEZ. More than 1,600 seabird colonies have been documented, ranging in size from a few pairs to 3.5 million birds. Breeding populations of seabirds are estimated at approximately 48 million birds and non-breeding migrant birds probably account for an additional 30 million birds. Most of the migrant birds are present only during the summer months (May through September) although some non-breeding albatross have been sighted at all months of the year. The distributions of species that breed in Alaska are well known in summer but for some species winter distributions are poorly documented or completely unknown.

Seabirds are caught incidentally in all types of fishing operations. The risk of seabirds getting caught in fishing gear varies with the density and behavior of the bird species around the fishing vessel, the type of fishing gear used, and the techniques and devices used, if any, to deter or avoid the birds. Many factors contribute to the abundance and distribution of birds at sea, including the availability of natural prey, but many species are attracted to fishing vessels in order to forage on bait, offal, discards, and prey disturbed by the fishing operation. The seabird incidental-take estimation methods and procedures, developed by USFWS in consultation with NOAA Fisheries confirm that seabirds taken in fisheries include short-tailed albatross, black-footed albatross, Laysan albatross, unidentified albatross, fulmars, gulls, shearwaters, unidentified tubenoses, alcids, other bird species, and unidentified seabirds (those not identified to one of the other ten groups).

The US Fish and Wildlife Service (FWS) compiles data collected annually for seabirds at breeding colonies throughout Alaska to monitor the condition of the marine ecosystem and to evaluate the conservation status of species. Their most recent report (Dragoo et al. 2007) covers the period through 2004. Populations of fish feeders (fulmars, cormorants, gulls, kittiwakes, murre, guillemots, rhinoceros auklets, puffins) exhibited stable populations in 36 of 69 cases. There was a significant upward trend in 14 cases and significant downward trend in 19 cases, but no geographic patterns were apparent with regard to population trends of fish eating seabirds.

The Alaska Fishery Science Center (AFSC) is currently increasing its research emphasis on seabird fishery interactions, and incorporating seabirds into ecosystems models being developed for the Bering Sea and Gulf of Alaska (e.g., Aydin *et al.* 2007). The AFSC is engaged in a series of studies designed to gain a better understanding of seabird interactions with the Alaska groundfish trawl fisheries and the factors that affect those interactions. This is an important issue in part due to seabird mortalities associated with those fisheries, including known incidental takes of Laysan albatross (*Phoebastria immutabilis*). In 2003 the Alaska groundfish trawl fisheries were included in the short-tailed albatross (*P. albatrus*) Biological Opinion due to the use of Laysan albatross as a bycatch proxy for short-tailed albatross in conjunction with the sighting of these seabirds around trawl vessels as they fished and processed catch. A summary of seabird and fishery interactions research is at: [www.afsc.noaa.gov/refm/reem/Seabirds/Default.php](http://www.afsc.noaa.gov/refm/reem/Seabirds/Default.php)

### 7.2.3 Pacific cod in the ecosystem

Pacific cod are commercially important in all three ecosystems, and are also important predators in the EBS, GOA, and AI. Although the density of cod differs between systems, the food web model estimates that the relative effects of fishing and predation mortality are similar between the AI, EBS, and GOA: cod have relatively more fishing mortality than predation mortality in all three ecosystems. Cod are clearly opportunistic predators in all three ecosystems, feeding on a variety of fish and invertebrates, and scavenging as well. In all three ecosystems, Pandalid and non-Pandalid shrimp and various crabs are important prey, but other major prey items differ by ecosystem and seem to relate to the relative importance of benthic and pelagic pathways. Commercially important crab species such as snow crab (*C. opilio*) and Tanner crab (*C. bairdi*) make up 9% of cod diets in the EBS and GOA, but less than 3% in the AI, reflecting the stronger benthic energy flow in the EBS and GOA.

In the EBS and GOA, pollock and halibut predation rank next, and in the AI, adult and juvenile Steller sea lion predation represents the largest single source of predation mortality for cod. Cod cannibalism is a significant source of cod mortality only in the EBS, and flatfish trawl fisheries, halibut predation and skate predation round out the large cod mortality sources in that ecosystem. In the GOA, sperm whales, sea lions, and dogfish, along with flatfish and halibut fisheries, account for most remaining cod mortality. Therefore, we see groundfish-dominated predation mortality sources for cod in the EBS, sea-lion dominated predation mortality in the AI, and a mixture of groundfish and marine mammal predation on cod in the GOA.

Cod fisheries are extremely specialized predators of cod, and thus fisheries are most sensitive to changes in the survival of cod in each ecosystem. None of the other predators of cod showed a significant sensitivity to a 10% decrease in cod survival. Pollock, halibut, and sea lions ranked highest as non-fishery mortality sources of cod in the EBS, GOA, and AI, respectively, but none of these species were predicted to have significant changes in biomass in any ecosystem in this analysis. While these predators may cause significant cod mortality in each system, Aydin et al (2007) found that none of them are dependent on cod to the extent that small changes in cod survival affect their biomass in a predictable manner.

Aydin et al. (2007) are reported that cod appear most sensitive in all ecosystems to bottom up effects from both pelagic and benthic production pathways (small phytoplankton and benthic detritus). In the GOA, there is considerable uncertainty in the effect of reduced small phytoplankton and benthic detritus survival on cod biomass. Reduced survival of juvenile and adult arrowtooth flounder in the GOA appear likely to have positive effects on cod biomass. Adult arrowtooth are only minor predators of adult cod, but cause an estimated 19% of the mortality on juvenile cod in the GOA. In addition, arrowtooth cause the majority of pollock mortality, which is the major prey of cod in the GOA. Arrowtooth are also estimated to cause the majority of capelin mortality and a substantial amount of the mortality for pandalid shrimp, also cod prey in the GOA. It is difficult to determine whether the simulated reduced arrowtooth survival benefits cod more by releasing predation on juvenile cod, by releasing predation on cod's major prey, or through a combination of effects.

### 7.3 By-catch and discarding

Prohibited species identified in the GOA FMP are Pacific halibut, Pacific herring, Pacific salmon, steelhead trout, king crab, and Tanner crab. They must be avoided while fishing groundfish and must be immediately returned to the sea with a minimum of injury when caught. All catch of pollock, Pacific cod, and shallow water flatfish must be retained when directed fishing for those species is open. When directed fishing for pollock, Pacific cod, or shallow water flatfish is prohibited, retention of those species is required up to any maximum retainable amount in effect for

these species. No discarding of whole fish of these species is allowed, except as permitted in the regulations. At-sea discarding of any processed product from pollock, Pacific cod, or shallow water flatfish is also prohibited, unless required by other regulations.

The North Pacific Groundfish Observer Program verifies catch composition and quantity, including those discarded at sea, and collects biological information on marine resources – see Table 6.

By providing good estimates of total groundfish catch and non-groundfish bycatch by species, the Observer Program reduced the concern that total fishing mortality was being underestimated due to fish that were discarded at sea. For groundfish fisheries, both retained catch and discarded catch are counted against TACs. Data from the Observer Program also made it possible to implement and enforce bycatch quotas for the non-groundfish species that by regulation had to be discarded at sea, provided information that managers and the industry could use to reduce bycatch and bycatch mortality.

In 1998, the amount of managed groundfish species discarded in federally-managed groundfish fisheries dropped to less than 10% of the total groundfish catch in both the GOA and BSAI after implementation of improved-retention regulations. Discards in the GOA increased somewhat between 1998 and 2003, but have declined again in recent years. Discards in both regions are much lower than the amounts observed in 1997. Alaska Fisheries Science Center Seabird Coordinated Studies estimate seabird bycatch annually. In 2006 the Pacific cod longline fishery was estimated to have taken ~800 seabirds, dominated by gulls and northern fulmar.

**Table 6.** Bycatch of the main non target species taken in the Gulf of Alaska Pacific cod trawl fishery between 2003 and 2005. The “proportion of total” shows the quantity expressed relative to the total catch taken by all gear types of that species group in that year (Thompson et al 2008).

Species Group	Bycatch (t)			Proportion of total		
	2003	2004	2005	2003	2004	2005
Large sculpins	11	20	80	0.09	0.03	0.16
Other sculpins	33	5	0	0.06	0.09	0
Misc. Fish	32	100	35	0.07	0.36	0.11
Skate	151	49	26	0.04	0.02	0.01

## **8 OTHER FISHERIES RELEVANT TO THIS ASSESSMENT**

This assessment considers all fisheries targeting cod in Alaskan waters (GOA and BSAI). Other groundfish fisheries which take a by-catch of cod would be relevant. It is noted, however, that all cod catches are recorded and set against the relevant TAC. In addition, a number of other fisheries are certified or within the MSC assessment process: Alaska salmon fisheries, Bering Sea and Gulf of Alaska pollock fisheries, 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.<sup>3</sup>:**

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.

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<sup>3</sup> 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<sup>4</sup>.
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.

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<sup>4</sup> 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 their implementation of MSC Certification procedures and for providing contribution 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: Dr Bob Mohn:** Bob is a Research Scientist with the Canadian Department of Fisheries and Oceans based at the Bedford Institute of Oceanography, Nova Scotia. With the exception of a brief period of consulting Bob has worked for DFO since 1977. He has been responsible for the assessment of various fish, invertebrate and mammal populations. Most of his work has been in the modelling of populations and management scenarios. He has also addressed methodological issues in stock assessment with emphasis on diagnostics and the quantification of uncertainty. His recent work has increasingly been focused on ecosystem modelling with particular attention on the seal-cod interaction and a more complete analysis of cod natural mortality. Bob is and has been a reviewer for several organizations including: The Centre for Independent Experts' (CIE), The Southern Bluefin Tuna Commission, The Pacific Halibut Commission and The International Council for the Exploration of the Sea (ICES).

**Expert advisor: Dr Geoff Tingley<sup>5</sup>:** 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

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<sup>5</sup> It should be noted that Geoff Tingley's name did not appear in the team notification that was posted on the MSC website for the Pacific cod trawl fisheries in the BSAI and GOA. Geoff was selected because of his relevant experience of trawl fisheries.

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

No other Pacific cod fishery has been certified in the GOA. A longline fishery for Pacific cod operating in the BSAI has already been assessed against the MSC standard. In February 2006, the Bering Select Seafoods Company Ltd. successfully achieved certification for six freezer longline vessels.

## 10.3 Inspection 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 7.** 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 Salvesson	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.

<b>Name</b>	<b>Affiliation</b>	<b>Date</b>	<b>Key Issues</b>
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
Nick Sagalkin	ADF&G	16/05/08	Status of stock and the environment, management of the fisheries.
Charles Trowbridge	ADF&G	16/05/08	Status of stock and the environment, management of the fisheries.
Bubba Cook	WWF	23/05/08	Bycatch and seabed impacts of demersal gears.
Dave Fraser	Adak Fisheries	20/06/08	Biology of EBS and AI Pacific cod

# 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 8** 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
1/5/08	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
2/06/09	Notification of Proposed Peer Reviewers	Direct E-mail Notification on MSC website
13/08/09	Notification of 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 and refinement of the Performance Indicators and Scoring Guideposts.

The public draft version of this report was consulted upon at the same time as the reports for the Pacific cod GOA and BSAI longline, pot and jig sectors. Two written submissions were received. The first, on behalf of The Worldwide Fund for Nature (WWF), and the second, on behalf of the Alaska Groundfish Data Bank and Best Use Coalition. ), Both highlighted issues related to the trawl component of the assessment only. Where possible the specific concerns have been extracted and are shown below along with a response from the assessment team. The complete submissions are attached in Appendix D to this report.

WWF Comment
<p><i>Bycatch</i> Bottom trawling in the North Pacific fisheries accounts for only 18% of the retained groundfish catch, but results in 82% of the discarded fish....the issue of excessive bycatch, from both a species and ecosystem function level, continues to fail to be addressed adequately in the bottom trawl</p>

fisheries of the BSAI and GOA.

#### **MML Assessment Team Response**

The comments are not specific to the unit of certification. For the fisheries under consideration, the focus should be on the levels of by-catch made within the fishery and the discard levels in relation to the overall levels of catch. Section 6.7.3 briefly describes the approach of the Fisheries Management Council to manage and minimise by-catch in the ground fish fisheries in general. There is in place the 85% ground fish retention standard.

#### **WWF Comment**

##### *Habitat Effects*

Of the myriad effects bottom trawling may have on the ocean ecosystem in the Bering Sea and Gulf of Alaska...Research has determined that repeated trawling results in substantial changes in benthic communities and that intensively fished areas are likely to remain permanently altered with reductions in both species richness and evenness. Thus, what little research has been conducted indicates that both diversity and productivity – and ultimately the ecosystem function – are reduced by bottom trawling.

Specific to indicator 2.1.3.1, physical impacts on habitat due to the use of trawl gear are known, but only in limited conditions and circumstances... Moreover, while some knowledge exists regarding the direct, acute effects of bottom trawling, much less is understood about the indirect, chronic effects of bottom trawling on reducing habitat diversity and ecosystem productivity in the long-term.

The science compiled by the National Research Council clearly outlines the known direct and acute effects from otter trawls such as those used by the North Pacific fleet. Those effects include reduced habitat complexity, discernable changes in benthic communities, and reduced productivity...recent science implicates bottom trawling in the collapse of the Bristol Bay red king crab population in the early 1980s. Since then, continued trawling in this area has helped keep the population at low levels.

From a procedural perspective, performance indicator 2.1.5.3 and 2.1.5.4 improperly reverse the burden of proof that should be employed in assessing sustainability. The minimum guidepost that “there is no evidence” of unacceptable impacts allows for a fishery to simply claim “no impacts” in the absence of adequate scientific research... Moreover, the qualifier of “unacceptable” renders the indicator further meaningless as the term is not defined and does not indicate who determines the standard for what is “unacceptable.”

We also note that the effects of bottom trawling in soft-bottomed habitat should not be discounted.

Therefore, the main impacts of gear use on the habitat are only partially addressed by existing research. Much more research must be conducted regarding the chronic, indirect effects of bottom trawling on ecosystem function before it can genuinely be considered sustainable. Consequently, the bottom trawl sector does not appear to meet the minimum standards for performance indicators 2.1.3.1, 2.1.5.3, and 2.1.5.4.

#### **MML Assessment Team Response**

The assessment team agree with the general comments about the types of damage that bottom trawling can do. The critical issue is does the level of damage so affect the environment that the activity is unsustainable as defined by the MSC.

Whilst permanent change in benthic ecosystems can result from bottom trawling, permanent change is not inevitable (Kaiser & de Groot, 2000. *Effects of fishing on non-target species and habitats*. Blackwell 399pp; Hall, S.J. 1999. *The effects of fishing on marine ecosystems and communities*. Blackwell 274pp. among many including the EFH EIS which describes approaches to define effects and recovery rates).

If permanent benthic change were to be a feature of these fisheries, then this damage will have already been done and further trawling is unlikely to make the position worse provided that the footprint of the fishery does not grow.

The footprint of the fisheries is a small proportion of the regional habitat. The key factor is that there are strategies and effective measures in place to protect rare and particularly vulnerable habitat types. This does appear to be the case in this region (see for example EFH EIS)

The score for PI 2.1.3.1 (85) does reflect the less than perfect knowledge of the impacts of bottom trawling on the physical habitat. It is, however, clear that sufficient is known to broadly understand the impacts of trawling on the physical habitat as well as aspects of recovery within the EFH EIS reference given in the text (Table 4.3-1 and Appendix B).

In relation to the quoted works looking at the crab populations in Bristol Bay, while there may well be significant effects on some species, populations or subpopulations (such as the red king crab) the issue is does this affect the ecosystem as a whole and does this lead to individual species being put at risk. Provided that that the level of impact is not too great and or there are sufficient, sufficiently large and appropriately distributed protected areas then this should not be a barrier to sustainable fishing.

The procedural concern about burden of proof should be directed to the Marine Stewardship Council, it is beyond the scope of the assessment team to address procedure. However, it is the role of the assessment team to consider what is unacceptable. It is of note, that the wording of the assessment tree did undergo public scrutiny as required by the MSC process.

Whilst we understand the concern, we do not accept that the minimum standards have not been met in PIs 2.1.31, 2.1.5.3 and 2.1.5.4. There has been considerable research and whilst there are impacts we do not consider that the evidence fails the tests of these PIs.

#### **WWF Comment**

##### *Legal and customary rights*

The management system, as currently implemented, inadequately addresses legal and customary rights of people dependent upon fishing under performance indicator 3A.2.3 (MSC Criteria 1, 2, 4). Over the last decade increasing conflicts have occurred between community-based fishermen in the Bering Sea and the North Pacific bottom trawl fleet. Rural communities along the Bering Sea coast depend upon fishing for their livelihood as well as for subsistence and cultural purposes. Residents of the area have increasingly come forward to protest what they perceive as encroachment by the bottom trawl fleet into traditional fishing grounds.<sup>23</sup> Additionally, the bottom trawl fleet received significant resistance from the Bering Sea communities in the implementation of the Bering Sea EFH provisions in 2007.<sup>24</sup> Based on Traditional Ecological Knowledge (TEK), Bering Sea communities proposed additional constraints on the bottom trawl fleet in excess of those originally proposed in the EFH proposal that would include closure areas around marine habitats they deemed important. The recent actions by the Bering Sea communities against the bottom trawl fleet were taken without the support of a Federal mandated policy that has yet to be implemented by NMFS.

Executive Order 13175 calls for a trust responsibility by the United States to protect tribal sovereignty and self-determination, tribal lands, assets, resources, and treaty and other federally

recognized and reserved rights.<sup>26</sup> The Executive Order directs Federal agencies to engage in meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications, to strengthen the United States government-to-government relationships with Alaska Native tribes, and to reduce the imposition of unfunded mandates upon Alaska Native tribes. To achieve meaningful consultation and coordination, NMFS must seek to establish and define a trust responsibility with the Alaska Native tribes and, thus far, has failed to implement an official policy for consultation and coordination with Alaska Native tribes. Since Alaska Natives dominate the population of Bering Sea communities, the management system fails to adequately observe the legal rights of the Bering Sea communities dependent upon fishing. Consequently, the current system falls short of observing the legal and customary rights of people dependent upon fishing for this performance indicator.

**MML Assessment Team Response**

The conflict between Bering Sea tribal governments and Alaska Native organizations over the issue of trawling is acknowledged in the scoring narrative for PI 3A.2.3. The Council has taken recent actions (June 2008) to address this concern by closing the Northern Bering Sea to bottom trawling and designating it as the Northern Bering Sea Research Area. On the basis of concern in some villages within the area the NPFMC agreed to reconsider some segments of the research area boundary in four years. The Bering Sea Elders Advisory Group is supporting a collective effort by Native Alaskan villages to apply local ecological knowledge to proposals for redrawing boundaries that reflect subsistence use areas and areas of ecological significance.

In 2009 the NPFMC established the Rural Community Outreach Committee as one action in implementing a priority in the Council’s Groundfish Policy Workplan: to Increase Alaska Native and Community Consultation. Specifically, the Committee is charged with advising the Council on how to provide opportunities for better understanding and participation from Alaska Native and rural communities, to provide feedback on community impacts sections of analyses and to recommend which proposed Council actions need a specific outreach plan.

Every fishery management action subject to National Environmental Policy Act (NEPA) must include a description of the consultation process as described by E.O. 13175. This is part of the formal NEPA process and must be included in the Federal Register notice of action. In addition, the recent actions taken to address Native Alaska concerns about trawling, the options left open to adaptively change boundaries if needed, and the establishment of a process for ongoing Native Alaskan input through the Rural Community Outreach Committee reflect a formal codified system by which customary rights are observed. Therefore the assessment team conclude that the fishery exceeds the 80 scoring guidepost for PI 3A.3.2., i.e. “The system observes the legal and customary rights of people dependent upon fishing but does not necessarily have a formal codified system.”

**WWF Comment**

*Surveillance and Monitoring*

Management of the bottom trawl fishery is notably deficient in at least one area under control measures specific to performance indicator 3A.8.2. Requirements for onboard observer validation are scaled to vessel size. Vessels greater than 125 ft (38 m) in length are required to have 100% observer coverage, while vessels between 65-125 ft (19.8-38 m) in length are required to have observer coverage for 30% of sea days. Vessels less than 65 ft are not required to have observer coverage. A lack of appropriate observer coverage has led to significant problems with reliability on observer data from the bottom trawl fleet.

**MML Assessment Team Response**

The absence of observer coverage on vessels <60 ft. and the lack of statistically based sampling process of observer assignment on the portion of the fleet with 30% observer coverage (vessels ≥60

ft. to <125 ft.) is issue that has been recognised by the North Pacific Groundfish Observer Program. The Council and NOAA Fisheries are currently developing FMP amendments to restructure observer program coverage in the groundfish and commercial halibut fisheries. In December 2008 Council staff prepared a discussion paper on issues related to observer program restructuring and received a directive to analyze restructuring alternatives. In September 2009, the draft implementation plan was provided to the Council, followed by a report on the plan at the Council's October 2009 meeting. At its October 2009 meeting the Council endorsed further work on the plan, recommending the expansion of several sections recommended by the Council's Observer Advisory Committee. The Council is scheduled to review the next iteration of the plan at its February 2010 meeting, with initial review of the entire analytical package in June 2010 (N. Kimball, pers. com.).

This issue has been re-visited and amendment has been made to the main text of the report (section 6.9.2) and also within the scoring table. The narrative and scores for Performance Indicators 1.1.2.1, 2.1.2.2, 3A.1.2, 3A.1.3, 3A.6.1, 3A.6.3, 3A.8.2 and 3B.5.3 have been revised to more specifically take account of the deficiency in the observer program and acknowledge that measures are in place to address them.

**Alaska Groundfish Data Bank / Best Use Coalition Comment**

Since Alaska State regulations for the GOA State waters cod fishery prohibit trawl gear from participating in this fishery, it seems that there is no need to include Condition 4 in the GOA cod trawl assessment report.

**MML Assessment Team Response**

This has been confirmed with the ADF&G and so this Condition has been removed. It remains in place for the other gear sectors that fish for Pacific cod in the GOA and presently under assessment against the MSC Principles and Criteria for Sustainable Fishing.

## **12 OBSERVATIONS AND SCORING**

### **12.1 Introduction to 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 GOA PACIFIC COD 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 identified in 1.1 and their vessels fishing with trawl gear will be eligible to sell MSC certified Pacific cod (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 cod are reported in logbooks, on landing tickets and through daily radio hail ins or via an electronic fish ticket system, called "Elandings" which is accessible and monitored by both state and federal management staff on a daily basis. On board observers 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 through 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 Pacific cod by AFDF 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**

To be eligible to carry the MSC logo, product from the certified fishery, as defined in 1.1, must enter into separate Chain of Custody certifications.

### **13.6 Target 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. Given the fishery is based on the calendar year and opened on 1<sup>st</sup> January 2009 the target eligibility date for product from the fishery (as and when certified) is February 14<sup>th</sup> 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 : 82
Principle 2: Maintenance of Ecosystem	Overall : 84
Principle 3: Effective Management System	Overall : 90

**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 AFDF Pacific Cod Trawl Fishery in the Gulf of Alaska 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 - 100% 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 AFDF, 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 3 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 that was considered to be deficient (i.e. scored 75) in this area of the assessment and the associated 80 scoring guidepost:

**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. If the evidence suggests recruitment has been adversely affected remedial measures must be implemented. It is required that this Condition is met by the second annual surveillance audit.*

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 longline 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 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

**Condition 2 – Effects of the 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 Recommendations**

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
<b>Principle 1</b>	<b>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.</b>		<b>33.3</b>	<b>82</b>
<b>1.1 (MSC Criterion 1)</b>	<b>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.</b>		<b>33.3</b>	<b>90</b>
<b>1.1.1</b>	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.		<b>16.7</b>	
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.			
<b>1.1.1.1</b>		Are the species readily identified as adults and juveniles?	<b>14.6</b>	<b>100</b>
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.	Pacific cod are easily identified as adults and juveniles by both fishers and regulators. There are no other gadoids with which they could be confused in the area. Research surveys and fishery data are sufficient to reconstruct the target population and estimate the effects of fishing.		
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
<b>1.1.1.2</b>		Is the life history of the species understood and the spawning and nursery areas described?	<b>14.6</b>	<b>100</b>
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.	<p>The life history of the species is clearly documented and understood including behaviour and ecological interactions.</p> <p>Spawning and nursery areas are sufficiently well documented and there are appropriate spatial and temporal closed areas to protect these where this is deemed necessary.</p> <p>Tagging studies (e.g., Shimada and Kimura 1994) have demonstrated significant migration both within and between the GOA, EBS and AI. Although at least one previous genetic study (Grant et al. 1987) failed to show significant evidence of stock structure within these areas.</p>		
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
<b>1.1.1.3</b>		Is the geographical range of the target stock known and any seasonal migration described?	<b>14.6</b>	<b>85</b>
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.	<p>Pacific cod (<i>Gadus macrocephalus</i>) is a transoceanic species, occurring at depths from shoreline to 500 m. The southern limit of the species distribution is about 34°E N latitude, with a northern limit of about 63°E N latitude. Pacific cod is distributed widely over Gulf of Alaska (GOA), as well as the eastern Bering Sea (EBS) and the Aleutian Islands (AI) area. Tagging studies (e.g., Shimada and Kimura 1994) have demonstrated significant migration both within and between the EBS, AI, and GOA. Although at least one previous genetic study (Grant et al. 1987) failed to show significant evidence of stock structure within these areas, current genetic research underway at the Alaska Fisheries Science Center may soon shed additional light on the issue of stock structure of Pacific cod within the BSAI (M. Canino, AFSC, pers. commun.). Pacific cod is not known to exhibit any special life history characteristics that would require it to be assessed or managed differently from other groundfish stocks in the GOA.</p> <p>The seasonality is not addressed by the research surveys and the catch information only relates to the fishery not the overall stock distribution. The score would have been higher if the research surveys in the GOA have had been conducted more frequently (e.g. annually). Migration studies have not been as frequent or regular as would be desired.</p>		
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
<b>1.1.1.4</b>		Is there information on fecundity and growth?	<b>14.6</b>	<b>80</b>
60	There is some appropriate information available on fecundity and growth.	A substantial time series of information on growth is available from the research surveys (most recent is 2007). Unlike the annual BSAI surveys, these surveys were triennial from 1984 to 1999 and then biennial thereafter. Catches are also sampled for age. New growth information is incorporated in the most recent assessment.		
80	Reliable estimates are available of fecundity at size and/or weight and growth rates, and this information forms an adequate time series.	From studies in the Puget Sound it has been reported as 0.25 to 5.0 million eggs per female (Gustafson et al. 2000). More recently, a study by Stark et al. (2007) investigated both maturation and growth in the Bering Sea and the Gulf of Alaska. They used monthly samples to determine the seasonality of maturation.		
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
<b>1.1.1.5</b>		Is there an understanding of the relationship of recruitment to parental stock?	<b>14.6</b>	<b>80</b>
60	Indices of recruitment levels and recruiting ages, and corresponding spawning stock levels are available.	<p>Stock assessment model output data for the current regime (1977 to 2006) exist. These data are without structure and noisy (Thompson et al, 2007, fig 2.8). Thus, SSB is not a good determinant of recruitment in this stock. Regime shifts are known to play a significant factor in recruitment (Hiatt et al. 2007, SAFE Report) and are modelled separately in the assessment analysis.</p> <p>In order to achieve a higher score further investigations into the key drivers of recruitment would be required.</p>		
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
<b>1.1.1.6</b>		Is information collected on the abundance/density of the stock?	<b>14.6</b>	<b>90</b>
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.	Fishery dependent and/or fishery independent indices are available for 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. Fishery dependent data are collected, compiled and analysed but are only used for comparative purposes. Uncertainties have been well analysed within the model framework.  The lack of annual surveys leads to a lower score than might otherwise be achieved.		
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
<b>1.1.1.7</b>		Is information available on environmental influences on the stock dynamics?	<b>12.5</b>	<b>90</b>
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 (see Figure 3 of Hiatt et al., 2007, SAFE Report attachment 2.1.).		
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
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<b>1.1.2</b>	There should be sufficient information on the fishery to allow its effects on the target stock to be evaluated		<b>16.7</b>	
Weighting Commentary		All Performance Indicators within this sub-criterion are considered of equal significance.		
<b>1.1.2.1</b>		Are all major sources of fishery related mortality recorded/ estimated, including landings, discards and incidental mortality?	<b>25</b>	<b>80</b>
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 are accurately recorded and monitored by the 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. The text in the 2005 assessment explicitly states that discards are included for catches after 1980. The most recent data in the 2005 assessment show the discard rates are of the order of a percent or two.  There has been no full stock assessment for the GOA since 2005.		
80	Landings are accurately recorded. Discards and incidental mortality are well estimated for the fishery.	In 2007 an abbreviated assessment was produced using a version of the BSAI model.		
100	Landings, discards and incidental mortality are accurately estimated and monitored.	Possible lower coverage by the observer program (due to smaller vessel size) increases uncertainty in accurate estimation of, for example, discards.		

SCORING INDICATORS	Comments	Weight	Score
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1.1.2.2		Are fleet descriptions, fishing methods and gear types known throughout the fishery under assessment?	25	95
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. <i>In-situ</i> 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).  The State fishery is less well documented, all fishing methods and gear types employed in the fishery are well known and described in their licensing system. The details of each licensed vessels is maintained on a database. The state deploy observers and assist the NMFS and State Troopers in enforcement activity (Sagalkin, 2008, pers. comm.).		
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. <i>In-situ</i> 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
<b>1.1.2.3</b>		Is gear selectivity known for the fishery?	<b>22.8</b>	<b>85</b>
60	Appropriate information is available on selectivity and qualitative changes in selectivity.	<p>Selectivity by season is estimated for the longline, trawl and pot fisheries in the 2008 assessment. All the commercial gear selectivities are highly domed, meaning that they have a preferred size range. The longlines, and hence jigs, select mainly fish between 65 and 85 cm (SAFE fig 2.1). The survey gear, on the other hand is asymptotic and selects equally all fish above about 40 cm.</p> <p>Spatial trends in selectivity do not appear to have been studied.</p>		
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
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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.	<p>Catches of cod are made in a number of other fisheries, including cod-targeting fisheries (trawl, jig and pot) and as incidental or by-catch in the Pollock trawl fishery. Over the period 2003 to 2007 cod bycatch varied from 275 t to 700 t which averages about 1% of the current ABC. The catches (landings and discards) are all recorded as part of the normal state and federal monitoring of the fisheries sector and are all used in the stock assessment.</p> <p>There is substantive and effective surveillance of fishing operations in this area and together with the monitoring of catches and the observer program IUU fishing is reliably estimated to be negligible.</p> <p>However, vessels of differing sizes have differing requirements for observer coverage (e.g. under 60ft vessels, potting vessels on short trips, etc. are not subject to the observer program and so the level of compliance from these vessels cannot be fully determined.</p>		
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
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<b>1.1.3</b>	Appropriate reference levels have been developed for the stock	<b>16.7</b>	
Weighting Commentary		All Performance Indicators within this sub-criterion are considered of equal significance.	
<b>1.1.3.1</b>		Are there appropriate limit and precautionary reference points based on stock biomass and fishing mortality?	<b>100</b> <b>95</b>
60	Limit and precautionary reference points have been set based on justifiable and reasonable practice appropriate to the species.	The Alaskan management system uses a framework of tiers (Goodman et al. 2002) to estimate Overall Fishing limit (OFL), a more conservative Allowable Biological Catch (ABC) and an even more conservative TAC. The quality of data and the completeness of the assessment determine which tier is used to define the reference points. Those tiers with less information contain more precautionary buffers between the reference points.	
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.	The current harvest controls for Pacific cod in the GOA are classed Tier3 and are based on F40%, B40%. Within this tier there are three subcategories defined by the position of the current biomass to the B40%. This is about 11% below the GOA B40% value of 121,000 t, thereby placing Pacific cod in sub-tier “b” of Tier 3. The values 35% reference ratios for 2007 are F/F35%=0.621, B/B35%=1.146. Furthermore, B <sub>20%</sub> is a limit reference point below which targeted fishing of cod is not allowed (see Section 5.8 and Figure 7).	
100	Appropriate limit and precautionary reference points are justified based on stock biology, uncertainty, variability, data limitations and statistical simulations of these factors.	There appears to be enough data and a sufficiently sophisticated model to develop the assessment up to tier 1 status. The main shortcoming is the lack of uncertainty information in terms of probability density functions for the assessment output variables including MSY. Nevertheless, the reference points are widely accepted internationally and have a high probability of meeting conservation and utilization objectives.	

SCORING INDICATORS		Comments	Weight	Score
<b>1.1.4</b>	There is a well-defined and effective harvest strategy to manage the target stock.		<b>16.7</b>	
Weighting Commentary		All Performance Indicators within this sub-criterion are considered of equal significance.		
<b>1.1.4.1</b>	Is there a mechanism in place to contain harvest as required?		<b>33.3</b>	<b>85</b>
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.	<p>Pacific cod in the GOA is rated as a Tier 3 stock and has a harvest control rule. Management has been successful in controlling catch. While there have been intermittent TAC over-runs in recent years, the ABC has not been exceeded since 1992 according to the 2005 assessment. These data were not updated in the 2007 assessment.</p> <p>Biomass estimates are reported to be known <math>\pm 16\%</math> (Assessment SAFE Table 2.1), should the trajectory of the stock be close to the <math>F_{ABC}</math> limit there is some probability of overfishing but harvest would be contained by the Tier approach to management and the application of the TAC and ABC levels.</p>		
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.	The score would be higher if appropriate risk analyses had been available in relation to the uncertainty affecting stock estimates and harvest control.		
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
<b>1.1.4.2</b>		Are clear, tested decision rules set out?	<b>33.3</b>	<b>90</b>
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.	<p>Clear, documented decision rules are fully implemented and have been fully reconciled with reference points and the data and assessment limitations. However, the most recent evaluation was in the full 2005 assessment and this may not provide sufficient frequency of re-evaluation. The decision rules have been tested within the Tier system in general but not specifically for this stock.</p> <p>Re-evaluation of the tier for the stock would occur if assessment model were upgraded. If MSY were estimated (instead of using a proxy) it would move to Tier 2. If in turn statistical analysis (in terms of probability density functions) of the principle assessment outputs were developed GOA cod could move to Tier 1.</p>		
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.	No management strategy evaluations could be found for this stock.		
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
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1.1.4.3		Are appropriate management tools specified to implement decisions in terms of input and/or output controls?	33.3	95
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. Their effectiveness are monitored, e.g. through TAC uptake (which has not be exceeded since 1995) and VMS and on-board observers.		
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
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1.1.5	There is a robust assessment of stocks.		16.7	
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	85
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.	This stock is assessed with an appropriate, well tested and accepted Stock Synthesis (SS2) model framework. A technical workshop was held in 2007 for BSAI cod and many variants on the model were compared and a close variant of the preferred model was applied to GOA in the 2007 update.  Unlike the BSAI smaller management units with separate TACs are identified in the western, central and eastern GOA. TACs are also divided between the inshore and offshore sectors, as well as seasonally between an A and B season.		
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
<b>1.1.5.2</b>		Does the assessment take into account major uncertainties in data and have assumptions been evaluated?	<b>20.0</b>	<b>80</b>
60	Major uncertainties are identified. Some attempt has been made to evaluate these in the assessment.	<p>Measurement and process uncertainties are explicitly handled in this assessment, as is usual in good stock assessment practice. Uncertainties external to the model (and typically difficult to assess) such as in the possibility of a regime shift are not included in the analyses. While the probability of such shifts occurring in the near future may well be impossible to predict, the sensitive of the management advice to such a change could be estimated.</p> <p>The harvest control rule is shown with point estimates, but should be displayed with confidence intervals or some similar description of uncertainty.</p> <p>Although a similar model to BSAI was employed, it did not receive the same scrutiny and review, so this score is slightly lower.</p>		
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
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1.1.5.3		Are uncertainties and assumptions explored and reflected in management advice?	20.0	85
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.  The score would be higher if this was a Tier 1 stock which entails the explicit estimation of uncertainty for stock status parameters and biological reference levels Goodman et al.2002).		
80	Major uncertainties and assumptions are addressed in the management advice and through the appropriate decision rules to address those limitations.	Frequency distributions of probable future states relative to references which also have tier uncertainties explicitly included have not been reported, i.e. the joint probabilities of future states and biological reference points. It is recommended that such an analysis be incorporated into the development of a Management Strategy Evaluation.		
100	All significant uncertainties and assumptions are addressed and reflected in the management advice, including appropriate decision rules.			

SCORING INDICATORS		Comments	Weight	Score
<b>1.1.5.4</b>		Does the assessment evaluate current stock status relative to reference points and make forecasts for the future?	<b>20.0</b>	<b>85</b>
60	The stock status is estimated relative to reference points.	Current stock status is projected for 13 years (until 2020) under a number of scenarios in tables 2.3-2.8 of the SAFE document. These projections would be considered up to a medium term as they included the standing stock plus several recruitments. Uncertainty is reported in these tables but this information is not carried into the estimation of biological reference points. Although it is given in tabular form for projections, the uncertainties are not converted into risks of exceeding references is not provided.		
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
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<b>1.1.5.5</b>		Does the assessment include the consequences of current harvest strategies?	<b>20.0</b>	<b>100</b>
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 of future consequences of those strategies and also evaluates stock trajectories under the operating decision rules (Hiatt et al., 2007, SAFE Report Tables 2.3 to 2.8).		
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
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1.1.6	The stock(s) is/are at appropriate reference level(s).		16.7	
1.1.6.1		Is there evidence that stock status is consistent with that providing long-term productivity? [Score $\geq 80$ : Criterion 1.1 is complete and Criterion 1.2 does not apply. Score 79 or less: Answer Criteria 1.2 in addition]	100	80
60	The stock has a high probability of being above its limit reference point	The stock has a high probability of being consistently at or above its limit reference point and precautionary/target reference point (B35%) See Thompson et al (2007) SAFE Report Figure 2.8.		
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.	The estimates of biomass are subject to moderately high uncertainty, greater than 15% in the terminal year. Moreover, while the projections have confidence levels with them, no risk analysis is provided  Because this Performance Indicator scores $\geq 80$ Criterion 1.1 is complete and Criterion 1.2 does not apply and so does not appear in the scoring table.		
100	The stock has a high probability of being consistently at or above its precautionary/target reference levels.			

SCORING INDICATORS		Comments	Weight	Score
1.3 (MSC Criterion 3)	<b>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.</b>		33	81
1.3.1	<b>Fishing activity maintains the age, genetic structure or sex composition of the stock to a degree that does not impair reproductive capacity.</b>		100	
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	85
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.	<p>The GOA Pacific cod is a large stock, the most recent estimate from assessment model is of the order of 295,000 t 3+ biomass and 121,000t female spawning stock biomass for 2008 (SAFE page 174 and Table 2.3). There appears to be little sub-structure (Grant, W. S., C. I. Zhang, and T. Kobayashi. 1987. Lack of genetic stock discretion in Pacific cod (<i>Gadus macrocephalus</i>). Can. J. Fish. Aquat. Sci. 44:490-498.) “...little genetic divergence between stock of Pacific cod is expected because random genetic drift in large population sizes is insignificant and because migration between areas prevents genetic differentiation.”.</p> <p>The stock recruit data show that reproductive capacity (in terms of recruitment) has been poorly estimated but without trend over a large range of stock sizes.</p>		
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.	<p>Age and sex structure information is available from the research surveys and from the commercial fishery through the observer program. There is also data available on fecundity and thus reproductive capacity. These data continue to be collected.</p> <p>This score is slightly lower than the score given in the corresponding BSAI longline assessment because of the lower frequency of surveys.</p>		
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
<b>1.3.1.2</b>		Does information indicate any changes in structure that would alter reproductive capacity?	<b>50.0</b>	<b>75</b>
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 Pacific cod in GOA that would permit structural change to be observed. The survey catch is measured and aged so some data to address this must be available to address this issue. Stark et al. 2007 provide an analysis of growth and maturation for GOA cod but temporal (as opposed to seasonal) changes were not reported. It is interesting to note that a study was published in the 1960's (Ketchen, K.S. 1964. Preliminary results of studies on a growth and mortality of Pacific cod ( <i>Gadus macrocephalus</i> ) in Hecate Strait, British Columbia. J. Fish. Res. Bd. Canada 21:1051-1067) which may provide an interesting comparison.)  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
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<b>Principle 2</b>	<b>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</b>	<b>33.3</b>	<b>84</b>
<b>2.1 (MSC Criterion 1)</b>	<b>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.</b>	<b>33.3</b>	<b>82</b>
<b>2.1.1</b>	<b>There is adequate understanding of ecosystem factors relevant to the distribution and life history strategy of the target species.</b>	<b>20</b>	
Weighting Commentary		The three MSC Criteria are given equal weightings.	
<b>2.1.1.1</b>		Are the nature, sensitivity and distribution of habitats relevant to the fishing operations known?	<b>33.3</b> <b>85</b>
60	Appropriate information exists but may not be comprehensive or up to date. The seasonal distribution of fishing operations is mapped.	<p>Comprehensive substrate data sets exist for the GOA and GOA bathymetry is also well understood. The nature, sensitivity, and distribution of these habitats relevant to fishing operations are known (EIS EFH).</p> <p>Studies show that juvenile and adult Pacific cod inhabit areas of mud, sandy mud, muddy sand, and sand along the inner and middle continental shelf and the lower portion of the water column of the GOA. (FMP GOA 2005).</p> <p>The distribution and effort of the trawl fishery is recorded by fishing vessels and monitored through the Observer Program, logbook recording scheme and VMS data collection.</p>	
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
<b>2.1.1.2</b>		Is information available on the trophic position, status and relationships of the target species within the food web?	<b>33.3</b>	<b>90</b>
60	Key prey, predators and competitors are known.	<p>Quantitative information is available on the diet of Pacific cod and, depending upon age, includes zooplankton, various invertebrates, including many species of commercial crabs, forage fish, and pollock. Pacific cod appear to opportunistic feeders on a wide range of benthic and pelagic species. There are quantitative estimates of predators of Pacific cod. These include Pacific halibut, salmon shark, northern fur seals, Steller sea lions, harbour porpoises, various whale species and tufted puffins. Annual SAFE documents provide a time series of information on the understanding of the Pacific cod in the ecosystem.</p> <p>These data have been used to estimate it's trophic position and the relative ecological importance of Pacific cod, as a target species, within the food web (Aydin et al. 2007, NOAA TM 178).</p>		
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
<b>2.1.1.3</b>		Is there information on the potential for the ecosystem to recover from fishery related impacts?	<b>33.3</b>	<b>85</b>
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.	<p>Habitat analyses have been based on depth/slope proxies as there has been little direct habitat mapping.</p> <p>Essential fish habitat analyses have provided preliminary estimates of the recovery potential of soft and hard bottom habitats. EFH studies and review of other work elsewhere in relation to bottom damage by trawls and recovery. Extrapolation from and comparison to the BSAI ecosystem is a significant source of available information, including Aydin <i>et al.</i> 2007.</p>		
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.			
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
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2.1.2	General risk factors are adequately determined.		20	
Weighting Commentary	The PIs associated with bait, the potential for relocation of species and unobserved mortality were considered to be less significant and so given lower weightings.			
2.1.2.1		Is information available on the nature and extent of the by-catch (capture of non-target species)?	39.2	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. For the more frequently affected non-target species, data from sampling is considered sufficient to estimate by-catch rate with reasonable precision. There are, however, some important exceptions to this generally good level of information, for example, bird strikes in gears and vessels by species are incompletely recorded (PSEIS). It is known from other fisheries that net sonde cables (third wires) can be a significant source of seabird mortality but this is addressed elsewhere.  There have been a number of <i>ad hoc</i> studies by, for example, Melvin <i>et al.</i> on various Alaskan fisheries that provide considerable information about seabird by-catch and mitigation.  A higher score is achievable through, for example, improving the quality of the information available.  Research is underway to identify seabirds from body parts, which will assist in reducing the unidentified component of seabird mortalities.		
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
<b>2.1.2.2</b>		Is information available on the extent of discard and slippage* (the proportion of the catch not landed)?	<b>39.2</b>	<b>80</b>
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 Pacific cod trawl fishery. By regulation, all cod are to be retained and 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 Pacific cod fisheries of invertebrates, fish, marine mammals, reptiles, and birds.		
80	Information is available to allow appropriate estimates of discard and slippage to be calculated and interpreted.	The score would have been higher if the recognised deficiencies in observer coverage within the 60'-125' fleet sector had been addressed.  *Slippage is a term more commonly used in European fisheries and in particular in reference to trawl/seine fisheries where, owing to the catch composition, i.e. wrong species, undersize, catches may not be hauled aboard a vessel but the net is opened or "slipped" to release the catch.		
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
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<b>2.1.2.3</b>		Is information available on other unobserved fishing mortality on target or other species?	<b>21.6</b>	<b>80</b>
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 (Pacific cod) will mostly be through damage to smaller individuals that pass through the meshes of the net. Given its mobility and contact with the bottom, demersal trawling is understood to have greater impact on demersal organisms than 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.  There is considerable aerial and other surveillance and enforcement activity focussed on Alaskan and surrounding waters that would define the level of 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
<b>2.1.3</b>	<b>There is adequate knowledge of the effects of gear-use on the receiving ecosystem and extent and type of gear losses.</b>		<b>20</b>	
Weighting Commentary		All performance indicators were given equal weighting.		
<b>2.1.3.1</b>		Is there adequate knowledge of the physical impacts on the habitat due to use of gear?	<b>50</b>	<b>85</b>
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 contract 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 (Dernie <i>et al.</i> , 2003; Collie <i>et al.</i> , 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
<b>2.1.3.2</b>		Is any gear lost during fishing operations and can 'ghost fishing' occur?	<b>50</b>	<b>75</b>
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. 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'.			
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.			

SCORING INDICATORS	Comments	Weight	Score
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<b>2.1.4</b>	<b>Strategies have been developed within the fisheries management system to address and restrain any significant negative impacts of the fishery on the ecosystem</b>	<b>20</b>	
Weighting Commentary		All the performance indicators are weighted the same.	
<b>2.1.4.1</b>		<b>25</b>	<b>85</b>
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. 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 <i>et al.</i> 2007).  Impacts and acceptable limits have been estimated for protected species.	
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
<b>2.1.4.2</b>		Are management strategies in place to address impact identification and avoidance/reduction?	<b>100</b>	<b>85</b>
60	Management strategies include some appropriate consideration of ecosystem impact identification and avoidance/reduction, but may not be tested.	<p>The FMP contains a number of elements to address the identification of impacts from fisheries and to avoid or reduce identified impacts (GOA 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 <i>et al.</i> 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.</p> <p>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:</p> <ul style="list-style-type: none"> <li>• Alaska Seamount Habitat Protection Areas</li> <li>• GOA Coral Habitat Areas of Particular Concern.</li> </ul> <p>The Observer Program also collects information to estimate impacts of fisheries on essential fish habitat and non-target species.</p>		
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	<b>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.</b>		20	
Weighting Commentary		All performance indicators were given equal weighting.		
2.1.5.1		Does the removal of target stocks have unacceptable impacts on ecosystem structure and function? <b>If there is evidence of depletion of non-target species, then Criteria 2.3 should also be addressed.</b>	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.  The groundfish cap (OY) of 2 million metric tonne limits ecosystem impacts of the fishing sector on the overall ecosystem function, as does the secondary ABC and TAC for Pacific cod.  Aydin <i>et al.</i> (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? <b>If there is evidence of depletion of non-target species, then Criteria 2.3 should also be addressed.</b>	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 and both ecosystem and by-catch studies this.  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 this would adversely impact 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 (GOA FMP 2005), such losses do, however, need to be balanced against, the reduced predation of these species by Pacific cod as a direct effect of the cod 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? <b>(Management measures related to habitat are considered under Principle 3)</b>	25	85
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 EFHEIS studies and analyses. Substantial areas are protected from bottom trawling covering all habitat types and especially vulnerable habitats/communities.  These analyses make some assumptions which have not been verified but represent a substantial body of evidence.  The score for the GOA would be higher if better information were available on the distribution of bottom substrates.		
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? <b>If there is evidence of depletion of non-target species, then Criteria 2.3 should also be addressed.</b>	25	85
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 removals cap, secondary removal limits (TACs) as well as a extensive network of MPAs, trophic impacts are not unacceptable.		
80	Appropriate information is available on the effects of the fishery on biological diversity, community structure and productivity. This indicates no unacceptable impacts.	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.  By-catches (including non-target species) are not indicative of significant impacts, but some elements require further determination.		
100	The effects of the fishery on biological diversity, community structure and productivity have been quantified and are within acceptable tested/justified limits.	Modelling studies (Aydin <i>et al.</i> (2007) indicate that other predators are not significantly affected by changes in cod survival and the same was true of most prey species. Impacts on biological diversity, community structure and productivity appear acceptable and reversible.		

SCORING INDICATORS		Comments	Weight	Score
2.2 (MSC Criterion 2)	<b>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.</b>		32.4	88
2.2.1	<b>Fishing is conducted in a manner, which does not have unacceptable impacts on recognised protected, endangered or threatened species.</b>		50.0	
Weighting Commentary		All performance indicators were given equal weighting.		
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.	<p>PET species in the GOA management area are listed below. They are protected under the Endangered Species Act (ESA) the Migratory Bird Treaty Act and the Marine Mammal Protection Act.</p> <p>Beluga Whale, Killer Whale, Blue Whale, Bowhead Whale, Fin Whale Humpback Whale, North Pacific Right Whale, Sei Whale, Sperm Whale, Steller Sea Lion, Short-tailed Albatross, Northern Fur Seal, Spectacled Eider, Steller's Eider, Northern Sea Otter, Pacific Leatherback Turtle, Chinook Salmon.</p>		
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.	<p>The legal status of most GOA PET species is at: <a href="http://www.nmfs.noaa.gov/pr/species/">www.nmfs.noaa.gov/pr/species/</a>.</p> <p>The Pacific cod trawl fishery in the GOA has the potential to interact with the short-tailed albatross (<i>Phoebastria albatrus</i>) and Steller sea lion (<i>Eumetopias jubatus</i>).. Adequate information on the presence and populations of these species is collected and available.</p> <p>There is information on the species and distribution of elasmobranchs, as well as on-going research examining trends in catches and relative abundance (Tribuzio <i>et al.</i> 2008).</p>		
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.	<p>Combined skate biomass in Alaskan waters is reported to have been increasing over the last 15 to 20 years (GOA FMP 2005).</p>		

SCORING INDICATORS		Comments	Weight	Score
<b>2.2.1.2</b>		Are interactions of the fishery with such species adequately determined?	<b>33.3</b>	<b>75</b>
60	The main interactions directly related to the fishery are known.	<p>Adequate quantitative estimates are made of the effects of interactions directly related to the fishery with mammals &amp; 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.</p> <p>The inter-actions of seabirds and the trawl fishery has been reasonably well studied and documented (e.g. Zador <i>et al.</i> 2008). There have also been a number of <i>ad hoc</i> studies by, for example, Melvin <i>et al.</i> on various Alaskan fisheries that provide considerable information about seabird by-catch and mitigation.</p> <p>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.</p>		
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
<b>2.2.1.3</b>		Do interactions pose an unacceptable risk to such species?	<b>33.3</b>	<b>85</b>
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 trawl fishery interacts with the endangered western stock of Steller sea lions (SSL) in two ways: by competing for prey and through incidental by-catch mortality. The Pacific cod trawl fishery interacts with SSL predominately through competition for prey as Pacific cod can be an important component of the SSL diet. Designated aquatic critical habitat for the eastern stock of the SSL consists of the areas within 3,000 ft (0.9 km) of designated rookeries and haul-out sites. Mortalities of sea lions due to fishing activities are monitored in a number of ways, including through the onboard observer programme. No mortalities were recorded between 2002 and 2005 (TM-180). Between 2000 and 2004, Kenai-Kiska and western Alaska population trend site counts of non-pup SSL increased by 12% (Fritz & Stinchcomb 2005). However, counts in the western GOA and 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). Aydin <i>et al.</i> (2007) presents evidence for the lack of significant negative effects on top predators of cod removals by the fishery.		
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.	Northern fur seals were listed as depleted under the MMPA in 1988. During 1998-2004, pup production on the Pribilof Islands 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 Pacific cod trawl fishery has any negative impact on the fur seal population.		
100	It is established that the direct and indirect effects of fishing on threatened and endangered species are within acceptable pre-defined limits.	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, two in any 5-year period, by as much as a factor of 10 would have little impact on when the proposed recovery goals for the species are achieved (Zador <i>et al.</i> 2008).		

SCORING INDICATORS	Comments	Weight	Score
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2.2.2	<b>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.</b>		<b>50.0</b>	
2.2.2.1	Are management objectives and accompanying strategies in place in relation to impact identification and avoidance/reduction?		<b>100</b>	<b>90</b>
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 observers 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 <i>et al.</i> 2007); MPA and closed areas around sea lion rookeries; and seabird research plans under the PSEIS.		
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
<b>2.3</b> (MSC Criterion 3)	<b>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.</b>			
<b>2.3.1</b>	<b>There are management measures in place that allow for the rebuilding of affected populations.</b>			
Weighting Commentary				
<b>2.3.1.1</b>		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
<b>Principle 3</b>	<b>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</b>		<b>33.3</b>	<b>90</b>
<b>3.A</b>	<b>Management System Criteria</b>			
<b>3A.1</b> ( <i>MSC Principle 3 Intent and Criterion 3</i> )	<b>A management system containing an institutional and operational framework exists with clear lines of responsibility.</b>			<b>95</b>
Weighting Commentary		Under sub-criterion 3A.1, external review was given a slightly lower weighting than the other performance indicators.		
<b>3A.1.1</b>		Are organisations with management responsibility clearly defined including areas of responsibility and interactions?	<b>25.8</b>	<b>100</b>
60	Organisations with management responsibility are known. Responsibilities and interactions require clarification and occasional issues may arise.	Management of the GOA cod fishery is carried out under the ultimate authority of the Magnuson Stevens Fishery Conservation and Management Act (MSFCMA) first passed in 1976 and most recently reauthorized in 2006. Under authority of the MSFCMA, these fisheries are managed by the Secretary of Commerce/NOAA/NMFS with recommendations from the North Pacific Fishery Management Council (NPFMC – or “Council”), one of eight U.S. regional management councils. These management authorities and their function are clearly defined in law. Working relations between the Council and NMFS have proven strong and effective.		
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.	The Alaska Board of Fisheries (BOF) has management authority for the portions of 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 (ADFG) to implement. Pacific cod is managed in state waters through both “parallel seasons” (in which the BOF through Emergency Orders (EOs) times state openings and closing by gear type to conform to federal water seasons), and “state waters” seasons, in which openings, closings, and gear types are established by the state. In general, state fisheries open when federal/parallel fisheries close. State fisheries operate under the same overall TAC for the stock in question, but have a separate sub-TAC (which allows their continued opening). For the GOA it is 25%.		
100	Organisations with management responsibility are clearly defined including all areas of responsibility and interaction. Interactions are demonstrably effective.	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 GOA Groundfish FMP enables formal consultations and coordination with State of Alaska fisheries. The Council meets with the BOF annually in February. The Council/Board of Fisheries Joint Protocol Committee meets twice a year to discuss issues of joint concern.  Enforcement action is carried out by NMFS, the US Coast Guard (USCG) and the ADFG. The US Fish and Wildlife Service, the USCG, 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.  Interactions between state and federal authorities, and among federal entities, appear to be well coordinated and effective.		

SCORING INDICATORS		Comments	Weight	Score
<b>3A.1.2</b>		Is the management system consistent with the cultural context, scale and intensity of the fishery?	<b>25.8</b>	<b>85</b>
60	Inconsistencies arise in some key areas but a programme is in place to address these.	The management system is entirely consistent with the cultural context, scale and intensity of the fishery which includes native, state and federal components.		
80	The system is consistent with key elements of the cultural context, scale and intensity of the fishery.	The Pacific cod fishery is part of the larger Alaskan groundfish fishery, which is an important economic component of both state and national fisheries. North Pacific fisheries constitute an important economic and environmental resource, comprising a large proportion of total U.S. fisheries production.		
100	The system is entirely consistent with the cultural context, scale and intensity of the fishery.	<p>Pacific cod allocations reflect the cultural context of the GOA management area, which includes state and federal interests. State fisheries in the GOA region receive a specific Pacific cod allocation (25% of the TAC) which is further apportioned by the BOF to management areas within the GOA (e.g. SAP, Kodiak, Chignik, Cook Inlet) and to gear sectors (jig, pot). Subsistence groundfish fisheries are minimal, are managed by the state, and take place primarily in state waters. Where appropriate, subsistence groundfish harvests are accounted for in annual groundfish stock assessment.</p> <p>Trawl, longline, pot and jig gear is allowed in parallel fisheries, but most state waters in the GOA (except the Western area) are closed to trawling. In state fisheries, only pot and jig gear is allowed, with the majority of harvest by pots.</p> <p>At the state level the 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 GOA 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.</p> <p>State resources directed towards managing this fishery include those of the ADFG through its divisions of Commercial Fisheries, Sport Fisheries, Subsistence, Habitat and Wildlife Conservation. Management is conducted through a regional structure. Below the regional structure there are area or community offices in many locations.</p> <p>There are concerns about the overall level of observer coverage for some sectors of the fishery, especially the smaller vessels under 60' LOA, which are not required to carry observers. There is no state observer program; however, opportunistic assignment of ADFG staff to vessels on pot and jig longline vessels does occur and bycatch information is taken account of by extrapolating data from equivalent vessels carrying observers in the federal fishery.</p>		

SCORING INDICATORS		Comments	Weight	Score	
<b>3A.1.3</b>		Is the management system subject to internal review?	<b>25.8</b>	<b>100</b>	
60	There are mechanisms in place to allow for internal review.	<p>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.</p> <p>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. Alaska Fisheries Science Center (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.</p> <p>The Council and NOAA Fisheries are currently developing FMP amendments to restructure observer program coverage in the groundfish and commercial halibut fisheries. In December 2008 Council staff prepared a discussion paper on issues related to observer program restructuring and received a directive to analyze restructuring alternatives. In September 2009, the draft implementation plan was provided to the Council, followed by a report on the plan at the Council's October 2009 meeting. At its October 2009 meeting the Council endorsed further work on the plan, recommending the expansion of several sections recommended by the Council's Observer Advisory Committee. The Council is scheduled to review the next iteration of the plan at its February 2010 meeting, with initial review of the entire analytical package in June 2010 (N. Kimball, pers. com.).</p> <p>The Observer Program has been reviewed several times during the course of these various reconsiderations. The restructuring analyses performed in 2006 and 2008 provided program reviews. These followed an earlier independent program review conducted by MRAG Americas in 2000.</p> <p>State TACs are derivative of TACs set through the NPFMC, and are based on assessments conducted through the NPFMC/AFSC process. The state requires in-season reporting of catch and daily processor reporting, and conducts dockside and at-sea biological monitoring. State-level reviews taking place outside the NPFMC process are primarily through state Legislative Task Forces to oversee particular aspects of ADFG management.</p>			
80	<p>The management system is subject to internal review at appropriate intervals. Monitoring and evaluation are responsive to reviews.</p> <p>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.</p> <p>Evaluation results demonstrate that the management system shows improvements.</p>				
100	<p>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.</p> <p>Results of on-going evaluation of management performance are made public.</p>				

SCORING INDICATORS		Comments	Weight	Score
<b>3A.1.4</b>		Is the management system subject to external review?	<b>22.7</b>	<b>90</b>
60	There are mechanisms in place to allow for external review.	<p>The management system is subject to regular and frequent external review. The NPFMC system conducts regular reviews of the groundfish fisheries including 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 nongovernmental organizations, and the general public. The Plan Development Team solicits peer reviews of stock assessments and its meetings consider outside views regarding its analyses.</p> <p>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 itself is subject to periodic review.</p> <p>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). Pacific cod was subjected to a Center for Independent Experts (CIE) review in 2001 that assessed the “next generation” models and use of decision theory to recommend harvest targets and limits.</p> <p>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 or implemented.</p>		
80	<p>The management system is subject to external review at appropriate intervals. Monitoring and evaluation are responsive to reviews.</p> <p>Results of the reviews are made public.</p>			
100	<p>The management system is subject to regular and frequent external review. Monitoring and evaluation are ongoing and improvements quickly tested and implemented.</p> <p>Results of on-going evaluation of management performance are made public.</p>			

SCORING INDICATORS	Comments	Weight	Score
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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.	<p>The Pacific cod fishery is conducted within the U.S. 200-mile EEZ. The fishery is 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.</p> <p>The fishery is 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 Pacific cod fisheries are managed to comply with agreed upon allowable levels of bycatch of Pacific halibut according to the International Pacific Halibut Commission (IPHC).</p>	
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
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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.	<p>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 NMFS.</p> <p>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.</p>		
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
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<b>3A.2.3</b>		Does the system observe the legal and customary rights of people dependent upon fishing?	<b>33.3</b>	<b>90</b>
60	The customary and legal rights of the people dependent upon fishing are known and no major conflicts have occurred.	The system observes all legal and customary rights of people dependent upon fishing under a formal codified system. The State of Alaska manages subsistence fishing for Pacific cod in state waters inside of 3 nm. This includes for 25% of the GoA TAC set aside for the state fishery which is then apportioned by the Alaska BOF across subareas and gear groups. These allocations provide access for traditional local uses and Alaska native participation.  The State Fishery Allocation formulas 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.  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.		
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
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<b>3A.3</b> ( <i>MSC Criteria 2, 5, 7</i> )	<b>The management system includes strategies to meet objectives including consultative procedures and dispute resolutions.</b>	<b>11.9</b>	<b>94</b>
Weighting Commentary		All the performance indicator were given an equal weighting	
<b>3A.3.1</b>		<b>16.7</b>	<b>95</b>
60	Short and long-term resource and environment objectives are implicit within the management system	<p>The management system contains clear and explicit short and long-term resource and environment objectives that can be measured by performance indicators. Long term objectives for the stock are specified in the Magnuson-Stevens Act (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 the affected ecosystem are clearly stated, principally in the PSEIS and EFH EIS.</p> <p>The GOA Groundfish FMP contains 45 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 Bycatch and Waste; (5) Avoid Impacts to Seabirds and Marine Mammals; (6) Reduce and Avoid Impacts to Habitat; (7) Promote Equitable and Efficient Use of Fishery Resources; (8) Increase Alaska Native Consultation; (9) Improve Data Quality, Monitoring and Enforcement. All objectives are measurable, although some require qualitative rather than quantitative, assessment.</p> <p>The BOF has broad long-term objectives defined by the State Legislature.</p>	
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.		

SCORING INDICATORS		Comments	Weight	Score
<b>3A.3.2</b>		Do operational procedures exist for meeting objectives?	<b>16.7</b>	<b>95</b>
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 P1 and include survey, assessment and harvest control, monitoring of fishing operations, catches and landings, surveillance and enforcement, all based on precautionary management.		
80	Transparent operational procedures are applied to the meeting of objectives. These procedures can be shown to support the objectives.	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.		
100	Operational procedures are transparent and clearly applied. There is a feedback mechanism testing effective application.	<p>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.</p> <p>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 <a href="#">groundfish management policy</a> in 2004. The policy contains a management approach and 45 objectives, which are categorized by goal statements. The Council adopted a <a href="#">workplan</a> 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 (<a href="http://www.fakr.noaa.gov/npfmc/Tasking.htm">http://www.fakr.noaa.gov/npfmc/Tasking.htm</a>).</p>		

SCORING INDICATORS		Comments	Weight	Score
<b>3A.3.3</b>		Are there procedures for measuring performance relative to the objectives?	<b>16.7</b>	<b>90</b>
60	Operational procedures exist which can be used to measure performance relative to the objectives.	<p>Neither the GOA nor BSAI Pacific cod stock is assessed to be in a state where it could be 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 or GoA cod stocks, nor are there indications that objectives for habitats, by-catch species or protected, endangered or threatened species are compromised by cod fisheries activity.</p> <p>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.</p> <ul style="list-style-type: none"> <li>• <b>Management Policy:</b> Objectives in the management policy statement will be reviewed annually.</li> <li>• <b>Essential Fish Habitat (EFH):</b> 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.</li> </ul>		
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
<b>3A.3.4</b>	Do procedures include for a precautionary approach in the absence of sufficient information?	<b>16.7</b>	<b>90</b>
60	Measures exist to implement a precautionary approach in the absence of sufficient information. There is some evidence that this is occurring.	<p>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 Pacific cod fisheries are outlined in the FMPs for the relevant areas.</p> <p>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.</p> <p>The current management of the Pacific cod fishery includes a broad range of regulations designed to maintain the productivity of the stock, provide for statistically reasonable catch quotas, set time, 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. In the federal fishery, all vessels over 60ft length overall (LOA) are required to carry an onboard observer. Vessels 60ft to 125ft must carry an observer on at-least 30 percent of their fishing days (or pot lifts) and at-all times on at least one trip per fishing quarter; vessels 125ft and larger must carry an observer at all times. Vessels under 60ft LOA are not required to carry observers. Concerns with respect to the lack of observer data for the &lt;60' fleet sector and the statistical reliability of data gathered by observers on the 60'-125' fleet sector has caused the Council to undertake a review of the program.</p> <p>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 preferred alternative for the PSEIS is a selection of policies from the suite of alternatives evaluated and represents a slightly more precautionary approach than that previously in place. 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 at <a href="http://www.afsc.noaa.gov/REFM/docs/2007/ecosystem.pdf">http://www.afsc.noaa.gov/REFM/docs/2007/ecosystem.pdf</a>) in which ecosystem considerations are extensively addressed (e.g. Boldt 2007).</p> <p>The following are examples of GOA areas monitored in the annual ecosystem assessment: links between Ichthyoplankton Dynamics and the Pelagic Environment in the Northwest Gulf of Alaska, forage species, benthic communities and non-target fish species, marine mammals, seabirds, Alaska Native traditional knowledge of climate regimes, habitats, nutrients and productivity.</p> <p>Some specific example where the PA is not applied within the system includes the use of very large management units for Pacific cod rather than have the TAC apportioned into smaller management units so as to ensure that local depletion of the stock cannot occur.</p>	
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	
<b>3A.3.5</b>		Does the system include a consultative process including relevant and affected parties?	<b>16.7</b>	<b>95</b>	
60	The system includes a consultative process including key stakeholders within the fishery.	<p>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.</p> <p>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.</p> <p>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.</p> <p>The Alaska BOF process is open to the public. Any member of the public can file a proposal to change existing regulations or write new ones. The proposals are compiled by Board staff, published in booklet form and distributed to the public. Department staff reviews and comments on each proposal, and Staff comments are also compiled into booklet form and distributed to the public. Both written and oral public testimony is encouraged throughout the meeting until the board enters the “deliberation” phase of the meeting. All members of the public signing up to testify are heard.</p> <p>A 2000 legislative review of BOF operational practices recommended that the BOF should continue to seek ways to integrate the perspective and input from local advisory committees into the committee process. It noted that local advisory committees have special status recognized in statute, which direct BOF to give advisory committee recommendations “special” consideration. Alaska Statute 16.05.200 requires that if BOF “chooses not to follow the recommendations of [a] local advisory committee the board shall inform the appropriate advisory committee of this action and state the reasons for not following the recommendations.”  <a href="http://www.legaudit.state.ak.us/pages/audits/2000/pdf/4603rpt.pdf">http://www.legaudit.state.ak.us/pages/audits/2000/pdf/4603rpt.pdf</a>.</p>			
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
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<b>3A.3.6</b>		Is there an appropriate mechanism for the resolution of disputes within the system?	<b>16.7</b>	<b>100</b>
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
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3A.4 (MSC Criterion 6)		The management system operates in a manner appropriate to the objectives of the fishery.	11.9	93
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.	The fishery is substantially free from subsidies or financial incentives that would promote overfishing or ecosystem degradation.		
80	The system is essentially free from subsidies that contribute to unsustainable fishing 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.		
100	The system has no subsidies that contribute to unsustainable fishing or ecosystem degradation.	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
<b>3A.4.2</b>		Does the system include economic/social incentives that contribute to sustainable fishing?	<b>50.0</b>	<b>95</b>
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 in the federal portion of the fishery is effective in controlling effort. The State fishery is open access but fishing mortality is controlled within state TACs (portions of the overall Pacific cod TAC).		
80	Allocations of fishing opportunities and/or entry to the fishery, and/or other incentives, promote fishery and ecosystem management goals.	<p>The NPFMC has made substantial investments in incentive-based fishery management programs. The state fishery has not adopted incentive-based management, but instead has responded to social objectives of equitable access in small-scale fisheries.</p> <p>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 (Central GOA, Western GOA, Southeast GOA), 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 in the BSAI and GOA.</p> <p>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 both the BSAI and GOA. 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 and GOA groundfish, from other license holders with little or no recent history in the fisheries. Of particular concern is the race for fish in GOA fisheries that are limited access but not rationalized.</p> <p>In 1999, the Council began developing a package of measures to rationalize the derby style GOA groundfish fisheries and address concerns regarding social and economic impacts of regulations on harvesters, processors, crew, and communities that depend on the GOA fisheries. In December 2006 the Council elected to delay further consideration of the comprehensive rationalization program and instead to proceed with the more discrete issues of allocating the Pacific cod resource to the various gear sectors and limiting future entry to the groundfish fisheries by extinguishing latent Limited License Program (LLP) licenses.</p> <p>Pacific cod is the second most important species in the commercial groundfish catch in the GOA. Pacific cod is one of the most valuable species targeted by the remaining open access fisheries in the GOA, and is the primary species targeted by the fixed gear sectors. The GOA Pacific cod resource is fished by multiple gear and operation types, principally pot, trawl, and hook- and-line catcher vessels, and hook-and-line catcher processors. Smaller amounts of cod are taken by other sectors, including catcher vessels using jig gear. Currently, separate total allowable catches (TACs) are identified for Pacific cod in the Western, Central, and Eastern GOA regulatory areas. TACs are not allocated by gear or operation type, which results in derby-style race for fish and competition for shares of the TAC. The competition among sectors in the fishery may contribute to higher rates of bycatch, discards, and off-season incidental catch of Pacific cod. Participants in the fisheries who have made long-term investments and are dependent on the fisheries face uncertainty as a result of the competition for catch shares.</p> <p>The Council is considering an amendment to the GOA FMP that would allocate the Western and Central Gulf of Alaska Pacific cod TACs</p>		

SCORING INDICATORS	Comments	Weight	Score
100	The system has established economic and social incentives that contribute to sustainable fishing and ecosystem management.	among gear and operation types, based on historic dependency and use. The purpose of sector allocations would be to enhance stability in the fishery, reduce competition among sectors, and preserve the historic distribution of catch among sectors.  The Council is also considering options that may create additional entry-level opportunities within the jig sector. It is also considering options to add GOA Pacific cod endorsements to fixed gear license to further limit entry to the GOA cod fishery and create a defined group of licenses eligible to fish each of the fixed gear cod allocations.	

SCORING INDICATORS	Comments	Weight	Score
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<b>3A.5 (MSC Criterion 8)</b>	<b>A research plan exists in line with the management system to address information needs.</b>	<b>11.9</b>	<b>100</b>
Weighting Commentary		All performance indicators were given equal weighting.	
<b>3A.5.1</b>		<b>33.3</b>	<b>100</b>
60	Some major areas requiring further research have been identified.	Fishery research in the GOA 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	
80	The key areas requiring further research have been identified.		
100	A comprehensive review of necessary information requirements has been undertaken.		

SCORING INDICATORS	Comments	Weight	Score
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<b>3A.5.2</b>		Is research planned/undertaken by the scientific advisers to meet the specific requirements of the management plan?	<b>33.3</b>	<b>100</b>
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 Pacific cod 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
<b>3A.5.3</b>		Is relevant research carried out by other organizations (e.g. Universities) and is this taken into consideration?	<b>33.3</b>	<b>100</b>
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.		
80	Appropriate research carried out by other organisations is taken into consideration, although there is not necessarily any proactive co-ordination between organisations.	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. Staff at NMFS appear extremely to be well aware of other research relevant to their scientific and management functions.		
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.	There is an annual Alaska science symposium (Anchorage) Funded in part by the NOAA and NPRB.		

SCORING INDICATORS		Comments	Weight	Score
<b>3A.6 (MSC Criteria 7, 9, 10)</b>		<b>The management system includes measures to achieve objectives for the stock</b>	<b>11.9</b>	<b>94</b>
Weighting Commentary		All performance indicators were given equal weighting		
<b>3A.6.1</b>		Are the resource and effects of the fishery monitored?	<b>33.3</b>	<b>80</b>
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.		
80	A monitoring programme is in place that addresses all key aspects of resource and effects at appropriate intervals and results are recorded.	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. Some issues have been identified in relation to data collected from the GoA (in particular) jig fishery, but this is not expected to significantly affect the overall monitoring of the stock and fishing mortality.		
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.	<p>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 GOA groundfish observer program was authorized in 1990 under Amendment 18 to the GOA 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. Although actions are being taken by the NPFMC to address the lingering problem of potential data bias and unreliability stemming from the method of observer placement on the “30% fleet” (vessels <math>\geq 60</math> ft. to <math>&lt; 125</math> ft.) as well as the absence of observer coverage on vessels <math>&lt; 60</math>ft, these actions are in the development stage. Initial Council review of the entire analytical package is scheduled for June 2010.</p> <p>The three resource management agencies tasked with commercial fisheries management in Alaska are the Alaska Department of Fish and Game (ADF&amp;G), the, and the National Marine Fisheries Service - Alaska Region (NMFS-AK). Since 2001, ADFG, NMFS Alaska Region, and the International Pacific Halibut Commission (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”.</p> <p>At the state level, data are managed using Neptune software. In-season monitoring of catch (within state TAC) is accomplished through E-landings, radio and dockside interviews with vessels, and ADFG staff contact with buyers</p> <p>There is a lack of ongoing monitoring of trawl impact on the sea bed, although studies have been done.</p>		

SCORING INDICATORS	Comments	Weight	Score
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<b>3A.6.2</b>		Are results evaluated against precautionary target and limit reference points?	<b>33.3</b>	<b>100</b>
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.		
80	Results of monitoring are regularly interpreted in relation to precautionary, target and limit reference points.	Fishery independent and dependent indices of stock status are carefully evaluated against reference points at the NPFMC. Pacific cod in the GOA is managed under Tier 3 of NPFMC's ABC and OFL definitions. Management under Tier 3 requires reliable estimates of projected biomass, B40%, F40% (for ABC), and F35% (for OFL). Under Tier 3, the maximum permissible ABC depends on the relationship of projected female spawning biomass to B40%. The Council/NMFS use precautionary harvest control rules that meet or exceed international standards. The overfishing level exceeds ABC, ABC usually exceeds TAC, and TAC usually exceeds catch. An ABC adjustment factor takes uncertainty into account. Lower exploitation rates as biomass falls result in ABC declining faster than biomass.		
100	Results of monitoring are quantitatively evaluated against precautionary target and limit reference points on a regular and timely basis.	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.		

SCORING INDICATORS	Comments	Weight	Score	
<b>3A.6.3</b>		Do procedures exist for reductions in harvest in light of monitoring results and how quickly and effectively can these be implemented?	<b>33.3</b>	<b>90</b>
60	Adequate procedures exist to reduce harvest. Programmes to link these with monitoring results are underway.	<p>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.</p> <p>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 GOA 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.</p> <p>Although effective procedures exist to reduce harvest in response to monitoring results, the absence of observer coverage on vessels &lt;60 ft. and concern about the statistical reliability of the observer assignment on the portion of the fleet with 30% observer coverage (vessels ≥60 ft. to &lt;125 ft.) means that present monitoring may not detect all relevant effects.</p> <p>Noticed closures are enforced by the USCG and by NMFS under laws of the MSA with stiff penalties.</p> <p>At the state level, ensuring that harvest stays within the state TAC is done through emergency orders closing fisheries.</p> <p>The BOF monitoring of in-season harvest is done three times per year. Emergency petitions or “agenda change requests” (ACRs) to the BOF can also be used to respond to changing conditions in the fishery.</p>		
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	
<b>3A.7(MSC Criterion 10)</b>		<b>The management system includes measures to pursue objectives for the affected ecosystem.</b>		<b>11.9</b>	<b>90</b>
Weighting Commentary		Measures to avoid or minimise environmental impacts were considered to be most important within the performance indicators.			
<b>3A.7.1</b>		Are measures in place to address (avoid or minimise) significant environmental impacts?	<b>80.4</b>	<b>90</b>	
60	Significant environmental impacts are known and measures are being applied to reduce key impacts.	Long-term effect indices of trawl impact on habitat in the GOA are low, particularly those on the habitat features most likely to be important to Pacific cod (infaunal and epifaunal prey). However, there are likely to be some effects of coral habitat destruction on other fish species. Significant areas, closed to trawling, are being implemented which would mitigate such impacts.			
80	Environmental impacts are known. Measures are being applied to minimise all significant ones and there is evidence that the measures are working.	<p>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 Pacific cod has not declined as a consequence of fishing.</p> <p>Sections 404 and 406 of the M-S Act set requirements for essential fish habitat 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.</p>			
100	Measures are in place to avoid all significant environmental impacts and are subject to monitoring and periodic review.	<p>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 a section on Pacific cod in the annual SAFE report and the SAFE report on ecosystem effects, generated a much more pro-active culture within the management system.</p> <p>NMFS recently developed a Fishery Interactions Team (FIT) to conduct research on the fishery interactions with ecosystem components. The recent study to determine if the trawl fishery causes Pacific cod depletion and possible impacts on Steller sea lions demonstrates a proactive approach. The results lead to a conclusion that local depletion does not occur and that there are minimal impacts of Pacific cod fishing on Steller sea lions. 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 bycatch. 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.</p> <p>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.</p>			

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.	<p>No-take zones and closed areas / seasons are established, enforced and monitored.</p> <p>The GOA Groundfish FMP list area restrictions in a number of areas, some affecting all vessels (the Sitka Pinnacles Marine Reserve) and other affecting specific gear types. These include trawl gear exclusions (King Crab Closure Areas around Kodiak Island, Cook Inlet non-Pelagic Trawl Closure Area, Southeast Outside Trawl Closure, and the GOA Slope Habitat Conservation Areas) and bottom contact gear exclusions (GOA Coral Habitat Protection Areas and the Alaska Seamount Habitat Protection Areas)</p>		
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.	<p>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.</p>		
100	No-take zones and closed areas / seasons are established and enforced if and where appropriate and, if implemented, the consequences are being monitored.	<p>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.</p> <p>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.</p> <p>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 Alaska Department of Fish and Game (ADF&amp;G). Habitat altering work, including any construction activity in a designated state refuge, critical habitat area, or sanctuary requires a special area permit.</p> <p>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.</p>		

SCORING INDICATORS	Comments	Weight	Score
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3 A.8 (MSC Criterion 11)	There are control measures in place to ensure the management system is effectively implemented.		16.8	90
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.	<p>There is a highly consultative management system in place involving fishers representatives 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.</p> <p>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.</p>		
80	Information, instruction and training are provided to fishers in the aims and methods of the management system allowing effective management of the system.	<p>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.</p> <p>Some <i>ad hoc</i> 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.</p>		
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.	<p>Fisher understanding is partially demonstrated though the high level of enforcement compliance.</p>		

SCORING INDICATORS		Comments	Weight	Score
<b>3A.8.2</b>		Is surveillance and monitoring in place to ensure that requirements of the management system are complied with?	<b>43</b>	<b>85</b>
60	An enforcement system has been implemented; however, its effectiveness and/or compliance has not been fully demonstrated relative to conservation objectives.	<p>Enforcement responsibilities of the NPFMC include:</p> <ul style="list-style-type: none"> <li>• Monitoring of commercial fishing activities to estimate the total catch of each species and to ensure compliance with fishery laws and regulations;</li> <li>• Actions to close commercial fisheries once catch limits have been reached; and</li> <li>• 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</li> </ul>		
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.	<p>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.</p> <p>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.</p> <p>Enforcement tools include:</p> <ul style="list-style-type: none"> <li>• VMS system to enforce closed areas (and activity in non-fishing areas or times).</li> <li>• Overflights to monitor IUU fishing activities (linked to VMS) and closed areas provide evidence of limited transgression.</li> <li>• Observer program has an enforcement role (e.g. discards), although it is noted that there are concerns about observer availability and coverage compliance problems in the &lt;60' and 65-125' vessel range and this is the subject of a review by the Council.</li> <li>• 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.</li> </ul> <p>The Joint Enforcement Program (JEP) of the Alaska Wildlife Troopers (AWT) and NMFS is a coordinated program updated biennially. As part of the JEA, AWT conducts boardings of vessels during the parallel fishery and AWT vessels inspect pot gear on the fishing grounds. The primary focus of AWT is the boardings and inspections of vessels under 60 feet in length. Boardings are conducted both at sea and dockside. In 2007 AWT boarded 88 cod boats in Dutch Harbor, 19 in Kodiak, and 3 in the South East; Boardings were conducted both at sea and dockside. Preseason courtesy inspections of vessels are also conducted to promote compliance.</p>		

SCORING INDICATORS	Comments	Weight	Score	
100	<p>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.</p>	<p>The majority of enforcement problems are vessels failing to register for either a state or federal permit during the parallel fishery. The VMS system is gaining increased compliance yearly with only a few vessels being issued citations for failing to activate their VMS systems.</p> <p>Corrective actions come in a variety of forms by AWT personnel in the field; federal violations observed are forwarded to the appropriate NMFS LEO. All state violations are handled either by issuing a verbal or written warning for small correctable violations, to court summonses for failing to register the vessel for a fishery, VMS system not activated, or no permit holder on board. Federal 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.</p>		

SCORING INDICATORS		Comments	Weight	Score
<b>3A.8.3</b>		Can corrective actions be applied in the event of non-compliance and is there evidence of their effectiveness?	<b>33.4</b>	<b>100</b>
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		
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.	<p><i>Examples of penalties:</i></p> <ol style="list-style-type: none"> <li>1. In a 2006 Alaska case NMFS Service assessed a \$254,500 civil penalty and permit sanctions against the owner, manager and three captains of the CP FV Alaska Juris , 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).</li> <li>2. In a 2005 Alaska case the fishing company Unimak Fisheries, LLC, operator of the Fishing Trawler "Unimak" pleaded guilty and was sentenced in U.S. District Court for intentionally under-reporting the amount of "by-catch" halibut brought aboard the Unimak 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)</li> </ol> <p>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.</p> <p>NMFS Fisheries, with authority delegated by the Secretary of Commerce may—</p> <ol style="list-style-type: none"> <li>(i) revoke any permit issued with respect to such vessel or person</li> <li>(ii) suspend such permit for a period of time</li> <li>(iii) deny such permit; or</li> <li>(iv) impose additional conditions and restrictions on any permit</li> </ol> <p>The MSA gives fishery enforcement officers the power to - with or without a warrant or other process</p> <ol style="list-style-type: none"> <li>(i) arrest any person, with reasonable cause</li> </ol>		

SCORING INDICATORS	Comments	Weight	Score	
100	<p>Agreed and tested corrective actions can be applied in the event of non-compliance.</p>	<p>(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.</p> <p>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.</p>		

SCORING INDICATORS		Comments	Weight	Score
<b>3 B</b>	<b>Operational Criteria</b>		<b>50.0</b>	<b>89</b>
Weighting Commentary		All performance indicators were weighted equal.		
<b>3B.1(MSC Criterion 12)</b>		<b>There are measures that include practices to reduce impacts on non-target species and inadvertent impacts upon target species.</b>	<b>19.5</b>	<b>95</b>
<b>3B.1.1</b>		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.	<b>100</b>	<b>95</b>
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 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 Council/NMFS require full retention and utilization of Pacific cod. The use of fishery rationalization programs to reducing the race for fish increases selectivity and efficiency, reducing by-catch.		
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.	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. The IR/IU program required 100 percent retention of cod in the BSAI, regardless of how or where they were caught (GOA Amendment 49). No discarding of whole fish of these species is allowed, either prior to or subsequent to that species being brought on board the vessel, except as permitted in the regulations. The IR/IU measure has been effective in reducing the discards of cod in the groundfish fishery to about 5% of total catch of managed species.		
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.	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.		

SCORING INDICATORS		Comments	Weight	Score
<b>3B.2</b> (MSC Criterion 13)	<b>There are systems in place that encourage fishing methods that minimise adverse impacts on habitat.</b>		<b>19.5</b>	<b>90</b>
<b>3B.2.1</b>		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?	<b>100</b>	<b>90</b>
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 are fulfill requirements of this indicator. Gear exclusion areas listed in 3.A.7.2 are specifically designed to minimize adverse impacts on habitat.  No-take zones and closed areas / seasons are established, enforced and monitored.		
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.	The GOA Groundfish FMP list area restrictions in a number of areas, some affecting all vessels (the Sitka Pinnacles Marine Reserve) and other affecting specific gear types. These include trawl gear exclusions (King Crab Closure Areas around Kodiak Island, Cook Inlet non-Pelagic Trawl Closure Area, Southeast Outside Trawl Closure, and the GOA Slope Habitat Conservation Areas) and bottom contact gear exclusions (GOA Coral Habitat Protection Areas and the Alaska Seamount Habitat Protection Areas)  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.		
100	There is direct evidence that fishing operations implement appropriate methods to avoid significant adverse impacts on all habitats.	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 Alaska Department of Fish and Game (ADF&G). 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.		

SCORING INDICATORS	Comments	Weight	Score
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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.		
80	The fishery does not employ any such destructive fishing practices and enforcement is considered sufficient to prevent their 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.		
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
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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.		
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.	IR/IU regulations (FMP Amendment 49), implemented in 1998, now require all fishing vessels and processors to retain and process 100% of the cod that they catch, and to utilize that fish in the production of one or more primary and secondary products. Most catcher processors and shoreside plants turn any fish byproducts (offal, racks, etc.) as well as any unmarketable species (sculpins, very small fish) into fish meal and fish oil, both of which are valuable byproducts. The IR/IU requirements further reduced any operational waste associated with the harvesting and processing of Pacific cod. 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.		
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.	Port disposal facilities are available shoreside.		

SCORING INDICATORS	Comments	Weight	Score
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<b>3B.5 (MSC Criterion 16)</b>	<b>Fishing operations are conducted in compliance with the management system and legal and administrative requirements.</b>	<b>22.1</b>	<b>87</b>
Weighting Commentary		Compliance was seen as being most significant.	
<b>3B.5.1</b>	Are fishers aware of management system, legal and administrative requirements?	<b>29</b>	<b>85</b>
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.	
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
<b>3B.5.2</b>		Do fishers comply with management system, legal and administrative requirements?	<b>36</b>	<b>85</b>
60	Fishers appear generally to comply with requirements, but there is incomplete information on the actual extent of compliance.	<p>Overall, compliance within the Pacific cod 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.</p> <p>There is no code of conduct operant in the fishery.</p>		
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	
<b>3B.5.3</b>		What is the record of enforcement of regulations in the fishery: quota control, by-catch limits, MLS, mesh regulations and closed areas?	<b>33.3</b>	<b>80</b>
60	There is information on breaches of regulations and on corrective action to prevent or curtail.	<p>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.</p> <p>See more a detailed description of monitoring, enforcement and corrective actions in 3A.8.2</p> <p>The score would have been higher but because of the absence of observer coverage on vessels &lt;60 ft. and the concern with the statistical reliability of the 30% observer coverage on vessels 60-125' means that strong evidence of rigorous monitoring and control is missing.</p>		
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
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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.		
80	Fishers are regularly involved in the collection and recording of relevant catch, discard and other information.	Fishers engage in co-operative research program		
100	Fishers assist significantly in the collection and recording of all appropriate catch, discard and other information.	The assessment team did not see information related to the extent of small-vessel fisher involvement in data collection on state fisheries.		

## **APPENDIX B**

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

## Peer Reviewer 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.

**Emory Andersen** – Emory has a background in fish stock assessments having worked for the National Marine Fisheries Service (NMFS) Northeast Fisheries Science Center in Woods Hole between 1970 and 1985 after which time he joined the International Committee for the Exploration of the Sea (ICES) as a statistician. There he progressed to the General Secretary position, responsible for the administration of the Secretariat. After staying in this post for five years he returned to the US, and to Woods Hole, in 1994 where he chaired the Northeast Stock Assessment Workshop process for 3 years before transferring to NMFS HQ in Washington where he worked as NMFS liaison to the National Sea Grant Office, where he served as Program Director for Fisheries. Since retiring in the fall of 2004, he has undertaken consultancy work and since 2008 has been an editor of the *ICES Journal of Marine Science* and editor of the *ICES Cooperative Research Report* series.

## PEER REVIEWER A

### Accuracy of the information quoted in the report.

As I was not familiar with the details of the cod fisheries in the BSAI and GOA, in addition to the certification studies, I also examined the following documents:

Alaska Department of Fish and Game. 2008. Pacific Cod fisheries in Alaska. Division of Commercial Fisheries Website at:  
<http://www.cf.adfg.state.ak.us/geninfo/finfish/grndfish/pcod/pcodhome.php>

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.

Gaichas, S.K., and R.C. Francis. 2008. Network models for ecosystem-based fishery analysis: a review of concepts and application to the Gulf of Alaska marine food web. Canadian Journal of Fisheries and Aquatic Sciences 65:1965-1982.

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.

Terry Hiatt, Ron Felthoven, Michael Dalton, Brian Garber-Yonts, Alan Haynie, Dan Lew, Jennifer Sepez, Chang Seung and the staff of Northern Economics, Inc.. 2008. Economic Status of the Groundfish Fisheries off Alaska, 2008. Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Bering Sea/Aleutian Islands Regions. Economic and Social Sciences Research Program, Resource Ecology and Fisheries Management Division, Alaska Fisheries Science Center, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, 7600 Sand Point Way N.E. Seattle, Washington 98115-6349.

Thompson, Grant G., James N. Ianelli, Martin W. Dorn, and Mark Wilkins 2007. NPFMC Gulf of Alaska SAFE. Chapter 2: Assessment of the Pacific Cod Stock in the Gulf of Alaska. 2007. pp 169 – 194.

Thompson, Grant, James Ianelli, Martin Dorn, Dan Nichol, Sarah Gaichas, and Kerim Aydin 2007. NPFMC Bering Sea and Aleutian Islands SAFE. Chapter 2: Assessment of the Pacific Cod Stock in the eastern Bering Sea and Aleutian Islands area. 2007. pp 209 – 328.

Thompson, Grant, James Ianelli, Robert Lauth, Sarah Gaichas, and Kerim Aydin 2008. NPFMC Bering Sea and Aleutian Islands SAFE. Chapter 2: Assessment of the Pacific Cod Stock in the eastern Bering Sea and Aleutian Islands area. 2008. pp 221 – 402.

Thompson, Grant, James Ianelli, and Mark Wilkins 2008. NPFMC Gulf of Alaska SAFE. Chapter 2: Assessment of the Pacific Cod Stock in the Gulf of Alaska. 2008. pp 169-302.

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 cod fisheries and their context. Comments on sections 1-7 are listed below:

Section 1.3. Check references. The Thompson et al. BSAI SAFE report citation mixes two works.

### MML Comment - Amended

Since Ormseth and Matt (should be Matta?) 2007 is cited in scoring criteria leading to a condition, this citation should be included.

### MML Comment - Amended

Section 3.1. Transboundary issues? Although the species is listed as transoceanic, this assessment (and the SAFE report) focus exclusively on U.S. fisheries. Is part of the population targeted by U.S. fleets also harvested in Canadian waters? If so, is this harvest significant? Based on the small fraction of the survey biomass seen in the eastern gulf, this seems unlikely to be a significant issue, but should be addressed.

MML Comment – Information on the Canadian Pacific cod fishery suggests that there is little movement between the principle groundfish fishing areas of Hecate Strait, Queen Charlotte Sound, west coast Vancouver Island and the Strait of Georgia.

Sinclair, A.F. and P.J. Starr. 2005. Assessment of Pacific cod in Hecate Strait (5CD) and Queen Charlotte Sound (5AB). Canadian Science Advisory Secretariat Research Document. 2005/026

Section 5.7 seems out of place. Since abundance, uncertainty, stock-recruitment, and selectivity estimates are all based on the stock assessment model, its description should precede these sections. There also appear to be model-independent indices of abundance based on surveys (Thompson et al. 2007 and text for criteria 1.1.1.6).

MML Comment - Re-ordering the elements would provide more work than real value. Yes there are other indices.

5.4 The uncertainty section needs to provide more context. The section seems to focus only on the uncertainty in projections of stock size under various harvest scenarios. Other types of uncertainty are not obviously discussed, although this may be the purpose of the first paragraph describing the use of the Hessian.

This section starts with a paragraph about methods that were (Hessian) and were not (Bayesian) used to estimate uncertainties, then follows with a paragraph about projection methodologies. The last half of the last sentence “to obtain distributions of possible future stock sizes...” would be a good beginning for an introductory paragraph. A longer, more descriptive section title (e.g., “Uncertainty in the outcome of potential harvest strategies”) would help.

MML Comment – Additional text added to 5.4

5.7 Assessments and stock status. The stock assessment is a complicated process, and has been evolving. This section does a decent job of describing the essentials of the 2005 and 2007 assessments, although some substantive changes have occurred since then (e.g., the dramatic change from fig. 2.8 in the 2007 SAFE to fig 2.7 in the 2008 SAFE).

MML Comment – When the site visit and subsequent review of information was undertaken the latest, i.e. 2007 SAFE report, was only available to us.

It would be helpful to add some more text to the first paragraph describing the very basics of how the stock synthesis model works. I’d suggest one or two sentences describing the datasets used, how they are compared to model outputs to calculate component likelihoods, and how the component

likelihoods are weighted to give an overall likelihood that is then maximized by adjusting parameter values.

**MML Comment – Some additional text has been added.**

5.8 Harvest reference points. This section is quite clear with the exception of the equations at the end. Several equations for different aspects of reference points are presented on single lines, without an adequate separation, and can easily be read as a single equation.

**MML Comment - Sentence added and the equation has been re formatted.**

5.9 Harvest control rules. A sentence or two should be added to the beginning of this section verbally describing the harvest control rules shown on the graph. The graph would greatly benefit by labelling some of the years in the harvest rate trajectory.

**MML Comment - The text has been revised to further aid those readers less familiar with these plots.**

Section 7.4.4. Although the assessment states that there is direct seabird mortality from fishing, interpretation is lacking. There are several studies on bycatch levels and deterrence strategies. I'd like to see some more text summarizing the results of these studies in terms of the potential for strong negative effects on seabird populations, along the lines of the text given in scoring criterion 2.2.1.2 for the BSAI longline fishery. Given that the assessments for longline and trawl fisheries assign conditions requiring a review of existing data and an improvement in data quality, it would be good to describe the deficiencies that led to these conditions in this section.

**MML Comment - Additional text inserted in Section 7.4.4**

#### **Whether the information has been applied appropriately to the scoring indicators**

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

1.1.1.5 Should refer to Fig. 2.7, not 2.8.

**MML Comment - Corrected**

1.1.6.1. The figure referred to in the text is from Thompson et al. 2007, not Hiatt et al. 2007.

**MML Comment - Corrected**

2.1.2.3. Minor typos.

**MML Comments - Amended**

3A.1.3 and 3A.1.4. These two criteria are scored quite differently, but the reasons for this discrepancy are not obvious. The internal review procedure for the management system (criterion 3A.1.3) is scored as a 100, whereas the external review system is given a 75, leading to a condition. The lower score is based on a lack of documentation of an external review process by the state.

In justifying a score of 100 for 3A.1.3, the text referring to the state of Alaska states that the state TAC is based upon the one set by NPFMC, which is subject to much internal review; however, this rationale could also apply to the external review process scored in 3A.1.4. The text also refers to periodic state legislative task forces as an internal review; this seems a sporadic and weak form of review, and could arguably be considered external rather than internal.

It seems that the two criteria should be scored similarly. Either state management is so derivative of that of the NPFMC that the internal and external review process in the NPFMC system is adequate, or it differs significantly and documentation of both the internal and external review process used by the state is lacking.

**MML Comment - The state fisheries (both parallel and state-managed) are both based on the federal TAC which is subject to external review. To the extent that enforcement of regulations within State waters is adequate and catches and bycatch remain within acceptable levels it would be correct to say that the management of the stock in state waters is of similar high quality as the federal management. However, the lack of information on these performance attributes of the State fisheries and the lack of an observer program, combined with the absence of access limitation within State waters, open the possibility for differential management outcomes in the state and federal fisheries. The absence of external review of the state fishery sector means that important aspects of state management performance are not subject to external review.**

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

This is a fishery that has a strong assessment and management system, on a stock that is only slightly below the management target. The scores assigned are generally high, reflecting these strengths. The scoring generally seems appropriate given the information, and the decision to certify the fishery with only a few minor conditions seems justified.

### **The suitability of the conditions attached to certification**

Conditions 1-3 seem suited to the criteria and scoring. Condition 4 may need to be re-examined, as discussed below.

Condition 1 asks that existing data be evaluated to determine whether there is evidence of changes in stock structure that might affect reproductive capacity, and whether there are data gaps that hinder making this determination. This phenomenon is much more likely if the stock consists of several reproductively isolated components, which section 3.1 and the text used in scoring criterion 1.3.1.1 imply is unlikely.

Arguably, given little subdivision in the population, maintaining an adequate spawning biomass ensures that the fishery is not causing changes in stock structure that might affect reproductive capacity. If population subdivision can be excluded, the existing surveys and assessment should make it quite simple to look for changes in spawning biomass, age, size, or fecundity schedules.

Condition 2 asks that a system be set up to document the amount of lost gear, and if necessary develop methods to reduce gear loss. This condition might eventually be removed if the amount lost is small and it can be shown that the adverse effects of lost gear are small and of short duration.

Condition 3 asks for a review of the impacts of the fishery on seabirds within 12 months. In the text for the scoring of criterion 2.2.1.2, the justification for this condition is given.

Condition 4 asks that the external review procedure employed by the state of Alaska be documented and examined for deficiencies, based on a score for criterion 3A.1.4 of 75. The internal review procedure (criterion 3A.1.3) is scored as a 100, but the text referring to the state's system doesn't appear to justify the difference in scores (see discussion of the two criteria above). Either this condition should be deleted, or it should be expanded to also include documenting the state's internal review procedures.

MML Comment - (Same response as above)

The state fisheries (both parallel and state-managed) are both based on the federal TAC which is subject to external review. To the extent that enforcement of regulations within state waters is adequate and catches and bycatch remain within acceptable levels it would be correct to say that the management of the stock in state waters is of similar high quality as the federal management. However, the lack of information on these performance attributes of the state fisheries and the lack of an observer program, combined with the absence of access limitation within state waters, open the possibility for differential management outcomes in the state and federal fisheries. The absence of external review of the state fishery sector means that important aspects of state management performance are not subject to external review.

Recommendation 1 asked for documentation of the methodology for estimating “slippage”. I’m not completely familiar with this term. This recommendation was only made for the BSAI and GOA trawl fisheries. Is it applicable to other gear types?

MML Comment – An explanation of the term is provided in the text (i.e. where a catch is not landed owing to wrong species, undersize fish, or some other reason, and so is released or “slipped”). It is term used in Europe and is only usually attributed to trawl or purse seine fisheries.

## PEER REVIEWER B

### General comments on Sections 1–13

Given the sound reputation of the North Pacific Fishery Management Council and the excellent track record it has compiled in the management of its stocks, there is strong reason to believe that the Gulf of Alaska Pacific cod longline fishery is well managed and can satisfactorily meet the Marine Stewardship Council (MSC) Principles and Criteria for Sustainable Fishing.

This portion of the report is quite well done, although there are some areas in which more information would be useful. For example, in **Section 3.1 Biology of the Target Species**, nothing is said about the age span of the stock, size at first capture, maximum age and size, age at maturity, fecundity, age at recruitment to the fishery, etc., although **Section 5.2 Fecundity and Growth** does provide some information, mostly in Figures 3 and 4.

**MML Comment - Additional text added to Section 3.1.**

On the issue of stock structure, the information presented in **Section 3.1 Biology of the Target Species** does not provide strong evidence of a separate stock of Pacific cod in the Gulf of Alaska (GOA), but rather that the eastern Bering Sea (EBS), Aleutian Islands area (AI), and the GOA may be a single stock. This seems to be in conflict with the statement in **Section 1.1 The fishery proposed for certification** that the MSC Guidelines to Certifiers specify that the unit of certification is a biologically distinct unit. I recognize that **Section 5.1 Stock Definition** says that separate Gulf of Alaska and Aleutian Islands/East Bering Sea stocks are recognized for management purposes (Westheim 1996).

Although there is apparently no minimum size limit in the fishery (since discards are not permitted), some information on the length range of catches would be helpful. It may also be helpful if some information were provided on the ultimate use of the landed fish (e.g. fresh, frozen, fillets, domestic market vs. foreign market).

**MML Comment - Additional text added in 3.3.2 on size range for different gear types and Pacific cod products.**

In **Section 3.3.2 Pacific Cod Catch**, Table 2, landings are grouped into three categories: trawl, pot, and hook and line. However, in this series of reports, the hook-and-line fisheries are reported separately by jig and longline. The amount of landings by these two gear types should be reported separately. Figure 1 shows landings by longline instead of hook and line. Does this suggest that the amount by jig is insignificant? For consistency, either one gear term or the other should be used in Figure 1 and Table 2. Preferably, all four gear types should have their landings indicated separately.

**MML Comment - To avoid confusion with terminology, i.e. longline and hook and line (the latter referring to longline and jig catches) table 2 has been amended (now referred to as Table 1) and Figure 1 removed. The text has also been amended to confirm that the quantity of Pacific cod caught by the jig sector is small.**

In Table 1, the catch in 2006 is presented by area in the Gulf, including inshore and offshore. The terms “inshore” and “offshore” should be defined. Does “inshore” refer to state waters and “offshore” to federal waters?

**MML Comment – Additional text added to explain the terms “inshore” and “offshore”.**

In **Section 5.2 Fecundity and Growth**, it mentions a “decade-long hiatus in production ageing of

Pacific cod”, but that ageing of fish from the EBS survey began “a few years ago”. Does this statement refer only to the EBS, or does it apply to the GOA as well. The age data for the GOA needs to be clarified. The years in question should be provided. Does this imply that no ageing of the species was done during that time period? If no ageing was done, that brings to question how any age-based assessments could be done. **Section 5.3 Abundance Information** states that “these surveys also are the source of length frequency and age frequency information”. How much age frequency information is implied by this statement? What years?

**MML Comment - On aging frequency: This information was not available when we did the review. However the next assessment presented this information and it has been added to the report.**

**Section 5.4 Uncertainty** mentions “the model program”, but does not say what model. Is this supposed to be the model for assessing the status of the stock? If so, more information should be provided. In general, this entire paragraph is poorly written and not helpful for the reader who may not be familiar with this type of assessment methodology.

**MML Comment - Additional text provided.**

The Ricker stock-recruit relationship presented in **Section 5.5 Stock Recruit** is meaningless. There should be a strong statement here that, in fact, there is no relationship between stock and recruitment. It is unclear if this data plot is for the GOA unit or all Pacific cod in the BSAI and GOA area.

**MML Comment - Additional text has been added so the reader can assess its utility and quality.**

In **Section 5.7 Assessments and Stock Status**, the descriptive material on the several assessment models used or considered (e.g. SS1, SS2) is not reader-friendly for the non-assessment person. It is unclear to this reviewer whether MSC reports typically contain more or less detail on assessment models. In summary, what is currently presented can only be understood by a practicing assessment scientist.

**MML Comment – Additional explanatory text has been added.**

In Figure 6 in **Section 5.9 Harvest Control Rules**, the blue trajectory line should have some of the points labelled by year to make it more understandable.

**MML Comment - The figure is taken from Thompson et al 2007 and we did not have access to these data points.**

**Section 6 FISHERIES MANAGEMENT FRAMEWORK, PROCESSES AND INTERACTIONS** mainly addresses the role of the North Pacific Fishery Management Council in managing Pacific cod (and other stocks), but does not provide comparable information on the role of the State of Alaska relative to regulating the fishery within State waters other than a brief description on consultations in **Section 6.6.1 State of Alaska**.

**MML Comment – Additional text provided in section 6.7.**

In **Section 6.5 Advisory Committee Roles**, perhaps additional detail should be provided on what kind of advice is given by the Advisory Panel and the Scientific and Statistical Committee. Just saying they provide “advice” is a bit vague and doesn’t adequately portray their important functions.

**MML Comment – Additional explanatory text provided.**

In **Section 6.6.1 State of Alaska**, it is stated that “there are also state-managed fisheries for Pacific

cod”. Some description of these state-managed fisheries should be provided.

**MML Comment – Additional text provided in 6.7.**

**Section 6.8.2 Observer Program** only describes the observer program in federal waters, but says nothing about observer coverage in state waters. Since the issue of state observer coverage, or the lack thereof, is addressed later in the Scoring Table, a description of what the State of Alaska does or does not do relative to observer coverage of vessels within its waters needs to be included. I managed to find mention of the possible need for observer coverage in state waters (see comment under **Performance Indicator 1.1.2.1** below), so obviously it has been discussed and may have even been implemented.

**MML Comment – Additional text provided in 6.8.2.**

## Comments on Scoring Table

### Principle 1

**1.1.1.1** The Evaluation Team commented that “research surveys and fishery data are sufficient to reconstruct the target population and estimate the effects of fishing”. The question about the extent of available age data is raised in light of the statement in the report, noted earlier, of a “decade-long hiatus in production ageing of Pacific cod.”

**MML Comment – Ageing data has been added. The model does not require annual ageing.**

**1.1.1.2** Life history is well understood, but, as noted above, some aspects on general biology (age span of the stock, size at first capture, maximum age and size, age at maturity, fecundity, age at recruitment to the fishery, etc.) are not provided in the report. Also, as mentioned above, the GOA unit has not been conclusively identified as a separate stock.

**MML Comment - Additional paragraph added to the main text of the report.**

**1.1.1.3** Research surveys are not conducted annually due to the sheer size of the area for which the NMFS Alaska Fisheries Science Center is responsible (GOA as well as all of the Bering Sea) which would require more vessels (either dedicated research vessels or contracted research vessels), personnel, and funding than is currently available. Biennial or triennial surveys for such a large area are about as good as possible.

**1.1.1.4** The fecundity data mentioned in the table are not provided in the main report.

**MML Comment - The maturation and growth data are in the main report as figures (3&4).**

**1.1.1.5** Based on the data presented in Figure 5, there appears to be no stock-recruitment relationship. Data on recruitment levels and corresponding SSB levels are given, but there is no realistic relationship. Therefore, I question the score of 80 given when it appears that the weighting commentary for a score of 60 is more applicable (i.e. Indices of recruitment levels and recruiting ages, and corresponding spawning stock levels are available.).

**MML Comment - The distinction in the scoring guidepost (SG) text is that for the 60 SG it refers to indices, while 80 SG refers to adequate estimates. The assessment team felt that the estimates were adequate - it was a case of no dependence of recruitment on SSB. The dynamic range is good, the assessment is good. The problem is that nature is not being cooperative. This is the reason for our request to look for other possible determinants. Further explanatory text has been provided in the scoring narrative.**

**1.1.1.6** No comment.

**1.1.1.7** No comment.

**1.1.2.1** Observer coverage for vessels  $\geq 60$  ft but  $< 125$  ft LOA is only 30% of the time. Data are not presented in the report to indicate what proportion of the catch is taken by vessels of this size. As mentioned, by the Evaluation Team, this lower percentage clearly increases the uncertainty in the estimates of data from this vessel class. A January 11, 2004 report of the Alaska Board of Fisheries Gulf of Alaska Groundfish Rationalization Committee

(<http://www.boards.adfg.state.ak.us/fishinfo/meetsum/goa/goa011104sum.pdf>) stated, however, that “Boats under 60 feet do not require observers, so state may need to develop an observer system for that class of vessel.” It is unclear if such a system has been implemented.

**MML Comment – Data on the percentage of catch taken by vessels lacking observer coverage by gear sector was not available to us but we were told (D. Witherell pers comm.) that 76% of the total Pacific cod catch is observed. To our knowledge the state place observers on vessels in an opportunistic manner and have not implemented a formal observer program.**

- 1.1.2.2 No comment.
- 1.1.2.3 No comment.
- 1.1.2.4 No comment.
- 1.1.3.1 As noted, the system employed by the NPFMC (e.g. Goodman *et al.*, 2002) is very good and well detailed, offering sufficient safeguards for establishing appropriate fishing limits.
- 1.1.4.1 No comment.
- 1.1.4.2 No comment.
- 1.1.4.3 Concur with comments by Evaluation Team.
- 1.1.5.1 As mentioned above, a clearer and simpler description of the assessment models for the non-assessment reader would be helpful. Only an assessment scientist would know that an SS is a Stock Synthesis model.
- 1.1.5.2 No comment.
- 1.1.5.3 No comment.
- 1.1.5.4 No comment.
- 1.1.5.5 No comment.
- 1.1.6.1 No comment.
- 1.3.1.1 In the absence of a meaningful stock-recruitment relationship, it is difficult to say whether the fishery has had any impact on reproductive capacity. Further research aimed at determining the factor(s) controlling recruitment needs to be conducted.
- 1.3.1.2 No comment.

## **Principle 2**

- 2.1.1.1 No comment.
- 2.1.1.2 No comment.
- 2.1.1.3 No comment.
- 2.1.2.1 I would concur with comments by the Evaluation Team that further information by Ed Melvin (Washington Sea Grant Program) on seabird bycatch and preventive measures is available and should be included in the report.
- 2.1.2.2 Concur with comments by Evaluation Team on slippage, but I would assume that this is probably not an issue with a trawl fishery, i.e. where part of the catch (e.g. excess) is released prior to the entire net being hauled back onto the deck.
- 2.1.2.3 No comment.
- 2.1.3.1 No comment.
- 2.1.3.2 Ghost fishing by lost trawl gear is generally not a problem, as it can be with other types of gear such as pots, gillnets, etc.
- 2.1.4.1 No comment.
- 2.1.4.2 No comment.
- 2.1.5.1 No comment.
- 2.1.5.2 No comment.
- 2.1.5.3 No comment.
- 2.1.5.4 No comment.
- 2.2.1.1 No comment.
- 2.2.1.2 Concur with comments by Evaluation Team.
- 2.2.1.3 No comment.

- 2.2.2.1 No comment.
- 2.2.1.4 Concur with comments by Evaluation Team.
- 2.2.1.5 No comment.
- 2.2.2.2 No comment.
- 2.3.1.1 No comment.
- 2.3.1.2 No comment.
- 2.3.1.3 No comment.

### Principle 3

**3A.1.1** This stock and all others under the jurisdiction of the North Pacific Fishery Management Council are very well managed. Compared to the other eight Regional Fishery Management Councils in the U.S., the NPFMC has, by far, the best track record in terms of stock management.

**3A.1.2** Agree with comments by Evaluation Team.

**3A.1.3** The SSC of the NPFMC has the reputation of being the most utilized and respected SSC of all the eight SSCs in the U.S. This speaks volumes about the attitude of the NPFMC and the fishing industry towards the scientific basis for making management decisions.

**3A.1.4** The Evaluation Team lowered the score of this Performance Indicator because “it is not known whether the state sector of the fishery is subject to a similar level of external review.” I too was unable to find any evidence of State of Alaska external review of its fishery management system. However, in light of the fact that Alaska’s management system for this fishery within its waters is basically a mirror image of the management system in federal waters (i.e. “parallel fishery”), any changes in the federal system emanating from external review would be assured of being similarly implemented in the state system. The Council meets with the State Board of Fisheries annually. The Council/Board of Fisheries Joint Protocol Committee meets twice per year to discuss issues of joint concern (Witherell 2008). Consequently, I would not view the apparent absence of routine external review of the state sector of the fishery as a serious problem warranting a lower score. The NPFMC is somewhat unique among the eight Councils in having the majority (6) of its 11 voting members from one state (Alaska). The concerns and interests of Alaskans apply equally to state and federal waters, and they have obviously opted to base state management of fisheries in state waters on the federal system. I would argue that the management of this stock, and all others in state waters that have a federal component, is very well served.

**MML Comment - The state fisheries (both parallel and state-managed) are both based on the federal TAC which is subject to external review. To the extent that enforcement of regulations within State waters is adequate and catches and bycatch remain within acceptable levels it would correct to say that the management of the stock in state waters is of similar high quality as the federal management. However, the lack of information on these performance attributes of the State fisheries and the lack of an observer program, combined with the absence of access limitation within State waters, open the possibility for differential management outcomes in the state and federal fisheries. The absence of external review of the state fishery sector means that important aspects of state management performance are not subject to external review.**

- 3A.2.1 No comment.
- 3A.2.2 No comment.
- 3A.2.3 No comment.
- 3A.3.1 No comment.
- 3A.3.2 No comment.
- 3A.3.3 No comment.
- 3A.3.4 No comment.
- 3A.3.5 No comment.

- 3A.3.6** No comment.
- 3A.4.1** No comment.
- 3A.4.2** The fact that the NPFMC is considering options for the removal of “latent” licenses to prevent their re-entry to the fishery is commendable. The removal of such licenses from other fisheries in other regions of the U.S. is a very difficult problem as Councils struggle with way to reduce fishing effort.
- 3A.5.1** There is a good track record of research needs being identified, funded, and addressed.
- 3A.5.2** The NMFS Alaska Fisheries Science Center has an excellent record of research accomplishments in support of the management of stocks under the jurisdiction of the NPFMC.
- 3A.5.3** The Alaska Sea Grant College Program has sponsored and coordinated the Lowell Wakefield Fisheries Symposium series since 1982. Co-sponsors have included PICES (North Pacific Marine Science Organization), Food and Agriculture Organization (FAO) of the United Nations, Alaska Department of Fish and Game, National Marine Fisheries Service, and North Pacific Fishery Management Council.
- 3A.6.1** There is good monitoring of this and other fisheries in the GOA in spite of major geographical and logistical problems.
- 3A.6.2** No comment.
- 3A.6.3** No comment.
- 3A.7.1** No comment.
- 3A.7.2** No comment.
- 3A.8.1** Information, instruction, and training to fishers are probably done as well or better by the NPFMC than any of the other Regional Fishery Management Councils.
- 3A.8.2** No comment.
- 3A.8.3** No comment.
- 3B.1.1** No comment.
- 3B.2.1** No comment.
- 3B.3.1** No comment.
- 3B.4.1** No comment.
- 3B.5.1** All Councils, including the NPFMC, do their best to communicate the legal and administrative requirements of their management regulations to fishers. By law, they are required to do so through the *Federal Register*, but also through other means. In spite of this, some fishers always find it difficult to know or understand such requirements, and frequently complain about needing a lawyer to keep them properly informed. This will probably always be a problem that can never be 100% solved.
- 3B.5.2** Fishers generally comply with regulations when they understand and support the need for them, and when there is fair and consistent enforcement. In any fishery, however, as with any segment of society, there are always some who choose not to comply fully, if they see some financial gain in so doing.
- 3B.5.3** No comment.
- 3B.6.1** According to Mattes and Sagalkin (2006), “ADF&G attempted to initiate a volunteer catch reporting system for the South Alaska Peninsula Area state-waters Pacific cod fishery in 2006. Vessel operators registering for the fishery were provided worksheets that described the information staff would request. Only a handful of vessels participated in inseason reporting.” This would tend to support the comment by the Evaluation Team.

Mattes, L. A., and Sagalkin, N. H. 2006. South Alaska Peninsula Area Pacific cod fishery report to the Alaska Board of Fisheries. Alaska Department of Fish and Game, Divisions of Sport Fish and Commercial Fisheries, Fishery Management Report No. 06-73. 32 pp.

## **APPENDIX C**

### **Client Action Plan**



## ***Draft Action Plan for Meeting the Conditions of Certification for the Gulf of Alaska (GoA) Pacific Cod Trawl Fishery***

The Alaska Fisheries Development Foundation (AFDF) submits this Action Plan for Meeting the Conditions for Certification of the Gulf of Alaska (GoA) Pacific Cod trawl fishery. AFDF agrees to make a good faith effort to meet the intent of the Conditions set forth in the certifier's March 2009 Draft Report determining that the GoA Alaska Pacific cod trawl fishery is sustainably managed under the MSC Principles and Criteria. Furthermore, AFDF 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 AFDF and the certification body, Moody Marine Ltd., and consistent with MSC policy, AFDF is willing to assign MSC logo and labeling rights to GoA Pacific cod trawl fishery participants who agree to share the cost of maintaining the certification and to join in good faith efforts to meet the Conditions.

### **AFDF's Approach to Meeting the Conditions for Certification.**

AFDF will utilize trawl sector members of the AFDF Pacific cod working group to direct a program to give effect to this Action Plan for meeting the Conditions for the GoA Pacific cod trawl fishery. The AFDF Pacific cod working group is composed of participants in the BS/AI and GoA Pacific cod fishery representing all sectors and gear types, including shore-based processing. The trawl sector members of the working group may enlist outside experts to assist with tasks needed to meet obligations under the Action Plan.

AFDF also works closely with other North Pacific marine research organizations, including the North Pacific Research Consortium, the North Pacific Research Board, the Alaska SeaLife Center and various other organizations committed to improving understanding of the BS/AI ecosystem. Most importantly, the AFDF and industry working group sector members will interface with the NOAA Fisheries' Alaska Region office and Alaska Fisheries Science Center (AFSC), the North Pacific Fishery Management Council (the Council), the Alaska Board of Fisheries, Alaska Department of Fish and Game and other participants in the management process, as necessary, in an effort to meet the Conditions established by the certification body.

### **Proposed AFDF Activities in Achieving the Conditions.**

The following details how AFDF will address each of the 3 Conditions.

#### **Condition 1 — Stock Structure**

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

**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. If the evidence suggests recruitment has been adversely affected remedial measures must be implemented. It is required that this Condition is met by the second annual surveillance audit.*

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.

### ***AFDF's Plan for Condition 1 – Stock Structure***

*It is AFDF's and the industry working group's belief that the GoA Pacific cod trawl fishery already meets Condition 1 as set forth above for a directed fishery in 2010, depending on clarification of some terminology by the assessment team members. It is thought that the current gonadal maturity sampling program on the catch of Pacific cod conducted by NMFS provides data directed at effects of the fishery on reproductive capacity, however, the sample size and the length of time series may not provide the statistical power to discern fishery effects to the desired level. AFDF will provide to the certification body information from AFSC staff pertaining to part a of the recommended approach to this Condition by the second year of the certification. Any outstanding issues raised in the consultation with the certifier, will be resolved in the following annual audit. AFDF fully expects that these activities will provide the necessary information to meet the condition. If the certification body deems it necessary to require additional work, AFDF will work closely with working group sector members and AFSC staff to see if additional sampling would ensure meeting the condition, and act to acquire funding for the additional sampling in as quick and efficient a manner as practical.*

### **Condition 2 — Effects of 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?

**SG 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'.

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 longline 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 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.

### ***AFDF's Plan for Condition 2 – Effects of Gear***

*AFDF will work with trawl sector members of the working group to initiate a program recording data on trawl gear loss in the Pacific cod fishery in the Gulf of Alaska management area. Information on this program will be provided to the certifier within the specified time frame. Some information on gear loss may be grouped so that confidentiality of sensitive location information cannot be traced to individual vessels.*

*AFDF, along with the trawl sector members of the working group, will implement this program, recording trawl gear loss in the GoA management area within the second year of certification.*

### **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?

**SG 80** - 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.

### ***AFDF's Plan for Condition 3 – Protected, Endangered and Threatened (PET) Species***

*Based on information from the NPFMC website and discussions with Ed Melvin of Washington Sea Grant, a leading researcher on both longline and trawl fisheries seabird impact, AFDF and the industry working group believe that the current Pacific cod trawl fishery already meets 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 in these fisheries.*

*AFDF and the industry working group will provide information on the impacts of the Pacific cod trawl fishery on seabird mortality within the first 12 months as directed. If the certifier decides that there are gaps or insufficient information on impacts to specific species, AFDF will work with the National Marine Fisheries Service (NMFS) and Ed Melvin with Washington Sea Grant to see if additional information can be gathered.*

*Additional information on the current state of knowledge available at:*

<http://wsg.washington.edu/communications/online/seabirds/seabirdsolvinglr.pdf>

<http://wsg.washington.edu/communications/online/seabirds/seabirdintro.pdf>

<http://wsg.washington.edu/communications/online/seabirds/seabirddoc.pdf>

<http://wsg.washington.edu/communications/online/seabirds/appendixtwo.pdf>

<http://wsg.washington.edu/communications/online/smallvesselslr.pdf>

**APPENDIX D**  
**Stakeholder Comments**



**World Wildlife Fund**  
**Kamchatka/Bering Sea Ecoregion**  
406 G. Street, Suite 303  
Anchorage, AK 99501 USA

Tel: (907) 279-5504  
Fax: (907) 279-5509

[www.worldwildlife.org](http://www.worldwildlife.org)

September 14, 2009

Mr. Paul Knapman  
c/o 24900 Pitkin Rd.  
Suite 200  
The Woodlands  
Texas 77386  
U.S.A.

Mr. Andrew Hough  
Merlin House, Stanier Way  
The Wyvern Business Park  
Derby DE21 6BF  
England

**Re: Certification of the Bottom Trawl component for the BSAI and GOA cod fisheries**

This memorandum provides comments on the assessment of the BSAI and GOA cod fisheries. WWF feels that this is an important issue with respect to the long-term productivity of the BSAI and GOA fisheries as well as the integrity and credibility of the MSC label. While we recognize certain conservation issues associated with the pot, jig, and longline components, we have chosen to focus our comments on the trawl segments of these certifications due to the serious nature of the fisheries' conservation impacts. Given the similar nature of the BSAI and GOA bottom trawl components, except where stated otherwise, we will address the segments in combination in our comments.

In recent years, scientists have compiled substantial amounts of scientific information on the generalized negative effects of bottom trawling. These negative effects include the loss of erect and sessile epifauna, smoothing of sedimentary bedforms, and removal of taxa that produce structure. It is undeniable that trawl gear is known to crush, bury, or expose marine flora and fauna and reduce structural diversity. Therefore, WWF remains intimately concerned about the potential for another bottom trawl fishery to be certified as sustainable by one of the most prominent and trusted ecolabel organizations.

WWF is principally concerned about two primary negative aspects of the bottom trawl fishery including adverse effects on habitat and excessive bycatch. We would also like to address the lack of appropriate consultation and coordination with Bering Sea fishing communities and the lack of adequate observer coverage.

**World Wildlife Fund**  
406 G. Street, Suite 303, Anchorage, AK 99501 USA  
Tel: (907) 279-5504 Fax: (907) 279-5509

*Affiliated with the World Wide Fund for Nature*

## **Bycatch**

This section addresses performance indicators 2.1.2.1, 2.1.2.2, and 2.1.2.3 (MSC Criterion 1). Bottom trawling in the North Pacific fisheries accounts for only 18% of the retained groundfish catch, but results in 82% of the discarded fish.<sup>1</sup> Additionally, over 1 million pounds of corals and sponges are removed from the seafloor every year, 90% of that value by bottom trawling.<sup>2</sup> High levels of bycatch can affect entire marine communities, reducing key species important to the food web and altering the ecological structure and diversity of the oceans.<sup>3</sup>

Impacts of bottom trawling and bycatch assessments in the GOA bottom trawl fishery are contained in a new discussion paper released this month by the National Marine Fisheries Service (NMFS). Salmon bycatch has increased substantially, while tanner crab bycatch continues to remain high in the bottom trawl fishery.<sup>4</sup> Specific conservation impacts in the tanner crab fisheries include negative impacts on recovering Kodiak tanner crab populations through bycatch, unobserved mortality due to rolling trawl gear over crab, or by impacting sensitive habitats as a result of an increase in allowed bottom trawling. Furthermore, recent declines in salmon populations throughout the West Pacific Coast and Alaska suggest a need to look more closely at the salmon bycatch captured by the bottom trawl fleet.

The introduction of the GOA Rockfish Pilot Program has additional implications for rockfish as the unique characteristics of rockfish make them especially vulnerable to overfishing and create special challenges for fishery management and rockfish conservation that the bottom trawl fleet fails to address.<sup>5</sup> Additionally, tables 8 and 9 in the EA for Amendment 79 reflect the high rates of recorded bycatch in the BSAI bottom trawl fleet.<sup>6</sup> While Amendment 79 of the BSAI and GOA Fishery Management Plans hold promise for improving the bycatch problem, segments of the bottom trawl fleet have vehemently opposed the measures.<sup>7</sup> Consequently, the issue of excessive bycatch, from both a species and ecosystem function level, continues to fail to be addressed adequately in the bottom trawl fisheries of the BSAI and GOA.

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<sup>1</sup> Fisheries Information Services. 2006. Discards in the North Pacific groundfish fisheries 2004.

<sup>2</sup> National Marine Fisheries Service. 2004. Alaska Groundfish Fisheries, Final Programmatic Supplemental Environmental Impact Statement.

<sup>3</sup> Norse, E., ed. 1993. Global Marine Biological Diversity, A Strategy for Building Conservation into Decision Making. Island Press.

<sup>4</sup> See National Marine Fisheries Service. 2008. Salmon and Crab Bycatch Measures for Gulf of Alaska Groundfish Fisheries. (retrievable at [Hhttp://www.fakr.noaa.gov/npfmc/current\\_issues/bycatch/GOAbycatch508.pdf](http://www.fakr.noaa.gov/npfmc/current_issues/bycatch/GOAbycatch508.pdf)).

<sup>5</sup> National Marine Fisheries Service. 2007. Rockfish Program Guide. (retrievable at [Hhttp://www.fakr.noaa.gov/sustainablefisheries/goarat/rockfish\\_finalrule\\_guide.pdf](http://www.fakr.noaa.gov/sustainablefisheries/goarat/rockfish_finalrule_guide.pdf))

<sup>6</sup> National Marine Fisheries Service. 2005. Environmental Assessment for Amendment 79 to the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area: Minimum Groundfish Retention Standard (IR/TU Trailing Amendment C) (retrievable at [Hhttp://www.fakr.noaa.gov/analyses/groundfish/amend79EARIRIRFA0505.pdf](http://www.fakr.noaa.gov/analyses/groundfish/amend79EARIRIRFA0505.pdf)).

<sup>7</sup> See Bauman, Margie. "Court holds firm on limiting waste of fish" Alaska Journal of Commerce (March 21, 2007) (retrievable at [Hhttp://www.alaskajournal.com/stories/032107/hom\\_20070321099.shtml](http://www.alaskajournal.com/stories/032107/hom_20070321099.shtml)).

## **Habitat Effects**

Of the myriad effects bottom trawling may have on the ocean ecosystem in the Bering Sea and Gulf of Alaska, adverse habitat modification represents the most significant. This section specifically addresses Principle 2 (MSC Criterion 1) regarding the maintenance of ecosystem function. Research has determined that repeated trawling results in substantial changes in benthic communities and that intensively fished areas are likely to remain permanently altered with reductions in both species richness and evenness.<sup>8</sup> Thus, what little research has been conducted indicates that both diversity and productivity – and ultimately the ecosystem function – are reduced by bottom trawling.

Specific to indicator 2.1.3.1, physical impacts on habitat due to the use of trawl gear are known, but only in limited conditions and circumstances. While general impacts of trawling are well known, specific impacts to benthic habitat in the North Pacific are relatively only moderately understood.<sup>9</sup> In many cases, proxies from other fisheries in different oceans provide the only knowledge of habitat effects that may be occurring in the North Pacific. Moreover, while some knowledge exists regarding the direct, acute effects of bottom trawling, much less is understood about the indirect, chronic effects of bottom trawling on reducing habitat diversity and ecosystem productivity in the long-term.

The science compiled by the National Research Council clearly outlines the known direct and acute effects from otter trawls such as those used by the North Pacific fleet.<sup>10</sup> Those effects include reduced habitat complexity, discernable changes in benthic communities, and reduced productivity. However, in the NMFS EFH EIS, NMFS notes that adverse habitat changes *may* affect the ability of fish to use the habitat as prey, shelter from predators, spawning substrate or for other functions. Subsequently, differential effects on components of the habitat resulting from bottom trawling *may* also produce long-term changes in community structure, which *may* indirectly change its function as fish habitat.<sup>11</sup> The use of the term “may” is no coincidence, as these effects are not well understood. For instance, NMFS recognizes that bottom trawling is known to damage epibenthic structures and could have a negative impact on growth and survival of fish such as rockfish, but notes that additional research is needed to determine the importance of these associations to the health of the stocks and how much damage is actually being done by trawling.<sup>12</sup> Furthermore, recent science implicates bottom trawling in the collapse of the Bristol Bay red king crab population in the early 1980s. Since then, continued trawling in this area has helped keep the population at low levels.<sup>13</sup> Thirty-three percent more juvenile crab and an increased abundance of other species exist in protected groves of sea whips around Kodiak

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<sup>8</sup> National Research Council. 2002. Effects of Trawling and Dredging on Seafloor Habitat. National Academy Press. Washington D.C. 126 pp. p.22.

<sup>9</sup> National Marine Fisheries Service. 2005. Final Essential Fish Habitat EIS, Chapter 3, p. 3-155 (2005)

<sup>10</sup> National Research Council. 2002. p.20-29.

<sup>11</sup> National Marine Fisheries Service. 2005. Final Essential Fish Habitat EIS, Chapter 3, p. 3-155 (2005)

<sup>12</sup> National Marine Fisheries Service. 2005. Final Essential Fish Habitat EIS, Chapter 4.3, p. 4-70 (2005)

<sup>13</sup> Dew, C. B., and R. A. McConaughy. 2005. Did trawling on the brood stock contribute to the collapse of Alaska's king crab? Ecol. Appl. 15(3):919-941.

Island as compared to similar habitat in adjacent areas open to bottom trawling.<sup>14</sup> Comparing trawled and non-trawled areas in the Bering Sea, researchers found that after trawling the number of different species decreased and some rare species groups were absent.<sup>15</sup>

The National Research Council also clearly stated the need for additional research regarding indirect, chronic effects and recovery dynamics as well as a broader investigation of ecosystem dynamics related to bottom trawling.<sup>16</sup> Since the NRC report, the scientific community has conducted relatively minimal research on these issues. As testament to this lack of information, the bottom trawl fleet requested the formation of the Northern Bering Sea Research Area as a compromise in the North Pacific Fishery Management Council's establishment of an area closed to bottom trawling in the Northern Bering Sea. The stated justification posed for retaining access to the research area was to conduct scientifically sound comparisons of trawled and untrawled control habitat in a relatively pristine environment.

From a procedural perspective, performance indicator 2.1.5.3 and 2.1.5.4 improperly reverse the burden of proof that should be employed in assessing sustainability. The minimum guidepost that "there is no evidence" of unacceptable impacts allows for a fishery to simply claim "no impacts" in the absence of adequate scientific research. This type of "three monkeys" requirement allows the industry and regulators to turn a blind eye to the glaring deficiencies in scientific information regarding the effects of bottom trawling on the ecosystem. The message seems to be "If there is no evidence – and you haven't bothered to look very hard – then plow forward." Moreover, the qualifier of "unacceptable" renders the indicator further meaningless as the term is not defined and does not indicate who determines the standard for what is "unacceptable." Industry, regulatory authorities, NGOs, and the public could all have different visions of what would be unacceptable with respect to habitat impacts and other ecosystem characteristics. Nonetheless, of the scientific information that does exist, it indicates that bottom trawling indeed has negative impacts on benthic habitat or ecosystem function as previously described. Unfortunately, while the scientific community has conducted some research into the acute and direct effects, very little science has been conducted to assess the impact of bottom trawling in the North Pacific on the chronic, indirect, and long term effects.

We also note that the effects of bottom trawling in soft-bottomed habitat should not be discounted. Bottom trawling in soft-bottomed habitat on the inner Bering Sea Shelf caused reduced macrofauna density, richness, and biomass with potential consequences for ecosystem functioning.<sup>17</sup> In a study comparing untrawled and trawled areas of the Bering Sea shelf, organisms providing sediment structure and stability, such as tube-dwelling amphipods, were less prevalent in the trawled area.<sup>18</sup> Additionally, negative impacts are not limited to epifauna,

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<sup>14</sup> Stone, R., M. M. Masuda, and P. W. Malecha. 2005. Effects of bottom trawling on soft-sediment epibenthic communities in the Gulf of Alaska. In: P.W. Barnes and J.P. Thomas (editors), *Benthic Habitats and the Effects of Fishing*. Am. Fish. Soc. Symposium 41. pp. 461-475

<sup>15</sup> Brown, E., B. Finney, S. Hills and M. Commisse. 2005. Effects of commercial otter trawling on benthic communities in the Southeastern Bering Sea. Am. Fish. Soc. Symposium 41. pp. 439-460.

<sup>16</sup> National Research Council. 2002. p. 29.

<sup>17</sup> Brown, E., B. Finney, S. Hills and M. Commisse. 2005. Effects of commercial otter trawling on benthic communities in the Southeastern Bering Sea. Am. Fish. Soc. Symposium 41. pp. 439-460.

<sup>18</sup> *Id.*

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<sup>14</sup> Stone, R., M. M. Masuda, and P. W. Malecha. 2005. Effects of bottom trawling on soft-sediment epibenthic communities in the Gulf of Alaska. In: P.W. Barnes and J.P. Thomas (editors), *Benthic Habitats and the Effects of Fishing*. Am. Fish. Soc. Symposium 41. pp. 461-475

<sup>15</sup> Brown, E., B. Finney, S. Hills and M. Comnisse. 2005. Effects of commercial otter trawling on benthic communities in the Southeastern Bering Sea. Am. Fish. Soc. Symposium 41. pp. 439-460.

<sup>16</sup> National Research Council. 2002. p. 29.

<sup>17</sup> Brown, E., B. Finney, S. Hills and M. Comnisse. 2005. Effects of commercial otter trawling on benthic communities in the Southeastern Bering Sea. Am. Fish. Soc. Symposium 41. pp. 439-460.

<sup>18</sup> *Id.*

but also include infauna.<sup>19</sup> Thus, leading some scientists to believe the ecosystem in soft bottom habitat is significantly altered by chronic bottom trawling.<sup>20</sup> Additionally, in soft-sediment epibenthic communities in the Gulf of Alaska, significant differences in epifauna abundance and species diversity were observed between areas open and closed to bottom trawling.<sup>21</sup> Sea whip groves were less dense in areas open to bottom trawling. Fewer fish were observed in the sparse seawhip groves than the dense seawhip groves.<sup>22</sup> Nonetheless, none of the research conducted since has substantially assessed the ecosystem impacts of these narrower direct impacts.

Therefore, the main impacts of gear use on the habitat are only partially addressed by existing research. Much more research must be conducted regarding the chronic, indirect effects of bottom trawling on ecosystem function before it can genuinely be considered sustainable. Consequently, the bottom trawl sector does not appear to meet the minimum standards for performance indicators 2.1.3.1, 2.1.5.3, and 2.1.5.4.

### **Legal and Customary Rights**

The management system, as currently implemented, inadequately addresses legal and customary rights of people dependent upon fishing under performance indicator 3A.2.3 (MSC Criteria 1, 2, 4). Over the last decade increasing conflicts have occurred between community-based fishermen in the Bering Sea and the North Pacific bottom trawl fleet. Rural communities along the Bering Sea coast depend upon fishing for their livelihood as well as for subsistence and cultural purposes. Residents of the area have increasingly come forward to protest what they perceive as encroachment by the bottom trawl fleet into traditional fishing grounds.<sup>23</sup> Additionally, the bottom trawl fleet received significant resistance from the Bering Sea communities in the implementation of the Bering Sea EFH provisions in 2007.<sup>24</sup> Based on Traditional Ecological Knowledge (TEK), Bering Sea communities proposed additional constraints on the bottom trawl fleet in excess of those originally proposed in the EFH proposal that would include closure areas around marine habitats they deemed important.<sup>25</sup> The recent actions by the Bering Sea communities against the bottom trawl fleet were taken without the support of a Federal mandated policy that has yet to be implemented by NMFS.

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<sup>19</sup> McConnaughey, R.A., S. E. Syrjala, and C. B. Dew. 2005. Effects of chronic bottom trawling on the size structure of soft-bottom benthic invertebrates. *American Fisheries Society Symposium* 41: 425-437.; McConnaughey, R.A., K. Mier, and C.B. Dew. 2000. An examination of chronic trawling effects on soft-bottom benthos of the eastern Bering Sea. *ICES Journal of Marine Science* 57:1377-1388.; Brown, E.J., B. Finney, and S. Hills. 2005. Effects of commercial otter trawling on benthic communities in the southeastern Bering Sea. *American Fisheries Society Symposium* 41: 439-460.

<sup>20</sup> Brown, E.J., B. Finney, and S. Hills. 2005. Effects of commercial otter trawling on benthic communities in the southeastern Bering Sea. *American Fisheries Society Symposium* 41: 439-460.

<sup>21</sup> Stone, R., M. M. Masuda, and P. W. Malecha. 2005. Effects of bottom trawling on soft-sediment epibenthic communities in the Gulf of Alaska. In: P.W. Barnes and J.P. Thomas (editors), *Benthic Habitats and the Effects of Fishing*. *Am. Fish. Soc. Symposium* 41. pp. 461-475.

<sup>22</sup> *Id.*

<sup>23</sup> See *Bristol Bay Times*, May 15, 2008, p.5. (retrievable at [http://www.alaskanewspapers.com/content/pdf/BT\\_05-15-08.pdf](http://www.alaskanewspapers.com/content/pdf/BT_05-15-08.pdf)).

<sup>24</sup> See Alaska Marine Conservation Council, May 23, 2008. (retrievable at <http://www.akmarine.org/our-work/conserves-fisheries-marine-life/bering-sea-bottom-trawl-boundary>).

<sup>25</sup> See *Tundra Drums*, April 18, 2008. (retrievable at <http://www.thetundradrums.com/news/show/2073H>).

Executive Order 13175 calls for a trust responsibility by the United States to protect tribal sovereignty and self-determination, tribal lands, assets, resources, and treaty and other federally recognized and reserved rights.<sup>26</sup> The Executive Order directs Federal agencies to engage in meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications, to strengthen the United States government-to-government relationships with Alaska Native tribes, and to reduce the imposition of unfunded mandates upon Alaska Native tribes. To achieve meaningful consultation and coordination, NMFS must seek to establish and define a trust responsibility with the Alaska Native tribes and, thus far, has failed to implement an official policy for consultation and coordination with Alaska Native tribes. Since Alaska Natives dominate the population of Bering Sea communities, the management system fails to adequately observe the legal rights of the Bering Sea communities dependent upon fishing. Consequently, the current system falls short of observing the legal and customary rights of people dependent upon fishing for this performance indicator.

### **Surveillance and Monitoring**

Management of the bottom trawl fishery is notably deficient in at least one area under control measures specific to performance indicator 3A.8.2. Requirements for onboard observer validation are scaled to vessel size. Vessels greater than 125 ft (38 m) in length are required to have 100% observer coverage, while vessels between 65-125 ft (19.8-38 m) in length are required to have observer coverage for 30% of sea days. Vessels less than 65 ft are not required to have observer coverage. A lack of appropriate observer coverage has led to significant problems with reliability on observer data from the bottom trawl fleet.

Onboard observers have experienced interference by the bottom trawl fleet that has tainted the validity of collected data. A vessel incentive program involving penalties for exceeding particular bycatch rates in selected target fisheries was introduced in the 1990's but was ineffective because vessel crews hid halibut from observers, and the observer catch sampling did not have the statistical properties to allow for prosecution.<sup>27</sup> Resultantly, only modest reductions were achieved in halibut bycatch mortality in Alaskan fisheries since 2000.<sup>28</sup> Additionally, recent testimony before the North Pacific Fishery Management Council indicates a trend of vessels conducting one trawl before midnight in a safe area, one after midnight, and then offloading the observer in a practice known as "observer" or "water hauls," which further conflate data reliability. Furthermore, recent anecdotal information indicated substantial unaccounted halibut bycatch by unobserved bottom trawlers (<65 ft) in Sand Point during the winter Adak cod fishery, which generated significant controversy in a community of fishermen that struggle to catch IFQ halibut in the same area. Thus, while at least 30% coverage is required for most vessels by regulation, in practice it is far less due to manipulation of the observer system regulations because vessels carrying observers tend to behave differently than vessels without observers. Therefore, it has been demonstrated that for the bottom trawl fleet to be effectively regulated, 100% observer coverage must be instituted on all vessels for the fishery to

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<sup>26</sup> Exec. Order No. 13,175, 65 Fed. Reg. 67,249 (Nov. 9, 2000).

<sup>27</sup> Renko, B. L. 1998. Management of Pacific halibut bycatch in the Alaskan groundfish fishery 1990-1996: The vessel incentive program. Master's Thesis, School Mar. Affairs, Univ. Wash., Seattle.

<sup>28</sup> Williams, G. H. 2005. Incidental catch and mortality of Pacific halibut, 1962-2004. Int. Pac. Halibut Comm. Rep. of Assessment and Research Activities 2005:213-224.

be properly managed. Consequently, while a surveillance and monitoring program is in place, its effectiveness has not been fully demonstrated relative to conservation objectives. Please also review the additional enclosed documents from the Association of Professional Observers (APO)<sup>29</sup>, the Office of the Inspector General (OIG)<sup>30</sup>, and the National Marine Fisheries Service (NMFS)<sup>31</sup> regarding the inadequacies of the current observer program, particularly with regard to the propensity for "observer tows" or "water hauls" on vessels with less than 100% observer coverage.

Please feel free to contact me if you have any questions or require any further information.

Respectfully,



Alfred Lee "Bubba" Cook Jr.  
Senior Fisheries Officer Kamchatka/Bering Sea Ecoregion  
World Wildlife Fund, Bering Sea Field Office  
406 G Street, Suite 303  
Anchorage, AK 99501  
Tel: 907-279-5504  
Fax: 907-279-5509  
Cell: 907-382-3887  
[www.worldwildlife.org](http://www.worldwildlife.org)

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<sup>29</sup> Letter to NMFS from APO, September 10, 2007. (*retrievable at* [http://www.peer.org/docs/noaa/07\\_24\\_9\\_apo\\_comments.pdf](http://www.peer.org/docs/noaa/07_24_9_apo_comments.pdf)).

<sup>30</sup> NMFS Observer Programs Should Improve Data Quality, Performance Monitoring, And Outreach Efforts. U.S. Department of Commerce, Office of the Inspector General, March 2004. (*retrievable at* <http://www.oig.doc.gov/oig/reports/2004/NOAA-IPE-15721-03-04.pdf>).

<sup>31</sup> National Marine Fisheries Service. 2008. Regulatory Impact Review/Initial Regulatory Flexibility Analysis for a Regulatory Amendment to Revise Administrative and Procedural Aspects of the North Pacific Groundfish Observer Program (*retrievable at* [http://www.fakr.noaa.gov/NPFMC/current\\_issues/observer/Observer108.pdf](http://www.fakr.noaa.gov/NPFMC/current_issues/observer/Observer108.pdf)).

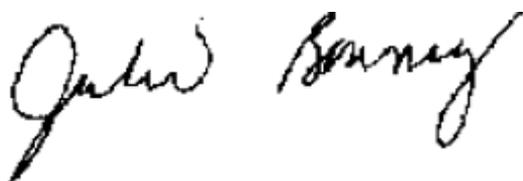
Alaska Groundfish Data Bank  
P.O. Box 788  
Kodiak, Alaska 99615  
Best Use Coalition  
4241 21st Ave West, Suite 300  
Seattle, WA 98199

Dear Paul,

We are writing you in regards to Moody's proposed Condition 4 (Management Review) in your MSC assessment of the GOA Pacific cod trawl fishery. Specifically, the assessment team states that "it was not possible to discern the detail of the external review process for the state management system". Since Alaska State regulations for the GOA State waters cod fishery prohibit trawl gear from participating in this fishery, it seems that there is no need to include condition 4 in the GOA cod trawl assessment report.

Best regards,

Executive Director



Alaska Groundfish Data Bank



Best Use Coalition