BSAI and GOA Harvest Specifications for 2006-2007

Council Review Draft

Environmental Assessment (EA) and Initial Regulatory Flexibility Analysis (IRFA)

September 2005

Lead Agency:	National Oceanic and Atmospheric Administration National Marine Fisheries Service Alaska Regional Office Juneau, Alaska
Responsible Official:	James W. Balsiger Regional Administrator Alaska Regional Office
For further information contact:	Ben Muse National Marine Fisheries Service P.O. Box 21668 Juneau, AK 99802 (907) 586-7234

Abstract: This document contains an Environmental Assessment (EA) and an Initial Regulatory Flexibility Analysis (IRFA) that analyze the potential impacts of the 2006-2007 harvest specifications for the groundfish fisheries of the Bering Sea and Aleutian Islands and Gulf of Alaska management areas. The analyses in this document address the requirements of the National Environmental Policy Act (NEPA) and the Regulatory Flexibility Act (RFA).

(This page is blank)

Table of Contents

List of Tables

List of Figures

List of Acronyms

ABC	Acceptable Biological Catch
ADCED	Alaska Department of Community and Economic Development
ADF&G	Alaska Department of Fish and Game
AFA	American Fisheries Act
AFSC	Alaska Fisheries Science Center
AKFIN	Alaska Fisheries Information Network
AP	Advisory Panel
APA	Administrative Procedures Act
B	Biomass
BiOp	Biological Opinion
BS	Bering Sea
AI	Aleutian Islands
BSAI	Bering Sea and Aleutian Islands
CDQ	Community Development Quota
CEQ	Council of Environmental Quality
CEY	Constant Exploitation Yield
CFEC	Alaska Commercial Fisheries Entry Commission
CFR	Code of Federal Regulations
CP	catcher-processor
CV	catcher vessel
DFA	Directed Fishing Allowance
DFL	Directed Fishing Level
EA	Environmental Assessment
EIS	Environmental Impact Statement
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
ESA	Endangered Species Act
F	Fishing mortality rate
FMP	Fishery Management Plan
FONSI	Finding of No Significant Impact
FR	*Federal Register*
FRFA	Final Regulatory Flexibility Analysis
GOA	Gulf of Alaska
FRFA	Final Regulatory Flexibility Analysis
HAPC	Habitat Area of Particular Concern
IFQ	Individual Fisherman's Quota
ITAC	Initial Total Allowable Catch
IRFA	Initial Regulatory Flexibility Analysis
MMPA	Marine Mammal Protection Act
MSST	Minimum Stock Size Threshold
MSY	Maximum Sustainable Yield
mt	metric ton
NEPA	National Environmental Policy Act

nm	nautical mile
NMFS	National Marine Fishery Service
NOA	Notice of Availability
NOAA	National Oceanographic and Atmospheric Administration
OFL	Overfishing Level
OY	Optimum Yield
PBR	Potential Biological Removal
PSC	Prohibited Species Catch
PSQ	Prohibited Species Quota
PSEIS	Programmatic Supplemental Environmental Impact Statement
RFA	Regulatory Flexibility Act
RIR	Regulatory Impact Review
SAFE	Stock Assessment and Fishery Evaluation Report
SBREFA	Small Business Regulatory Enforcement Fairness Act
SEIS	Supplemental Environmental Impact Statement
SSC	Scientific and Statistical Committee
TAC	Total Allowable Catch
USFWS	United States Fish and Wildlife Service

Executive Summary

The proposed action would adopt harvest specifications for the Federally managed groundfish fisheries in the Gulf of Alaska (GOA), and Bering Sea and Aleutian Islands (BSAI), management areas.

In the GOA and BSAI, groundfish harvests are managed subject to annual limits on the amounts of each species of fish, or of each group of species, that may be taken. The U.S. Secretary of Commerce (Secretary) sets the limits based on the recommendations of the North Pacific Fishery Management Council (Council). The set of annual limits adopted are referred to as "harvest specifications," and the process of adopting them is referred to as the "specifications process." The National Marine Fisheries Service (NMFS) manages the groundfish fisheries.

ES.1 Environmental Assessment

As stated in section 1.4 of this EA (Purpose and need), the purpose of this action is to meet the requirements of the Magnuson-Stevens Act's national standards for fisheries conservation and management. One of the most important of these is National Standard 1: "Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry." (16 U.S.C. 1851). Section 1.4 cites the Council's management objectives including providing for orderly and controlled commercial fisheries (including CDQ fisheries) that will promote sustainable fisheries and communities and equitable and efficient use of fishery resources, while preventing overfishing and meeting the other environmental objectives described in the Council's objectives.

Five alternatives have been evaluated for all direct, indirect, and cumulative effects on resources, species, and issues within the action area as a result of specified TAC levels. The impacts of alternative TAC levels are assessed in Chapter 4 of this EA.

In addition to the PSEIS and other NEPA analyses for the groundfish fisheries, the significance of impacts of the actions analyzed in this EA is determined through consideration of the following information, as required by NEPA and 40 CFR 1508.27.

Context

For the 2006 and 2007 harvest specifications action, the setting of the proposed action is the groundfish fisheries of the BSAI and GOA. Any effects of this action are limited to these areas. The effects of the 2006 and 2007 harvest specifications on society within these areas are on individuals directly and indirectly participating in the groundfish fisheries and on those who use the ocean resources. Because this action has impacts that may go beyond the bounds of the BSAI and GOA and continues groundfish fisheries in BSAI and GOA into the future, this action may have impacts on society as a whole or regionally.

Intensity

Listings of considerations to determine intensity of the impacts are in 40 CFR 1508.27(b) and in the NOAA Administrative Order 216-6, Section 6. Each consideration is addressed below in order as it appears in the regulations.

Adverse or beneficial impact determinations for marine resources, **including sustainability of target and nontarget species, damage to ocean or coastal habitat or essential fish habitat, effects on biodiversity and ecosystems**, **and marine mammals** Significant impact determinations for marine resources accruing from alternatives to establish year 2006 and 2007 Federal groundfish fisheries harvest specifications are summarized in Table 5.0-1.

Alternative 1 Alternative 1 may have adverse impacts on resources. While Alternative 1 involves increased TACs for many species, these may not lead to proportionate increases in fishing activity or fish production. Large increases in TACs for arrowtooth flounder may be difficult to market. In other instances, large increases in TACs for species that are currently constrained by PSC bycatch, or that are close to levels at which PSC constraints would be binding, may not be able to be fully harvest base on the increased TACs. For this reason, Alternative 1 was not found to have significant impacts. Note that Alternative 1 involves levels of harvest that are actually illegal in the BSAI (levels that exceed the regulatory 2 million mt OY). While this almost certainly precludes Alternative 1 in 2006 and 2007, NEPA alternatives do not have to be currently authorized by regulation to be considered. In this case, Alternative 1 has been included because it provides a potentially biologically acceptable upper bound on the range of TAC specifications considered. The regulatory prohibition on Alternative 1 was not considered in the significance determinations. An unknown rating for Alternative 1 was found for PSC species, since the PSC constraints introduced in the past are assumed to be implemented within the OY limits. Adverse impacts are also expected for marine mammals, seabirds, habitat and ecosystems due to increased fishing effort, but these effects are considered either unknown or insignificant.

Alternative 2 (preferred alternative) Alternative 2 provided for TAC levels that were generally close to those of the 2005 status quo. This is the Council's preferred alternative. Alternative 2 had adverse impacts on some resource components, but all impacts are insignificant.

Alternatives 3 and 4 Alternatives 3 and 4 tended to be associated with somewhat less fish production than Alternative 2. In the GOA, Alternative 3 was actually associated with TACs that were somewhat larger than those under Alternative 2, but a large part of these were flatfish TACs; the full harvest of these TACS might be prevented by halibut PSC constraints. The effects of alternatives 3 and 4 for the environmental components were generally identified as similar to those of Alternative 2. Both alternatives had adverse impacts, but they were considered insignificant.

Alternative 5 Under Alternative 5, there would be no groundfish fisheries in 2006 and 2007. Alternative 5 had no adverse impacts on the environment and no significant impacts. However, Alternative 5 would be very disruptive to persons and firms directly involved in fishing, processing, transportation, and other operations that service these sectors, and to the persons, firms, and communities dependent on the health of these sectors, and to the consumers of fish products. This would be inconsistent with the portion of the guidelines for National Standard 1 that defines "optimum yield" as "the amount of fish that will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities…" (50 CFR 600.310)

Public health and safety will not be affected in any way not evaluated under previous actions or disproportionally for Alternatives 1-4. The harvest specifications will not change fishing methods, timing of fishing or quota assignments to gear groups which are based on previously established seasons and allocation formulas in regulations. Alternative 5 effects on safety and health are unknown. It is likely that no fishing would result in a reduction in fishery related injuries and mortality, but the lack of income may result in adverse effects on public health.

Cultural resources and ecologically critical areas: These actions take place in the geographic areas of the Bering Sea, Aleutian Islands, and GOA, generally from 3 nm to 200 nm offshore. The land adjacent to these areas contain cultural resources and ecologically critical areas. The marine waters where the fisheries occur contain ecologically critical area. Effects on the unique characteristics of these areas are not anticipated to occur with these actions and mitigation measures such as a bottom trawling ban in the Bering Sea are part of fisheries management measures.

Controversiality: These actions deal with management of the groundfish fisheries. Differences of opinion exist among various industry, environmental, management, and scientific groups on the appropriate levels of TAC to set for various target species and in particular fishery management areas. Alternative 2 is less likely to be controversial compared to the other alternatives analyzed because it continues to apply scientific and public processes used for harvest specifications that are similar to those used in the past for the groundfish fisheries. Alternatives 1 and 5 would be more likely to be controversial because of the large increase and decrease in harvest, respectively. Alternatives 3 and 4 also would be more likely than Alternative 2 to be controversial because they do not apply the scientific or public processes for harvest specifications development.

Risks to the human environment, **including social and economic effects:** Risks to the human environment by setting harvest specifications in the BSAI and GOA groundfish fisheries are described in detail in the PSEIS (NMFS 2004b) and in this EA. Because of the mitigation measures implemented with every past action, it is anticipated that there will be minimal or no risk to the human environment beyond that disclosed in the PSEIS (NMFS 2004b) or the Steller Sea Lion Protection Measures SEIS (NMFS 2001b). While Alternative 2 is expected to have some adverse impacts on the human environment, these were rated insignificant for the harvest specifications. Alternative 2 is very similar to, and effectively continues, the status quo fishery management regime. It is therefore likely to impose minimal disruption on persons, firms, and communities dependent on the fish resources.

Future actions related to this action may result in impacts and are addressed in Chapter 4.0 of this EA. A cumulative effects analysis for each resource component fully evaluated the impacts of reasonably foreseeable future actions. Section 3.2 of the EA surveyed the reasonably foreseeable future actions under the headings of ecological approaches to management, rationalization, traditional fishery management tools, other federal, state and international actions, and private actions. NMFS is required to establish fishing harvest levels for up to two years for the BSAI and GOA groundfish fisheries. In the future, changes may occur in the environment or in fishing practices that may result in significant impacts. Additional information regarding marine species may make it necessary to change management measures. NMFS has the ability to mitigate environmental emergencies by adopting emergency rules. In December 2006, the Council will adopt new specifications for 2007 and will have the opportunity to adapt to changing conditions at that time. The new specifications and alternatives will be reviewed in a NEPA analysis. The analysis of the cumulative effects Chapter 4 did not identify any significant incremental effects of the current action as a result of the foreseeable future actions. Pursuant to NEPA, appropriate environmental analysis documents will be prepared to inform the decision makers of potential impacts of future actions on the human environment, and mitigation measures are likely to be implemented, if necessary to avoid potentially significantly adverse impacts.

Cumulatively significant effects, including those on target and nontarget species
Cumulative impacts of the preferred alternative on each of the environmental resource components are analyzed in Chapter 4.0. The cumulative effects of this action, when added to past, present, and reasonably foreseeable future actions were insignificant.

The specifications were determined following a process that has been fully analyzed in the PSEIS and in the NEPA analysis for BSAI and GOA FMP Amendments 48/48 (NMFS 2004c). Moreover, this action in and of itself is of short duration, and its effects will be measurable only on a very fine scale. At the population level, the effects of up to two years of harvest specifications may be impossible to detect. Moreover, the Council will adopt new specifications for the second year of the period covered by this action, 2007, in December 2006. The agency will attempt to more fully assess cumulative effects in future editions of the PSEIS when sufficient time has passed for analysts to be able to evaluate more clearly the cumulative environmental consequences of the annual BSAI and GOA specifications.

Districts, sites, highways, structures, or objects listed or eligible for listing in the National Register of Historic Places: This action will have no effect on districts, sites, highways, structures, or objects listed or eligible for listing in the National Register of Historic Places, nor cause loss or destruction of significant scientific, cultural, or historical resources. This consideration is not applicable to this action.

Impact on ESA listed species and their critical habitat: ESA listed species that range into the fishery management areas are listed in Table 3.3-1. An FMP level Section 7 consultation BiOp was completed for the groundfish fisheries in November 2000 (NMFS 2000). The FMP level BiOp is limited to those species under NMFS jurisdiction and covers most of the endangered and threatened species occurring in the action area, including marine mammals, turtles, and Pacific salmon.

Under NMFS' FMP level BiOp (NMFS 2000), the western distinct population segment of Steller sea lions was the only ESA listed species identified as likely to be jeopardized by the groundfish fisheries. A subsequent biological opinion on the Steller sea lion protection measures was issued in 2001 (NMFS 2001b, appendix A). The 2001 BiOp found that the groundfish fisheries conducted in accordance with the Steller sea lion protection measures were unlikely to cause jeopardy of continued survival and recovery or adverse modification or destruction of critical habitat for Steller sea lions. This action would be implemented within the protection measures.

The effects of the groundfish fisheries on ESA listed salmon are discussed in section 4.5. The incidental take statement of 55,000 chinook salmon from the 1999 BiOp (NMFS 1999) was exceeded in the 2004 groundfish fishery. NMFS Alaska Region is currently consulting with NMFS NW Region to determine if the exceedence of the ITS is likely to adversely affect ESA listed salmon and the Council is evaluating the current bycatch management methods to determine if changes are needed.

Listed seabirds are under the jurisdiction of the USFWS which has completed an FMP level (USFWS 2003a) and project level BiOp (USFWS 2003b) for the groundfish fisheries. Both USFWS BiOps concluded that the groundfish fisheries and the annual setting of harvest specifications were unlikely to cause the jeopardy of extinction or adverse modification or destruction of critical habitat for ESA listed birds.

NMFS is currently consulting with the USFWS on northern sea otters and may consult on Northern right whales after designation of critical habitat. No other consultations are required for the 2006 and 2007 harvest specification because the proposed actions will not modify the actions already analyzed in previous BiOps, are not likely to adversely affect ESA listed species beyond the effects already analyzed. Summaries of the ESA consultations on individual listed species are located in the section 3.0 and accompanying tables of the PSEIS under each ESA listed species' management overview (NMFS 2004b).

This action poses **no known violation by NMFS of Federal, State, or local laws or requirements for the protection of the environment**. Implementation of the harvest specifications would be conducted in a manner consistent, to the maximum extent practicable, with the enforceable provisions of the Alaska Coastal Management Program within the meaning of section 30(c)(1) of the Coastal Zone Management Act of 1972 and its implementing regulations.

Alternatives 2-5 pose **insignificant effects on the introduction or spread of nonindigenous species** into the BSAI and GOA because they do not change fishing, processing or shipping practices that may lead to the introduction of nonindigenous species. Because Alternative 1 is associated with potentially increased levels of harvests, it was given an unknown significance rating on this criterion.

Comparison of Alternatives and Selection of a Preferred Alternative

Alternative 1 would set TACs in the BSAI above the upper limit of 2,000,000 mt for OY and has more potential for adverse effects on a number of environmental components compared to Alternatives 2-5. It does not provide as much flexibility as Alternative 2 for the reduction of fishing rates below the maxF_{ABC} in order to take account of biological and conservation issues unique to each species. Alternative 5 under which no fishing takes place, eliminates the adverse impacts of fishing on the environment, but at a very high cost, since setting TACs equal to zero in both the BSAI and GOA would result in severe socioeconomic impacts. Neither Alternative 3 nor 4 uses the best and most recent scientific information on status of groundfish stocks nor takes into account socioeconomic benefits to the nation.

Alternative 2 is the preferred alternative because: 1) it takes into account the best and most recent information available regarding the status of the groundfish stocks, public testimony, and socio-economic concerns; 2) it sets all TACs at levels equal to or below ABC levels; 3) it falls within the specified range of OY for both the BSAI and GOA, 4) it is consistent with the ESA and the National Standards and other requirements of the Magnuson Stevens Fishery Conservation and Management Act, and 5) it does not disrupt the persons, firms, and fishing communities that are dependent on the fish resources.

Table ES-1 Summary of Significance Determinations (this is 5.0-1 in Chapter 5)

		Alternative 1	Alternative 2	Alternative 5	Alternative 4	Alternative 5
Target species (Section 4.2)	Evaluated with respect to level of mortality, changes in genetic structure, reproductive success, prey availability, and habitat	Harvest levels will be consistent with OFL and ABC constraints identified by scientists. These are expected to create a low probability of overfishing and prevent significant adverse impacts to genetic structure, reproductive success, prey availability and habitat. Impacts not significant.	Harvest levels will be consistent with OFL and ABC constraints identified by scientists. These are expected to create a low probability of overfishing and prevent significant adverse impacts to genetic structure, reproductive success, prey availability and habitat. Impacts not significant.	Harvest levels will be consistent with OFL and ABC constraints identified by scientists. These are expected to create a low probability of overfishing and prevent significant adverse impacts to genetic structure, reproductive success, prey availability and habitat. Impacts not significant.	Harvest levels will be consistent with OFL and ABC constraints identified by scientists. These are expected to create a low probability of overfishing and prevent significant adverse impacts to genetic structure, reproductive success, prey availability and habitat Impacts not significant.	There would be no harvest under this alternative, and no impacts.
Non-specified species (4.3)	Evaluated using 50% change in target species TACs as a proxy for impact on non-specified species.	Target species TAC changes did not trigger the threshold. Direct, indirect, and cumulative effects analyses did not identify significant impacts.	Target species TAC changes did not trigger the threshold. Direct, indirect, and cumulative effects analyses did not identify significant impacts.	Target species TAC changes did not trigger the threshold. Direct, indirect, and cumulative effects analyses did not identify significant impacts.	Target species TAC changes did not trigger the threshold. Direct, indirect, and cumulative effects analyses did not identify significant impacts.	There would be no harvest under this alternative, and no impacts.
Forage species (4.4)	Evaluated using 100% change in Pollock TACs as a proxy for impact on forage species.	Pollock TAC changes did not trigger the threshold. Direct, indirect, and cumulative effects analyses did not identify significant impacts.	Pollock TAC changes did not trigger the threshold. Direct, indirect, and cumulative effects analyses did not identify significant impacts.	Pollock TAC changes did not trigger the threshold. Direct, indirect, and cumulative effects analyses did not identify significant impacts.	Pollock TAC changes did not trigger the threshold. Direct, indirect, and cumulative effects analyses did not identify significant impacts.	There would be no harvest under this alternative, and no impacts.
PSC species (4.5)	Evaluated with respect to consistency with PSC protection measures incorporated in the FMPs and in regulations.	Alternative 1 was given an unknown significance rating for this resource component. PSC protection measures have been evaluated and adopted under the assumption that the BSAI OY cap would be met. This alternative	Fisheries will be conducted in accordance with FMP provisions and regulations directly limited PSC harvests, or constraining fishing behavior to prevent overfishing of PSC species. These provisions were	Fisheries will be conducted in accordance with FMP provisions and regulations directly limited PSC harvests, or constraining fishing behavior to prevent overfishing of PSC species. These provisions were	Fisheries will be conducted in accordance with FMP provisions and regulations directly limited PSC harvests, or constraining fishing behavior to prevent overfishing of PSC species. These provisions were	There would be no harvest under this alternative, and no adverse impacts.

		would allow harvests greater than that cap. It has thus been given an unknown significance rating.	adopted pursuant to NEPA analyses and FONSIs. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	adopted pursuant to NEPA analyses and FONSIs. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	adopted pursuant to NEPA analyses and FONSIs. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	
Marine mammals (4.6)	Evaluated with respect to incidental take and entanglement in marine debris, harvest of prey species, and disturbance.	TACs are higher, but it is not clear if harvests will rise proportionately. Market considerations for some species (arrowtooth flounder) may limit harvest, in other instances halibut PSC bycatch may be a limiting factor. This was rated adverse, but not significantly adverse. Existing protection measures were also found to constrain the impacts of increased TACs	Incidental takes were found to be within PBR levels (the threshold), and entanglement, harvest of prey, and disturbance, were adverse but not significant. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	Incidental takes were found to be within PBR levels (the threshold), and entanglement, harvest of prey, and disturbance, were adverse but not significant. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	Incidental takes were found to be within PBR levels (the threshold), and entanglement, harvest of prey, and disturbance, were adverse but not significant. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	There would be no harvest under this alternative, and no adverse impacts.
Seabirds (4.7)	Evaluated with respect to incidental take, prey availability, and impact on benthic habitat.	The analysis concluded that takes would be small compared to population, that they would have little impact on prey availability or on species that exploit benthic habitat for prey. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	The analysis concluded that takes would be small compared to population, that they would have little impact on prey availability or on species that exploit benthic habitat for prey. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	The analysis concluded that takes would be small compared to population, that they would have little impact on prey availability or on species that exploit benthic habitat for prey. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	The analysis concluded that takes would be small compared to population, that they would have little impact on prey availability or on species that exploit benthic habitat for prey. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	There would be no harvest under this alternative, and no adverse impacts.
Habitat (4.8)	Evaluated with respect to impact on benthic habitat, using minimal and temporary standard for impacts	TACs are higher, but it is not clear if harvests will rise proportionately. Market considerations	Analysis in the EFH EIS concluded that impacts on habitat would be no more than minimal and	Analysis in the EFH EIS concluded that impacts on habitat would be no more than minimal and	Analysis in the EFH EIS concluded that impacts on habitat would be no more than minimal and	There would be no harvest under this alternative, and no adverse impacts.

	on EFH as a proxy	for some species (arrowtooth flounder) may limit harvest, in other instances halibut PSC bycatch may be a limiting factor. This was rated adverse, but not significantly adverse.	temporary. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	temporary. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	temporary. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	
Ecosystem relationships (4.9)	Evaluated with respect to nine key impacts, including pelagic forage availability, spatial and temporal concentration of fishy impact on forage, removal of top predators, introduction of non-native species, energy redirection, energy removal, and species, functional, and genetic diversity.	Because of the potential increase in harvests that would be permitted under this alternative, it was found to have adverse impacts of unknown significance for several criteria. These included spatial and termporal concentration, removal ot top predators, introduction of non-native species, energy removal, species diversity, functional diversity and genetic diversity.	Alternative 2 was found to have impacts generally similar to those under the status quo baseline. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	Alternative 3 was found to have impacts generally similar to those under the status quo baseline. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	Alternative 4 was found to have impacts generally similar to those under the status quo baseline. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	There would be no harvest under this alternative, and no adverse impacts.

ES.2 Initial Regulatory Flexibility Analysis

An Initial Regulatory Flexibility Analysis (IRFA) is included as Chapter 6 in this document, to evaluate the adverse impacts on small entities of the proposed harvest level specifications for the groundfish fisheries in the Bering Sea and Aleutian Islands and the Gulf of Alaska in 2006 and 2007. TheIRFA meets the statutory requirements of the Regulatory Flexibility Act (RFA) of 1980, as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996 (5 U.S.C. 601-612).

Table ES-2, below, identifies the estimated numbers of small entities that may be affected by this action.

Table ES-2 Estimated numbers of regulated entities in the BSAI and GOA groundfish fisheries (Table 6.7-1 in the IRFA)

Fleet segment	Number small entities	Number large entities	Total number of entities
Catcher vessels	758	< 98	< 856
Catcher processors	24	< 60	< 84
Motherships	0	3	3
CDQ groups	6	0	6
Shoreside Processors	<= 65	> 8	73

Notes: Numbers of small CVs and CPs are calculated as described in the paragraphs below. The numbers of large CPs and CVs are estimates of vessel numbers and are upper bound estimates of entities. Actual numbers of large entities in these categories are considerably smaller, as many of these vessels are affiliated with AFA cooperatives and should not be independently counted as entities. Catcher vessel and catcher/processor estimates prepared from fishtickets, weekly processor reports, product price files, and intent-to-operate listing. The methodology used may overstates the numbers of small entities. Shoreside processors include all Alaska processors that reported processing of groundfish to NOAA Fisheries in 2002. The number of small processing entities cannot be determined at this time due to insufficient ownership and affiliation information. All CDQ groups are non-profits and are therefore treated as small.

In general, increases in TAC specifications from 2005 levels are expected to increase fishing and processing operation (including small fishing and processing operation) gross revenues, while decreases in TAC specifications from those levels would adversely impact small entities.

Model estimated BSAI non-CDQ first wholesale gross revenues were $1,156 million in 2005. The BSAI gross revenues decline from that level in 2006 and 2007 under the preferred alternative. However, revenues are higher under the preferred alternative than under Alternatives 3, 4 or 5. Revenues are only higher under Alternative 1 in 2006 (they are lower in 2007). However, TAC levels under Alternative 1 exceed the statutory 2 million mt optimum yield in the BSAI, and therefore this alternative is not legally available.

Model estimated BSAI CDQ gross revenues were $115 million in 2005. Under the preferred alternative, Alternative 2, these revenues remain at that level in 2006, and then decline in 2007. Revenues, however, are smaller under Alternatives 3, 4, and 5. They are larger under Alternative 1, but as noted earlier, Alternative 1 is not legally available.

Model estimated GOA revenues were $226 million in 2005. Under the preferred alternative, Alternative 2, these revenues rise from that level in 2006, and then decline in 2007. Revenues, however, are smaller under Alternatives 3, 4, and 5. They are larger under Alternative 1. Alternative 1 is not precluded by statutory limits in the GOA. Fishing rates are often set lower under Alternative 2 than under Alternative 1 to take account of biological concerns that may be unique to each species. Thus, Alternative 2 is a more biologically prudent approach than Alternative 1.

This regulation does not impose new recordkeeping or reporting requirements on the regulated small entities.

This analysis did not reveal any Federal rules that duplicate, overlap or conflict with the proposed action.

There are no significant alternatives to the proposed rule that accomplish the stated objectives, are consistent with applicable statutes, and that would minimize the economic impact of the proposed rule on small entities. Alternative 1 of the action alternatives provides high revenues, however, it is precluded by optimum yield restrictions in the BSAI, and by biological concerns that are better reflected in Alternative 2 in the BSAI and the GOA. Alternatives 3, 4, and 5 are associated with lower gross revenues and a greater impact on small entities.

1.0 Purpose and Need

What's in this chapter:

1.1 Introduction

The proposed action would adopt harvest specifications for the Federally managed groundfish fisheries in the Gulf of Alaska (GOA), and Bering Sea and Aleutian Islands (BSAI), management areas in 2006 and 2007

In the GOA and BSAI, groundfish harvests are managed subject to annual limits on the amounts of each species of fish, or of each group of species, that may be taken. The U.S. Secretary of Commerce (Secretary) sets the limits based on the recommendations of the North Pacific Fishery Management Council (Council). The set of annual limits adopted are referred to as "harvest specifications," and the process of adopting them is referred to as the "specifications process." The National Marine Fisheries Service (NMFS) manages the groundfish fisheries.

Harvest specifications include:

- overfishing levels (OFLs),
- acceptable biological catches (ABCs),
- total allowable catches (TACs),
- prohibited species catches (PSC),
- and, seasonal apportionments and allocations for TACs and PSCs.

The BSAI and GOA Fishery Management Plans (FMPs) define OFL, ABC, and TAC as follows (page 12 in each FMP):

> Overfishing level (OFL): "…a limit reference set annually for a stock or stock complex during the assessment process…Overfishing occurs whenever a stock or stock complex is subjected to a rate of level of fishing mortality that jeopardizes the capacity of a stock or stock complex to produce MSY on a continuing basis. Operationally, overfishing occurs when the harvest exceeds the OFL." MSY is the maximum sustainable yield, defined in the FMPs as "…the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental conditions."

> Acceptable biological catch (ABC): "…an acceptable sustainable target harvest (or range of harvests) for a stock or stock complex, determined by the Plan Team and the Science and Statistical Committee during the assessment process. It is derived from the status and dynamics of the stock, environmental conditions, and other ecological factors, given the prevailing technological characteristics of the fishery. The target reference point is set below the limit reference point for overfishing." (the details on the Plan Team and Science and Statistical Committee input into the determination of ABC are described in Section 3.1 of this EA).
>
> Total allowable catch (TAC): "…the annual harvest limit for a stock or stock complex, derived from the ABC by considering social and economic factors."

Under current procedures, two years worth of new harvest specifications are adopted each year; each year's specifications replace those that were adopted the previous year. This way, fishing activity is usually controlled by harvest specifications based on the most recent information. The process by which harvest specifications are adopted is described in detail in Section 3.1 of this EA.

This Environmental Assessment (EA) and Initial Regulatory Flexibility Analysis (IRFA) provide environmental and small entity assessments of the impacts of the annual specifications for 2006 and 2007. Specifically, this EA/IRFA provides a National Environmental Policy Act (NEPA) EA and a Regulatory Flexibility Act (RFA) IRFA, covering the 2006-2007 BSAI and GOA groundfish specifications.

The EA/IRFA examines five alternative approaches to the 2006-2007 specifications. These alternatives are described in detail in Chapter 2. The EA evaluates each of these alternatives with respect to nine environmental components:

- Target species and fisheries
- Incidental catch of other and non-specified species
- Incidental catch of forage fish species
- Incidental catch of prohibited species
- Marine mammals
- Seabirds
- Benthic habitat
- Ecosystem indicators
- Economic and social indicators

These environmental components are defined in Section 4.1, along with the criteria used to evaluate the environmental significance of the alternatives. In addition, in Chapter 6, the IRFA evaluates the adverse impacts of this action on directly regulated small entities.

Locations of key parts of the EA/IRFA:	
The five alternatives	Chapter 2
Environmental and social context for the specifications	Chapter 3
The criteria used to evaluate the environmental significance of the alternatives	Section 4.1
NEPA analysis of direct, indirect, and cumulative environmental effects	Sections 4.2-4.9
Economic and Social impacts	Sections 4.10
NEPA conclusions	Chapter 5
Regulatory Flexibility Act analysis of impacts on small entities	Chapter 6

1.2 Statutory Authority for This Action

The National Marine Fisheries Service manages the U.S. groundfish fisheries of the Gulf of Alaska and the Bering Sea and Aleutian Islands management areas in the Exclusive Economic Zone (EEZ) under the Fishery Management Plans (FMPs) for those areas. These FMPs are the Fishery Management Plan for Groundfish of the Gulf of Alaska (Council, 2005) and the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Island Management Area (Council, 2005). The Council prepared the FMPs under the authority of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act).

1.3 The Action Area

The action area for the GOA and BSAI groundfish fisheries effectively covers all of the Gulf of Alaska, Bering Sea, and Aleutian Islands, under U.S. jurisdiction, extending southward to include the waters south of the Aleutian Islands west of 170°W to the border of the EEZ (Figures 1.3-1 and 1.3-2).

Figure 1.3-1 Management areas in the Gulf of Alaska

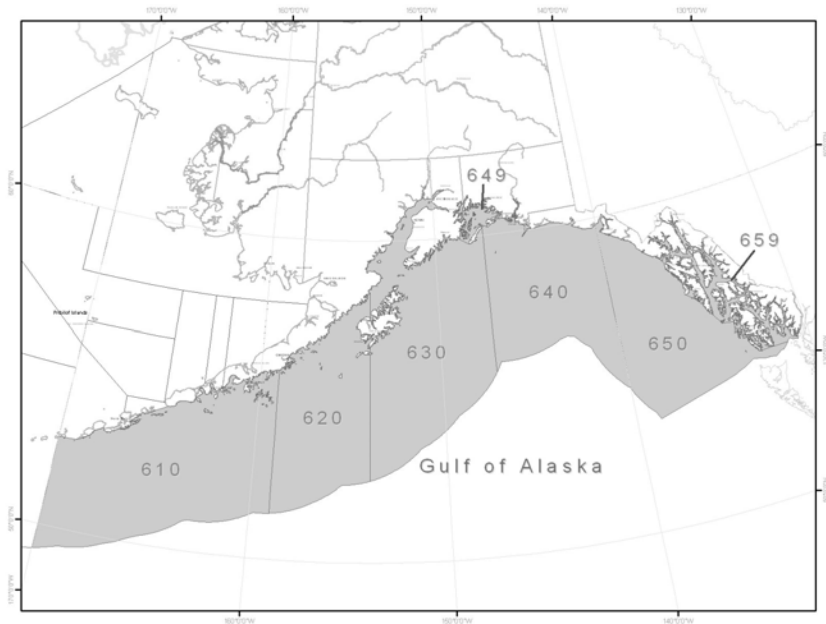
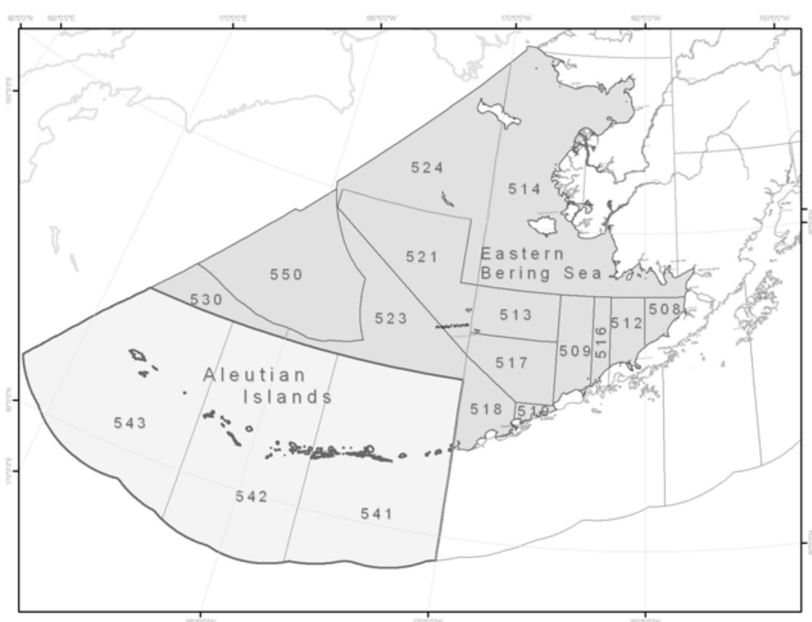


Figure 1.3-2 Management areas in the Bering Sea and Aleutian Islands



1.4 Purpose and Need for this Action

The purpose of this proposed action is to meet the requirements of the Magnuson-Stevens Act's National Standards for fisheries conservation and management. The most important of these is National Standard 1: "Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry". (16 U.S.C. 1851).

In 2004, the Council adopted management objectives to guide its fishery management decision-making. These objectives were incorporated into the BSAI and GOA FMPs through Amendments 81 and 74, respectively (69 FR 31091, June 2, 2004, approved August 26, 2004). These objectives may be found in Section 2.2 of each of the FMPs. The specific goals (italicized) and numbered objectives of Amendments 81and 74 that are related to this proposed action are:

Prevent Overfishing:

1. Adopt conservative harvest levels for multi-species and single species fisheries and specify optimum yield.
2. Continue to use the existing optimum yield cap for the BSAI (as stated in current law) groundfish fisheries.
3. Continue to improve the management of species through species categories.

Promote Sustainable Fisheries and Communities:

6. Promote conservation while providing for optimum yield in terms of providing 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.
7. Promote management measures that, while meeting conservation objectives, are also designed to avoid significant disruption of existing social and economic structures.
8. 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.

Preserve Food Web:

13. Incorporate ecosystem-based considerations into fishery management decisions, as appropriate.

Manage Incidental Catch and Reduce Bycatch and Waste:

14. Continue and improve current incidental catch and bycatch management programs.
16. Continue to manage incidental catch and bycatch through seasonal distribution of TAC and geographical gear restrictions.
19. Continue to account for bycatch mortality in TAC accounting and improve the accuracy of mortality assessments for target, PSC bycatch, and non-commercial species.
20. Control the bycatch of prohibited species through PSC limits or other appropriate measures.

Avoid Impacts to Seabirds and Marine Mammals:

22. Continue to cooperate with USFWS to protect ESA-listed seabird species, and if appropriate and practicable, other seabird species.
23. 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.
25. Continue to cooperate with NMFS and USFWS to protect ESA-listed marine mammal species, and if appropriate and practicable, other marine mammal species.

Promote Equitable and Efficient Use of Fishery Resources:

31. Provide economic and community stability to harvesting and processing sectors through fair allocation of fishery resources.
33. Develop management measures that, when practicable, consider the efficient use of fishery resources, taking into account the interest of harvesters, processors, and communities.

Improve Data Quality, Monitoring, and Enforcement:

45. Continue to cooperate and coordinate management and enforcement programs with the Alaska Board of Fish, Department of Fish and Game, and Alaska Fish and Wildlife Protection, the U.S. Coast Guard, NMFS Enforcement, IPHC, 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.

This action is needed to provide for orderly and controlled commercial fisheries (including CDQ fisheries) that will promote sustainable fisheries and communities and equitable and efficient use of fishery resources, while preventing overfishing and meeting the other environmental objectives described in the Council's objectives.

1.5 Relationship of this Action to Federal Law

While NEPA and the RFA are the primary laws directing the preparation of this document, a variety of other Federal laws and policies require environmental, economic, and socio-economic analysis of proposed Federal actions. This document contains the required analysis of the proposed Federal action to ensure that the action complies with these additional Federal laws and executive orders (EO):

- Magnuson-Stevens Fisheries Conservation and Management Act (including Sustainable Fisheries Act of 1996)
- Endangered Species Act
- Marine Mammal Protection Act
- Administrative Procedures Act
- Information Quality Act

The following provides details on the laws and executive orders directing this analysis.

National Environmental Policy Act: NEPA (42 United States Code [U.S.C.] 4331, *et seq*.) establishes our national environmental policy, provides an interdisciplinary framework for environmental planning by federal agencies, and contains action-forcing procedures to ensure that federal decision-makers take environmental factors into account. NEPA does not require that the most environmentally desirable alternative be chosen, but does require that the environmental effects of all the alternatives be analyzed equally for the benefit of decision-makers and the public.

NEPA has two principal purposes:

> 1. To require federal agencies to evaluate the potential environmental effects of any major planned federal action to ensure that public officials make well-informed decisions about the potential impacts.
>
> 2. To promote public awareness of potential impacts at the earliest planning stages of major federal actions by requiring federal agencies to prepare a detailed environmental evaluation for any major federal action significantly affecting the quality of the human environment.

NEPA requires an assessment of both the biological and the social and economic consequences of fisheries management alternatives and provides that members of the public have an opportunity to be involved in and to influence decision-making on federal actions. In short, NEPA ensures that environmental information is available to government officials and the public before decisions are made and actions taken.

Title II, Section 202 of NEPA (42 U.S.C. [United States Code] 4332) created the Council of Environmental Quality (CEQ). The duties of the CEQ include, among other things, advising and assisting the President in preparing an annual environmental quality report, which is submitted to Congress. This report gathers information concerning trends in the quality of the environment, and developing policies to promote the goals of NEPA (42 U.S.C. 4344). The CEQ is also responsible for the development and oversight of regulations and procedures implementing NEPA. The CEQ regulations provide guidance for federal agencies regarding NEPA's requirements (40 Code of Federal Regulations [CFR] Part 1500) and require agencies to identify processes for issue scoping, for the consideration of alternatives, for developing evaluation procedures, for involving the public and reviewing public input, and for coordinating with other agencies—all of which are applicable to the Council's development of FMPs.

NOAA has also prepared environmental review procedures for implementing NEPA (NOAA Administrative Order 216-6). This Administrative Order describes NOAA's policies, requirements, and procedures for complying with NEPA and the implementing regulations issued by the CEQ. A 1999 revision and update to the Administrative Order includes specific guidance regarding categorical exclusions, especially as they relate to endangered species, marine mammals, fisheries, and habitat restoration. The Administrative Order also expands on guidance for consideration of cumulative impacts and "tiering" in the environmental review of NOAA actions. This Administrative Order provides comprehensive and specific procedural guidance to NMFS and the Council for preparing and adopting FMPs.

Federal fishery management actions subject to NEPA requirements include the approval of FMPs, FMP amendments, and regulations implementing FMPs. Such approval requires preparation of a NEPA analysis. The purpose of an EA is to determine if the proposed action is a major federal action significantly affecting the environment and thereby requiring an EIS or whether the action does not significantly affect the environment, in which case a "finding of no significant impact" (FONSI) may be issued.

NEPA and the Magnuson-Stevens Act requirements for schedule, format, and public participation are compatible and allow one process to fulfill both obligations. The purpose of this EA is to predict whether the 2006-07 final harvest specifications will have significant impacts on the human environment. If the predicted impacts from the preferred alternatives are not significant, and those alternatives are chosen, then a FONSI will be issued and no further analysis is necessary to comply with the requirements of NEPA.

<u>Magnuson-Stevens Fishery Conservation and Management Act</u> In 1976, Congress passed into law what is currently known as the Magnuson-Stevens Act (16 U.S.C. 1801, *et seq*.). This law authorized the U.S. to manage its fishery resources in an area extending from a State's territorial sea (extending in general and in Alaska to 3 nm from shore) to 200 nm (4.8 to 320 km) off its coast (termed the EEZ). The management of these marine resources is vested in the Secretary and in regional Fishery Management Councils. In the Alaska region, the Council is responsible for preparing FMPs for marine fishery resources requiring conservation and management. NMFS is charged with carrying out the federal mandates with regard to marine fish. The NMFS Alaska Regional Office and Alaska Fisheries Science Center (AFSC) research, draft, and review the management actions recommended by the Council.

The Magnuson-Stevens Act established the required and discretionary provisions of an FMP and created ten national standards to ensure that any FMP or FMP amendment is consistent with the Magnuson-Stevens Act. Each FMP contains a suite of additional management tools that together characterize the fishery management regime. These management tools are either a framework type measure, thereby allowing for annual or periodic adjustment using a streamlined notice process, or are conventional measures that are fixed in the FMP and its implementing regulations and require a formal plan or regulatory amendment to change.

The Sustainable Fisheries Act (SFA) (Pub. L. 104-297), enacted by Congress on October 11, 1996, reauthorized and made significant amendments to the Magnuson Fishery Conservation and Management Act of 1976 (renamed the Magnuson-Stevens Fishery Conservation and Management Act). While the original focus of the Magnuson-Stevens Act was to Americanize the fisheries off the coasts of the U.S., the SFA included provisions aimed at the development of sustainable fishing practices in order to guarantee a continued abundance of fish and continued opportunities for the U.S. fishing industry. The SFA included provisions to prevent overfishing, ensure the rebuilding of overfished stocks, minimize bycatch, and address impacts on fish habitat. The SFA also placed a four-year moratorium (until October 1, 2000) on the implementation of new individual fisherman's quota (IFQ) programs and commissioned a comprehensive study of IFQ programs by the National Academy of Sciences (NAS). The Consolidated Appropriations Act of 2001 (Pub. L. 106-554) extended the moratorium on new IFQ programs until October 1, 2002. Finally, the SFA codified the Alaskan community development quota (CDQ) program already adopted by the Council, but also commissioned a NAS study of the CDQ program.

The SFA emphasizes the need to protect fish habitat. Under the law, regional Fishery Management Councils prepared amendments identifying essential fish habitat (EFH) as areas necessary to manage fish species for their basic life functions. The EFH provisions of the Magnuson-Stevens Act require NMFS to provide recommendations to federal and state agencies for conserving and enhancing EFH, for any actions that may adversely impact EFH.

The action under examination in this EA is the proposed groundfish harvest specifications for 2006 and 2007. In line with NMFS policy of blending EFH assessments into existing environmental reviews, NMFS intends the NEPA analysis contained in this EA to double as an EFH assessment. An EFH consultation will be carried out with the NMFS Alaska Region's Habitat Division before the publication of the specifications final rule.

Endangered Species Act The ESA of 1973 as amended (16 U.S.C. 1531, *et seq*), provides for the conservation of endangered and threatened species of fish, wildlife, and plants. The program is administered jointly by NMFS and the U.S. Fish and Wildlife Service (USFWS). With some exceptions, NMFS oversees marine mammal species, marine and anadromous fish species, and marine plant species. USFWS oversees walrus, sea otter, seabird species, and terrestrial and freshwater wildlife and plant species.

The listing of a species as threatened or endangered is based on the biological health of that species. Threatened species are those likely to become endangered in the foreseeable future (16 U.S.C. § 1532[20]). Endangered species are those in danger of becoming extinct throughout all or a significant portion of their range (16 U.S.C. § 1532[20]). Species can be listed as endangered without first being listed as threatened.

In addition to listing species under the ESA, the critical habitat of a newly listed species must be designated concurrent with its listing to the "maximum extent prudent and determinable" (16 U.S.C. § 1533[b][1][A]). The ESA defines critical habitat as those specific areas that are essential to the conservation of a listed species and that may be in need of special consideration. Federal agencies are prohibited from undertaking actions that destroy or adversely modify designated critical habitat. Some species, primarily the cetaceans (whales), which were listed in 1969 under the Endangered Species Conservation Act and carried forward as endangered under the ESA, have not received critical habitat designations.

Federal agencies have an affirmative mandate to conserve listed species (Rohlf 1989). One assurance of this is that federal actions, activities or authorizations (hereafter referred to as federal action) must be in compliance with the provisions of the ESA. Section 7 of the ESA provides a mechanism for consultation by the federal action agency with the appropriate expert agency (NMFS or USFWS). Informal consultations, resulting in letters of concurrence, are conducted for federal actions that have no adverse affects on the listed species. The action agency can prepare a biological assessment to determine if the proposed action would adversely affect listed species or modify critical habitat. The biological assessment contains an analysis based on biological studies of the likely effects of the action on the species or habitat.

Formal consultations, resulting in biological opinions, are conducted for federal actions that may have an adverse affect on the listed species. Through the biological opinion, a determination is made about whether the proposed action poses "jeopardy" or "no jeopardy" of extinction to the listed species. If the determination is that the action proposed (or ongoing) will cause jeopardy, reasonable and prudent alternatives may be suggested which, if implemented, would modify the action to no longer pose the jeopardy of extinction to the listed species. These reasonable and prudent alternatives must be incorporated into the federal action if it is to proceed. A biological opinion with the conclusion of no jeopardy may contain a series of management measures intended to further reduce the negative impacts to the listed species. These management alternatives are advisory to the action agency (50 CFR 402.24[j]). If a likelihood exists of any taking[1] occurring during promulgation of the action, an incidental take statement may be appended to a biological opinion to provide for the amount of take that is expected to occur from normal promulgation of the action. An incidental take statement is not the equivalent of a permit to take.

This EA contains an analysis of the impacts of the proposed specifications on ESA listed marine mammals and seabirds (in Sections 4.6 and 4.7). An informal Section 7 ESA consultation will be carried out with the NMFS Alaska Region's Protected Resources Division and USFWS before the publication of the specifications final rule.

Marine Mammal Protection Act The Marine Mammal Protection Act (MMPA) of 1972 (16 U.S.C. 1361, *et seq.*), as amended, establishes a federal responsibility to conserve marine mammals with management responsibility for cetaceans and pinnipeds (seals) other than walrus vested with the U.S. Department of Commerce, NMFS. The Department of Interior, USFWS, is responsible for all other marine mammals in Alaska including sea otter, walrus, and polar bear. Congress found that certain species and population stocks of marine mammals are or may be in danger of extinction or depletion due to human activities. Congress also declared that marine mammals are resources of great international significance, and should be protected and encouraged to develop to the greatest extent feasible commensurate with sound policies of resource management.

The primary management objective of the MMPA is to maintain the health and stability of the marine ecosystem, with a goal of obtaining an optimum sustainable population of marine mammals within the carrying capacity of the habitat. The MMPA is intended to work in concert with the provisions of the ESA. The Secretary is required to give full consideration to all factors regarding regulations applicable to the "take" of marine mammals, including the conservation, development, and utilization of fishery resources, and the economic and technological feasibility of implementing the regulations. If a fishery affects a marine mammal population, then the potential impacts of the fishery must be analyzed in the appropriate EA or EIS, and the Council or NMFS may be requested to consider regulations to mitigate adverse impacts.

Administrative Procedure Act The Administrative Procedure Act (APA) (5 U.S.C. 553) requires federal agencies to give the public prior notice of rule making and an opportunity to comment on proposed rules. General notice of proposed rule making must be published in the *Federal Register*, unless persons subject to the rule have actual notice of the rule. Proposed rules published in the *Federal Register* must include reference to the legal authority under which the rule is proposed and explain the nature of the proposal including what action is proposed, why it is being proposed, what is its intended effect, and any relevant regulatory history that provides the public with a well-informed basis for understanding and commenting on the proposal. The APA does not specify how much time the public must be given for prior notice and opportunity to comment; however, Section 304 (b) of the Magnuson-Stevens Act provides that proposed regulations that implement an FMP or FMP amendment, or that modify existing regulations are to have a public comment period of 15 to 60 days.

Except for the emergency or interim rule provisions, a proposed rule is designed to give interested or affected persons the opportunity to submit written data, views or arguments for or against the proposed action. After the end of a comment period, the APA requires comments received to be summarized and responded to in the final rule notice. Further, the APA requires the effective date

[1] The term "take" under the ESA means "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct" (16 U.S.C. § 1538[a][1][B]).

of a final rule to be no less than 30 days after publication of the final notice in the Federal Register. This delayed effectiveness, or “cooling off” period, is intended to allow the affected public to become aware of, and prepared to comply with the requirements of the rule. The 30-day delayed effectiveness period can be waived for a final rule only if it relieves a restriction, merely interprets an existing rule, or provides a statement of policy, or it must be made effective earlier than 30 days after publication for good cause. For fishery management regulations, the primary effect of the APA, in combination with the Magnuson-Stevens Act, NEPA, and other statutes, is to provide for public participation and input into the development of FMPs, FMP amendments, and regulations implementing FMPs. Section 1.6 of this EA describes the opportunities available for public comment during the process of adopting groundfish harvest specifications.

Regulatory Flexibility Act The Regulatory Flexibility Act (RFA) (5 U.S.C. 601, *et* seq.) of 1980, as amended by the Small Business Regulatory Enforcement Fairness Act of 1996, requires Federal agencies to consider the impact of their regulatory proposals on directly regulated small entities, analyze alternatives that minimize small entity impacts, and make their analyses available for public comment. The RFA applies to a wide range of small entities, including small businesses, not-for-profit organizations, and small governmental jurisdictions.

The RFA applies to any regulatory actions for which prior notice and comment is required under the APA. Hence, emergency or interim rules that waive notice and comment are not required to have regulatory flexibility analyses. After an agency begins regulatory development and determines that the RFA applies, it must decide whether to conduct a full regulatory flexibility analysis or to certify that the proposed rule will not “have a significant economic impact on a substantial number of small entities.”

Unless an agency can certify that an action will not have a significant impact on a substantial number of small entities, the agency must prepare an initial regulatory flexibility analysis (IRFA) for actions subject to the RFA. The requirements of an IRFA are specified at 603(b) of the RFA; an IRFA should include information on the number and description of small entities directly regulated by the action, the impacts of the action on small entities, and a description of significant alternatives to the action that minimize significant economic impacts on the entities while accomplishing the agency objectives. Chapter 6 of this EA contains the regulatory flexibility analysis prepared for the proposed action.

The SBA has established size criteria for all major industry sectors in the United States, including fish harvesting and fish processing businesses. A business involved in fish harvesting is a small business if it is independently owned and operated and not dominant in its field of operation (including its affiliates) and if it has combined annual receipts not in excess of $3.5 million for all its affiliated operations worldwide. A seafood processor is a small business if it is independently owned and operated, not dominant in its field of operation, and employs 500 or fewer persons on a full-time, part-time, temporary, or other basis, at all its affiliated operations worldwide. A business involved in both the harvesting and processing of seafood products is a small business if it meets the $3.5 million criterion for fish harvesting operations. Finally, a wholesale business servicing the fishing industry is a small businesses if it employs 100 or fewer persons on a full-time, part-time, temporary, or other basis, at all its affiliated operations worldwide. Non-profit organizations and governmental jurisdictions with populations up to 50,000 persons are also considered small entities.

When promulgating a final rule, agencies must prepare a final regulatory flexibility analysis (FRFA) unless the agency finds that the final rule will not have a significant economic impact on a substantial number of small entities or the final rule is issued under the APA provision allowing for good cause to forego notice and comment rulemaking. Several elements of a FRFA are (a) a summary of significant issues raised in public comment on the IRFA and the agency's response to those comments, and (b) a description of the steps the agency has taken to minimize the significant economic impacts on small entities, including a statement of factual, policy, and legal reasons for selecting the alternative adopted in the final rule and why all other alternatives considered were rejected. Finally, the FRFA or a summary of it must be published in the *Federal Register* with the final rule. NMFS has published revised guidelines, dated August 16, 2000, for RFA analyses; they include criteria for determining if the action would have a significant impact on a substantial number of small entities. The NMFS guidelines can be found at http://www.nmfs.noaa.gov/sfa/prorules.html

Chapter 6 is an IRFA prepared to evaluate the adverse impacts of this action on directly regulated small entities, in compliance with the RFA.

Information Quality Act Section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Public Law 106-554) directed the OMB to issue government-wide policy and procedural guidance for ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by federal agencies. This bill is known as the Information Quality Act. The OMB's guidelines require all federal agencies to develop their own guidelines for ensuring and maximizing the quality, objectivity, utility, and integrity of information disseminated by the agency. NOAA published its guidelines in February 2002 (available online at http://www.commerce.gov).

1.6 Related NEPA Documents

The NEPA documents listed below have detailed information on the groundfish fisheries, and on the natural resources and the economic and social activities and communities affected by those fisheries. These documents contain valuable background for this action under consideration in this EA.

Groundfish PSEIS The implementation of the 2006-07 harvest specifications is a project level action within the fishery management programs under the groundfish FMPs. In September 2004, NMFS completed a Supplemental EIS that analyzed the impacts of the groundfish fisheries program on the human environment. The following provides background information on this Programmatic supplemental EIS (PSEIS) and the relationship between this EA/IRFA and the PSEIS.

The EISs for the GOA and BSAI Groundfish FMPs were prepared in 1978, and 1981, respectively. NEPA requires preparation of an EIS or SEIS when significant environmental changes have occurred. Significant changes have occurred in the GOA and BSAI groundfish fisheries, and the GOA and the BSAI environment since the original EISs for the GOA and BSAI FMPs were published approximately 25 years ago. These changes include (but are not limited to) the following: the fisheries have shifted from primarily foreign fisheries to completely domestic fisheries; the FMPs governing the fisheries have been amended numerous times; new information is available about the ecosystem; the science of fisheries management has progressed substantially; public opinion about the management of these fisheries has changed; and several bird and marine mammal species have been listed as threatened or endangered under the Endangered Species Act.

While EAs and several EISs have been prepared for BSAI and GOA FMP amendments over the ensuing years, none has comprehensively examined the groundfish FMPs at a programmatic level. In 1999, U.S. District Court Judge Thomas S. Zilly issued a ruling in *Greenpeace v. National Marine Fisheries Service*, 55 F.Supp.2d 1248 (W.D.Wash.1999) that a 1998 SEIS prepared for BSAI and GOA FMPs was legally inadequate and remanded the document to NMFS for additional analyses, directing NMFS to produce a "programmatic" SEIS. The document was completed in June 2004.

The Alaska Groundfish Fisheries PSEIS has multiple purposes. First, it serves as the central environmental document supporting the management of the BSAI and GOA groundfish fisheries. The historical and scientific information and analytical discussions contained therein are intended to provide a broad, comprehensive analysis of the general environmental consequences of fisheries management in the EEZ off Alaska. The document also provides agency decision-makers and the public with an analytical reference document necessary for making informed policy decisions in managing the groundfish fisheries and sets the stage for future management actions. In addition, it describes and analyzes current knowledge about the physical, biological, and human environment in order to assess impacts resulting from past and present fishery activities. The PSEIS is intended to bring both the decision-maker and the public up to date on the current state of the environment, while describing the potential environmental consequences of alternative policy approaches and their corresponding management regimes for management of the groundfish fisheries off Alaska. In doing so, it serves as the overarching analytical framework that will be used to define future management policy with a range of potential management actions.

A final programmatic SEIS (PSEIS) has been prepared to evaluate the fishery management policies embedded in the BSAI and GOA groundfish FMPs against policy level alternatives. NOAA Fisheries issued a Record of Decision on August 26, 2004, and with the simultaneous approval of Amendments 74 and 81 to the GOA and BSAI Groundfish FMPs, respectively, this decision implements a new management policy that is ecosystem-based and is more precautionary when faced with scientific uncertainty. The PSEIS carries out the public decision-making process prescribed by NEPA, and also serves as a primary environmental document for subsequent analyses of environmental impacts of the groundfish fisheries. For more information see the http://www.fakr.noaa.gov/sustainablefisheries/seis/default.htm website.

Chapter 3 of the PSEIS establishes an environmental baseline, a description of existing conditions that serves as the starting point for the document's analyses. That description of baseline environmental conditions was developed using the best available scientific information, which at the time that the PSEIS was drafted incorporated data up to 2002.

The PSEIS provides a recent, complete description of the environment that may be affected by groundfish fishing activities in the following sections:

Features of the physical environment, Section 3.3.
Threatened and endangered species, Section 3.4
Groundfish resources, Section 3.5,
Prohibited species, Section 3.5.2
Other species, Section 3.5.3
Habitat, Section 3.6.
Seabirds, Section 3.7
Marine mammals, Section 3.8.
Socioeconomic Conditions, Section 3.9

Ecosystem, Section 3.10.

Essential Fish Habitat (EFH) Environmental Impact Statement (EIS)   In 2005 NMFS and the Council completed the Environmental Impact Statement for Essential Fish Habitat Identification and Conservation in Alaska (EFH EIS, NMFS 2005). The EFH EIS provided a thorough analysis of alternatives and environmental consequences for amending the Council's FMPs to include EFH information pursuant to Section 303(a)(7) of the Magnuson-Stevens Act and 50 CFR 600.815(a). Specifically, the EFH EIS examined three actions: (1) describing and identifying EFH for Council managed fisheries, (2) adopting an approach to identify HAPCs within EFH, and (3) minimizing to the extent practicable the adverse effects of fishing on EFH. The Council's preferred alternatives from the EFH EIS were implemented through Amendments 73 and 73 to the BSAI and GOA FMPs, respectively, and corresponding amendments to the Council's other FMPs. The Final EIS, dated April 2005, may be found on the NMFS AKR web site at: http://www.fakr.noaa.gov/habitat/seis/efheis.htm .

Annual TAC-Specification EAs In addition to the TAC-setting EIS analysis, environmental assessments have been written to accompany most new year's TAC specifications since 1991. The 2005 and 2006 harvest specifications were analyzed in an EA and a FONSI determination was made prior to publication of the rule (NMFS 2005c). Harvest specification EAs back to 2000 may be found at the NMFS AKR web site: http://www.fakr.noaa.gov/analyses/list.htm#tac .

Steller Sea Lion Protection Measures SEIS   A supplemental environmental impact statement was completed in 2001 (NMFS 2001a) to evaluate fishery management measures for mitigating impacts on Steller sea lions. The purpose of that SEIS was to provide information on potential environmental impacts that could occur from implementing a suite of fisheries management measures such that the western population of Steller sea lions existence is not jeopardized nor its critical habitat adversely modified by the groundfish fisheries in the GOA and the BSAI. Fisheries management measures considered were designed to allow commercial groundfish fishing in the North Pacific while assuring that the fisheries would neither jeopardize the continued existence of both western and eastern Steller sea lion stocks, nor adversely affect their critical habitat. Alternative 4, the area and fishery specific approach, was selected in the Record of Decision. Revision of fishery management measures in accordance with that decision has been promulgated through proposed and final rulemakings in accordance with Magnuson-Stevens Act procedures. Many components of the harvest specifications incorporate these management measures, which are further discussed in Section 4.6 of this EA. The EIS may be found at the NMFS AKR web site: http://www.fakr.noaa.gov/sustainablefisheries/seis/sslpm/default.htm .

American Fisheries Act Amendments 61/61/13/8 EIS This EIS (NMFS 2002) was prepared to evaluate sweeping changes to the conservation and management program for the pollock fishery of the BSAI and to a lesser extent, the management programs for the other groundfish fisheries of the BSAI and GOA, the king and Tanner crab fisheries of the BSAI, and the scallop fishery off Alaska. Under the Magnuson Act, the Council prepared Amendments 61/61/13/8 to implement the provisions of the AFA in the groundfish, crab and scallop fisheries. Amendments 61/61/13/8 incorporated the relevant provisions of the AFA into the FMPs and established a comprehensive management program to implement the AFA. The EIS analysis provided an evaluation of the environmental and economic effects of the management program that was implemented under these Amendments, as well as developed scenarios of alternative management programs for comparative use. The harvest specifications include components of the AFA program. The EIS may be found at the NMFS AKR web site:
http://www.fakr.noaa.gov/sustainablefisheries/afa/final_eis/cover.pdf .

1.7 Public Participation in the Specifications Process

Public involvement may occur at a number of stages during harvest specifications development. Table 1.7-1 provides an overview of the decision-making process, and of the opportunities for public comment. The process is described in more detail in Section 3.1 of this EA. Public comments are welcomed and encouraged throughout the Council process.

In September of each year the GOA and BSAI plan teams meet to review new information and plan for the preparation of the SAFE documents. These are open public meetings, and notice is provided in the *Federal Register*. The public is given opportunities to comment on the discussions of the plan team members. The Plan Teams make preliminary OFL and ABC recommendations at this time.

At the October Council meeting, the Council's SSC reviews the OFL and ABC recommendations and the accompanying NEPA and RFA analyses. The public has an opportunity to submit comments at these meetings. The Council's Advisory Panel (AP) reviews the numbers, and makes preliminary recommendations about appropriate TACs to the Council. The public has an opportunity to submit comments. Finally, the Council reviews reports from the SSC and AP, and the NEPA and RFA analyses, and recommends its preferred OFL, ABC, and TAC specification alternatives. The public has an opportunity to submit comments to the Council, before it makes its decision.

The Secretary publishes the proposed specifications in the *Federal Register*. The public is given a minimum of 30 day period to submit comments, prior to publication of the final specifications.

In November, the GOA and BSAI Plan Teams meet again to review the new and updated SAFE documents that have been prepared by the Alaska Fishery Science Center (AFSC) scientists. As in September, these are open public meetings, with notice provided in the *Federal Register*. The public is given opportunities to comment on the discussions of the plan team members. The Plan Teams may revise their OFL and ABC recommendations at this time, if new information justifies this.

At the December Council meeting, the Council's SSC and AP review the SAFE analyses, the Plan Team OFL and ABC recommendations, and the accompanying NEPA and RFA analyses. The SSC will make OFL and ABC recommendations, and the AP will add TAC recommendations. The public has an opportunity to submit comments at these meetings. As in October, the Council reviews the reports from the SSC and AP, and the NEPA and RFA analyses, and recommends its preferred OFL, ABC, and TAC specification alternatives. The public has an opportunity to submit comments to the Council, before it makes its decision.

In late December, and January, following the December Council meeting, the harvest specifications rule and the accompanying analyses will be revised. Comments on information released prior to and during the December Council meeting may still be coming in. Those comments are given consideration in final edits of the analyses. Usually in late February or early March, the Secretary will publish final specifications for the current year, and the next year. The regulations are published 30 days before they are to become effective, unless good cause is found to waive this "cooling off" period, in which case the regulations become effective on the date of publication in the *Federal Register*. There is, however, limited opportunity for additional public comment during this period.

Table 1.7-1 Current Groundfish Harvest Specifications Setting Process

Time	**Activity**	**Opportunity for public involvement**	**Decision points**
January to August (of year prior to fishing year)	Plan and conduct stock assessment surveys	Casual (staff and public may interact directly with stock assessment authors)	Cruise Plans finalized. Scientific Research Permits issued. Finalize lists of groundfish biomass and prediction models to be run. Staff assignments and deadlines set
August-September	Preparation of proposed specifications recommendations. Groundfish Plan Teams meeting	Open Public Meetings. *Federal Register* Notice of Plan Team's meeting	Stock assessment teams fully scope out work necessary to complete SAFE reports, models to run, emerging ecosystem issues
September	Staff start drafting proposed harvest specifications notices and EA/IRFA based on current year's specifications or current report projections	None	Proposed specifications initially based on current year's specs. or projections.
October	October Council Meeting presentation of proposed specifications, highlights of differences seen in recent surveys and ecosystem from past years. Council recommends proposed specifications.	Open Public Meeting. *Federal Register* Notice of initial action on next year's harvest specifications as an agenda item	Council recommends proposed harvest specifications
November	NMFS reviews proposed specifications	None	NMFS publishes proposed specs
November	November Plan Team Meetings. Staff start drafting EA/IRFA for final specs. Finalize SAFE Reports. Initiation of informal Section 7 Consultation on final specs if needed	Open Public Meetings. *Federal Register* Notice of Plan Teams' Meetings	Plan Teams make their ABC recommendations. Determination of whether Section 7 Consultation is needed and if it has to be formal or informal
November- December	File proposed specification rules with *Federal Register.*	Written comments accepted for 30 days comment period for proposed rule. Comments welcome on EA/IRFA for proposed specs. Some specifications announced in the proposed rule **are not** the same as the final.	Comments are accepted and are responded to in preamble to the final rule
December	December Council Meeting. Release and present Draft EA/IRFA containing Final SAFE Reports, Ecosystem information, Economic SAFE report	Open Public Meeting *Federal Register* notice. Agenda includes next year's harvest specifications. Last meaningful opportunity for comments on the next year's quotas	Determine next year's TAC and PSC quotas.
Late December-January	NMFS staff draft final harvest specifications rule. Harvest specifications EA/FRFA finalized	Comments related to information released prior to and during December Council meeting may still be trickling in. Those comments are given	ESA Section 7 and EFH consultation concluded on final specifications. FONSI may be determined by or an EIS prepared.

Time	Activity	Opportunity for public involvement	Decision points
		consideration in final edits of the EA/FRFA. No public comment period for EA/FRFA	
February of **subject fishing year**	Submit final rule to Secretary for filing with Office of Federal Register	None	Secretarial determination whether to approve Council recommendation.
February or March of **subject fishing year**	*Federal Register* publication of Final Rule	None. Administrative Procedure Act sets up 30 day cooling off period that may be waived for good cause.	Final harvest specifications replace current specifications on date of effectiveness.

(This page is blank)

2.0 Description of Alternatives

What's in this chapter:

The five alternatives considered in the EA	Section 2.1
Comparison of BSAI TACs for all alternatives	Section 2.2
Comparison of GOA TACs for all alternatives	Section 2.3
Comparison of OFLs, ABCs and TACs in preferred 2006-07 specifications alternative to those in 2005	Section 2.4
Comparison of TACs for all alternatives with the 2005 baseline (a graphic analysis)	Sectin 2.5
How the projections were made	See the text in Sections 2.2 and 2.3, and in Appendix E.

2.1 Introduction

Harvest specifications are management measures used to control groundfish fishing. Overfishing levels (OFLs) and acceptable biological catches (ABCs) are published with the harvest specifications and provide guidance to the Council and NMFS on the development of total allowable catches. OFL and ABC values reflect fishery science, applied in light of the requirements of the FMPs, and are not policy choices in the specifications process. The GOA and BSAI FMP definitions of OFL and ABC are summarized at the start of Chapter 1 in this EA.

Harvests are controlled by the enforcement of total allowable catch (TAC) limits, and prohibited species catch (PSC) limits, apportionments of those limits among seasons and areas, and allocations of the limits among fishing fleets. The GOA and BSAI FMP definitions of TAC are summarized at the start of Chapter 1 of this EA. TAC seasonal apportionments and allocations are specified by regulations at 50 *CFR* part 679.

Prohibited species include halibut, herring, salmon and steelhead, king crab, and Tanner crab.[2] A target fishery that has caught the seasonal or annual PSC limit appropriate to an area, is closed in that area for the remainder of the season or year. PSC limits are specified in the FMP or regulations. The Council has discretion to apportion PSC among seasons, or allocate among fleets, in the specifications process. However these decisions are driven primarily by the amounts of groundfish TAC allocated to different fishing sectors. For instance, the Council will recommend allocating enough halibut PSC to the Pacific cod hook-and-line sector to avoid unnecessarily burdening the fishery, and increasing the risk that it will not fully harvest its Pacific cod TAC allocation if the fishery is closed because it reached its halibut PSC limit. The impacts of the specifications on PSC species are discussed in Section 4.5 of the EA.

Because target fishing mortality, and other environmental impacts, are driven by the available TAC amounts, and because the Council must decide on the TAC amounts to recommend to NMFS, the alternatives in this analysis are based on a range of TACs. Each of the five

[2] Prohibited species are discussed in both the BSAI and GOA FMPs, in Section 3.6.

specifications alternatives represents alternative amounts of TAC that could be set for managed species and species groups for the fishing years 2006 and 2007. The alternatives have been selected to display a wide range of TACs, and their impacts on the environment. TAC specifications are harvest quotas that include both retained catch and discarded catch.

This is the range of alternatives NMFS has determined would best accomplish the proposed action's purpose and need. These alternatives have been used in the specifications process for many years. They span a wide range of potential harvest scenarios from no fishing (under Alternative 5), to fishing at the upper range of the acceptable biological catch levels associated with the Council's overfishing criteria, themselves based on NOAA guidance under National Standard 1, (Alternative 1). Fishing levels contemplated under Alternative 1 would actually exceed statutory optimum yield levels in the BSAI. Nevertheless, the alternative has been included to show what would happen at high levels of fishing mortality; an alternative need not be permissible under current statutes to be considered in an EA. Because these alternatives have been used for several years, and because they provide for analysis of a "reasonable" range of potential fishing levels, there are no alternatives considered and eliminated from further study. The five alternatives are:

Alternative 1: **Set TACs to produce fishing mortality rates[3], *F*, that are equal to *maxF*$_{ABC}$.** This is equivalent to setting TACs to produce harvest levels equal to the maximum permissible ABCs. "*maxF*$_{ABC}$" refers to the maximum permissible value of F_{ABC} under Amendment 56 to the groundfish fishery management plans (FMPs). Historically, TAC has been set at or below ABC, so this alternative provides a likely upper limit for setting TAC within the limits of ABC.

Alternative 2: **Set TACs that fall within the range of ABCs recommended by the Plan Teams and TACs recommended by the Council. (Preferred alternative)**. Under this scenario, F is set equal to a constant fraction of *maxF*$_{ABC}$. The recommended fractions of *maxF*$_{ABC}$ may vary among species or stocks, based on other considerations unique to each.

Alternative 3: **For Tiers 1, 2, and 3, set TAC to produce *F* equal to 50% of *maxF*$_{ABC}$. For Tiers 4, 5, and 6, set TAC equal to 50% of TAC associated with *maxF*$_{ABC}$.** This is equivalent to: for stocks with a high level of scientific information, set TACs to produce harvest levels equal to 50 percent of the maximum permissible ABCs. For stocks with insufficient scientific information, set TACs equal to 50 percent of TACs associated with the maximum ABCs. This alternative provides a likely lower bound on F_{ABC} that still allows future harvest rates to be adjusted downward should stocks fall below reference levels.

Alternative 4: **For Tiers 1, 2, and 3, set TAC to produce *F* equal to the most recent five year average actual *F*. For Tiers 4, 5, and 6, set TAC equal to the most recent five year average actual catch.** This is equivalent to: For stocks with a high level of scientific information, set TACs to produce harvest levels equal to the most recent five year average actual fishing mortality rates. For stocks with insufficient scientific information, set TACs equal to the most recent five year average actual catch. This alternative recognizes that for some stocks, TAC may

[3] "F" stands for the fishing mortality for a stock (a ratio between fishing mortality and biomass size). Fishing mortality includes both retained and discarded catch mortality.

be set well below ABC, and recent average *F* may provide a better indicator of F_{TAC} than F_{ABC} does.

Alternative 5: **Set TAC equal to zero**. This alternative recognizes that, in extreme cases, TAC may be set at a very low level, perhaps zero. This is the no action alternative, but does not reflect the *'status quo'* or baseline.

Except for Alternative 5, the alternatives analyzed in this EA/FRFA are within the scope of the Preferred Alternative in the PSEIS. See Table 4.2-2 in the PSEIS for the Preferred Alternative bookends. This action is the TAC setting process within the FMP framework. The alternatives are based on setting TAC at various levels. The bookends for the action of setting TAC under the Preferred Alternative in the PSEIS are, (1) setting the sum of the TACs to be within optimum yield range, and (2) setting TAC less than or equal to ABC for all target and other species categories. Alternatives 2, 3, and 4 would establish TAC within the optimum yield range, and therefore, meet the first bookend described. Alternative 1 would set TAC at the ABC level, meeting the upper threshold defined by the second bookend of the PSEIS Preferred Alternative. Alternative 5 would set TAC at zero for target species and is considered the no action alternative, as required by NEPA for environmental analysis.

2.2 BSAI Alternatives

Table 2.2-1 shows the 2006 BSAI TACs associated with each of the five alternatives, and Table 2.2-2 shows the TACs for 2007. Table 2.4-1 in Section 2.4 shows the OFL and ABC projections for 2006 and 2007, along with the TAC projections for the preferred alternative (Alternative 2). Table 2.4-1 provides, for comparison, OFL, ABC, TAC, and estimated catches, for 2005 as well.

OFL, ABC and TAC projections for species with relative good information[4]

The OFL, ABC, and TAC projections for Tier 1 to 3 species for 2006 and 2007 were made using species-specific Alaska Fisheries Science Center (AFSC) population models.[5] These models incorporate the best available scientific information on species age structure, reproduction rates, growth rates, and natural mortality rates. Given this information, and information on the size and age composition of the biomass at the start of the year, and on fishery induced mortality during the year, these models can be used to project the species biomass and age composition at the start of the next year.[6]

[4] These Tiers 1 to 3 species include Pollock, Pacific cod, sablefish, yellowfin sole, Greenland turbot, arrowtooth flounder, rock sole, flathead sole, Alaska plaice, Pacific Ocean perch, northern rockfish, and Atka mackerel.

[5] Overfishing criteria for species, summarized in species OFL and ABC estimates, vary depending on the amount of biological information available on that species. Species are assigned to one of six "Tiers," depending on the amount of information available. Tier 1 status requires the most available information, Tier 6 status the least. Each Tier uses a different set of rules to determine OFL and ABC. BSAI FMP, Section 3.2.4.

[6] The AFSC uses single species stock models to make these projections. These models do not fully account for ecological interactions among different target species. AFSC is actively working to develop multi-species models that take account of ecological interactions among species.

The following discussion explains how the AFSC population models were used to project OFLs, ABCs, and TACs for species in 2006 and 2007. These models are available for, and used to make projections for, the Tier 1 to 3 species about which biological information is best.[7] Alternative methods were used for species in Tiers 4 to 6, for which less biological information is known. These methods are described later in this section.

Mortality estimates for the calendar year 2005 were prepared in May 2005. These estimates took account of the 2005 TACs, the harvest up to April 12, and average harvests from April 12 to the end of the year in previous years. The details of the procedures used to make these fishing mortality projections are described in Appendix E to this EA.

The mortality estimates for 2005 were used in the population models to project the biomass and its age structure for the start of 2006. OFL and ABC projections are based on harvest rate schedules described in the overfishing criteria in the groundfish FMPs (Section 3.2.4 in each of the FMPs). Once biomass for 2006 is known, the OFLs and ABCs that would produce those rates in 2006 can be calculated.

The TACs and fishing rates for Alternatives 1, 3, 4, and 5 are tightly constrained by the alternatives. Once the biomass is known, and the ABC calculations are available, it is possible to prepare 2006 TAC estimates for Alternatives 1 ($maxF_{ABC}$) and 2 (1/2 $maxF_{ABC}$). The target fishing rate for Alternative 4 is the most recent five year average F rate. The TAC for this alternative is the harvest that would generate that rate, given the 2006 biomass. The TAC for Alternative 5 is set to zero.

Alternative 2 is the Council's preferred alternative. In December 2004 the Council recommended TAC levels for 2006 as well as for 2005. These recommendations were adopted into specifications by the Secretary of Commerce (70 *FR* 8958, 70 *FR* 8679). The TACs for Alternative 2 were those recommended by the Council for 2006.

The fishing mortality for 2006 is assumed to equal the 2006 TACs as calculated above for each alternative. These mortality estimates can be used to prepare biomass estimates for 2007, and once the 2007 biomass is known, the overfishing criteria from the FMPs, and target fishing mortality rates from the alternatives, can be used to calculate the OFLs, ABCs, and TACs for these alternatives. For Alternatives 1, 3, 4, and 5, these are calculated in the same way as the 2006 OFLs, ABCs, and TACs.

The 2007 TACs for Alternative 2 were estimated by drawing on past Council practice, and were influenced by a decrease in the 2007 Eastern Bering Sea (EBS) pollock ABC. In order to keep the sum of the BSAI TACs equal to the two million mt optimum yield (OY), it was necessary to offset the decrease in Pollock ABC (and TAC) with an increase in the TACs for other species. The ABCs for both 2006 and 2007 may be found in Table 2.4-1, in the last section of this chapter.

The ABC for EBS pollock decreased by 413,600 mt from 2006 to 2007 (dropping from 1,636,800 mt in 2006 to 1,223,200 mt in 2007. The 2006 EBS pollock TAC is 1,487,756 mt which is almost 264,556 mt higher than the 2007 ABC. Since the EBS pollock ABC has decreased to such a degree in 2007, the 2007 TAC for EBS pollock is set equal to the 2007 ABC.

This decrease in the EBS pollock TAC allows for most of the remaining 2007 BSAI TACs to be set at their respective ABCs and the sum of the total TACs to remain under the OY of 2 million

[7] These are almost all "Tier 3" species.

mt. Only three TACs were set lower than their ABCs. The Aleutian Islands pollock TAC was set at 19,000 mt because that is the maximum amount allowed by regulations at 50 CFR 679.20(a)(5)(iii)(B)(1). The Bogoslof pollock TAC was set at 10 mt because that area is closed to directed fishing for pollock. The Alaska plaice is set at 58,131 mt so the total BSAI TAC are under 2 million mt. This 2007 TAC for Alaska plaice is almost 50,000 mt higher than in previous years.

OFLs, ABCs, and TACs for species about which less is known[8]

There are species about which too little is known to allow the use of projections based on the population models, as described above. These are the species falling into Tiers 4, 5 and 6. In these instances, the 2006 OFLs, ABCs, and TACs for Alternatives 1, 2, 3, and 5 were those adopted by the Council for 2006 when it met in December 2004. The 2007 OFLs, ABCs, and TACs were set equal to these 2006 values.

September 2005 Plan Team review

In September 2005 the BSAI Plan Team reviewed a preliminary set of simulation results, and recommended adoption of the projected OFLs and ABCs for the 2006/2007 seasons. The results reported below have been modified to address inconsistencies identified by the plan team.

[8] These Tiers 4 to 6 species include the other flatfish complex, shortraker, rougheye, the other rockfish complex, squid, and the other species complex.

Table 2.2-1 2006 BSAI TACs for Alternatives 1 through 5 (in metric tons)

Species	Area	Alt 1.	Alt 2.	Alt 3.	Alt 4.	Alt 5.
Pollock	EBS	1,636,800	1,487,756	894,200	1,211,500	0
	Aleutian Islands	19,000	19,000	19,000	1,210	0
	Bogoslof District	29,700	10	14,850	27	0
Pacific cod	BSAI	214,300	195,000	112,600	169,800	0
Sablefish	BS	2,500	2,310	1,300	2,000	0
	AI	2,800	2,480	1,400	2,100	0
Yellowfin sole	BSAI	117,700	90,000	60,400	37,500	0
Greenland turbot	Total	14,700	3,500	7,800	3,700	0
	BS	10,500	2,500	5,571	2,643	0
	AI	4,200	1,000	2,229	1,057	0
Arrowtooth flounder	BSAI	104,200	12,000	55,000	8,300	0
Rock sole	BSAI	121,700	42,000	62,900	23,100	0
Flathead sole	BSAI	54,900	20,000	28,600	10,000	0
Alaska plaice	BSAI	183,400	10,000	105,400	10,700	0
Other flatfish	BSAI	21,391	3,000	10,696	6,662	0
Pacific Ocean perch	BSAI	14,900	12,600	7,500	11,900	0
	BS	1,656	1,400	833	1,322	0
	AI total	13,245	11,200	6,667	10,578	0
	WAI	6,016	5,085	3,028	4,804	0
	CAI	3,589	3,035	1,807	2,866	0
	EAI	3,640	3,080	1,832	2,907	0
Northern rockfish	BSAI	8,200	5,000	4,200	5,200	0
Shortraker	BSAI	596	596	298	708	0
Rougheye	BSAI	223	223	112		0
Other rockfish	BSAI	1,400	1,050	700	818	0
	BS	810	460	405	316	0
	AI	590	590	295	502	0
Atka mackerel	AI	107,000	63,000	58,800	65,000	0
	Area 543	33,968	20,000	18,667	20,635	0
	Area 542	60,294	35,500	33,133	36,627	0
	Area 541	12,738	7,500	7,000	7,738	0
Squid	BSAI	1,970	1,275	985	1,038	0
Other species	BSAI	68,810	29,200	34,405	27,855	0
Total	BSAI	2,726,190	2,000,000	1,481,146	1,599,118	0
Notes: Alternative 5 is the no action alternative; AI pollock TAC equals 19,000 mt so long as ABC is greater than 19,000 mt.						

Table 2.2-2 2007 BSAI TACs for Alternatives 1 through 5 (in metric tons)

Species	Area	Alt 1.	Alt 2.	Alt 3.	Alt 4.	Alt 5.
Pollock	EBS	1,160,200	1,223,200	805,500	1,036,100	0
	Aleutian Islands	19,000	19,000	19,000	1,200	0
	Bogoslof District	29,700	10	14,850	27	0
Pacific cod	BSAI	182,600	172,200	116,300	161,600	0
Sablefish	BS	2,400	2,400	1,300	1,920	0
	AI	2,500	2,500	1,400	2,080	0
Yellowfin sole	BSAI	106,900	109,600	57,700	36,500	0
Greenland turbot	Total	9,500	10,500	6,300	3,500	0
	BS	6,786	7,500	4,500	2,500	0
	AI	2,714	3,000	1,800	1,000	0
Arrowtooth flounder	BSAI	83,900	38,200	49,400	8,200	0
Rock sole	BSAI	106,600	116,100	58,600	22,400	0
Flathead sole	BSAI	45,500	50,600	25,700	9,500	0
Alaska plaice	BSAI	107,200	58,131	79,200	10,400	0
Other flatfish	BSAI	21,391	21,400	10,696	6,662	0
Pacific Ocean perch	BSAI	14,900	15,100	7,900	12,000	0
	BS	1,656	1,678	878	1,333	0
	AI total	13,245	13,422	7,022	10,667	0
	WAI	6,016	6,096	3,189	4,845	0
	CAI	3,589	3,637	1,903	2,890	0
	EAI	3,640	3,689	1,930	2,932	0
Northern rockfish	BSAI	8,000	8,200	4,100	5,100	0
Shortraker	BSAI	596	596	298	708	0
Rougheye	BSAI	223	223	112		0
Other rockfish	BSAI	1,400	1,400	700	818	0
	BS	810	810	405	316	0
	AI	590	590	295	502	0
Atka mackerel	AI	74,100	90,800	50,400	54,600	0
	Area 543	23,524	28,825	1,600	1,733	0
	Area 542	41,755	51,165	28,400	30,767	0
	Area 541	8,821	10,810	6,000	6,500	0
Squid	BSAI	1,970	1,970	985	1,038	0
Other species	BSAI	68,810	57,870	34,405	27,855	0
Total	BSAI	2,047,290	2,000,000	1,344,846	1,402,108	0

Notes: Alternative 5 is the no action alternative; AI pollock TAC equals 19,000 mt so long as AI pollock ABC is greater than or equal to 19,000 mt.

2.3 GOA TAC Alternatives

Table 2.3-1 shows the 2006 GOA TACs associated with each of the five alternatives, and Table 2.3-2 shows the TACs for 2007. Table 2.4-2 in Section 2.4 shows the OFL and ABC projections for 2006 and 2007, along with the TAC projections for the preferred alternative (Alternative 2). Table 2.4-2 provides, for comparison, OFL, ABC, TAC, and estimated catches, for 2005 as well.

The procedures used to project 2006 and 2007 OFLs, ABCs and TACs were similar to those used for the BSAI. AFSC population models were used for stocks in Tiers 1 to 3; for other stocks, the 2006 OFLs, ABCs, and TACs adopted by the Council in December 2004 were rolled over.

OFL, ABC and TAC projections for species with relative good information[9]

Tier 1 through 3 modeling followed the BSAI process. Fishing mortalities for 2005 were projected in April 2005. These were used in the population models to prepare OFL and ABC estimates for 2006. For Alternatives 1, 3, 4, and 5, TACs were set equal to ABCs. Under Alternative 2, the TACs that the Council would be likely to set were approximated. The 2006 TACs were estimated for each species, by following the ABC-TAC patterns adopted by the Council in past years.[10] If the Council had set TAC equal to ABC, it was set equal to ABC here; if the Council had set TAC less than ABC by some average proportion in recent years, it was set lower by that proportion here. These TACs were used as 2006 mortality estimates, and the population models were rerun to project 2007 OFLs and ABCs. The 2007 TACs were then projected using the same rules as those used in 2006.[11]

For all species the apportionments of the GOA TAC to the different management areas in the GOA based on the most recent estimates of biomass distribution found in the November 2004 SAFE reports.

OFLs, ABCs, and TACs for species about which less is known[12]

[9] These Tiers 1 to 3 species included Pollock, Pacific cod, arrowtooth flounder, flathead sole, sablefish, Pacific Ocean perch, and northern rockfish.

[10] For Pollock, sablefish, Pacific Ocean perch, and northern rocksish, TACs were set equal to ABC. For Pacific cod, TAC was set equal to ABC, minus an allowance for a State of Alaska GHL, calculated as described in the next footnote. For arrowtooth and flathead sole I've changed the Alt 2 amounts to reflect that the Council usually sets TAC at levels well below the ABC in the GOA except that the Council usually sets the TACs for flathead sole in the WYK and SEO Districts at ABC levels.

[11] Note that the AFSC population model did not model the Pollock population in the Southeast Outside (SEO) district of the Eastern GOA. For the SEO district, the 2005 TAC was rolled over. For Pacific cod the council usually sets TAC at a level equal to ABC minus the State's GHLs. The State has raised the GHL in the Central GOA from 24.25% to 25% of the ABC for that area, and this change is reflected in Alt 2. It is assumed that the entire amounts of the GHLs plus the TACs will be harvested in 2006 except in the Eastern GOA. Note that, for modeling purposes, fishing mortality was assumed equal to the TAC plus the GHL.

[12] These Tiers 4 to 6 species include the deep water flatfish complex, rex sole, the shallow water flatfish complex, the other slope rockfish complex, shortraker, rougheye, the pelagic shelf rockfish complex, the demersal shelf rockfish complex, thornyhead rockfish, Atka mackerel, big skates, longnose skates, the other skates complex, and the other species complex.

For stocks in tiers 4 and below the TAC alternatives are the same as those in the final EA for the 2005-06 specifications (NMFS 2005b).

September 2005 Plan Team review

In September 2005 the GOA Plan Team reviewed a preliminary set of simulation results, and recommended adoption of the projected OFLs and ABCs for the 2006/2007 seasons. The results reported below have been modified to address inconsistencies identified by the plan team.

Table 2.3-1 2006 GOA TACs for Alternatives 1 through 5 (in metric tons)

Species	Area	Alt 1.	Alt 2.	Alt 3.	Alt 4.	Alt 5.
Pollock	610	41,266	35,202	21,649	29,693	0
	620	46,732	39,865	24,517	32,395	0
	630	25,411	21,678	13,332	17,624	0
	640	2,291	1,955	1,202	1,588	0
	Subtotal	115,700	98,700	60,700	81,300	0
	650	6,520	6,520	3,510	4	0
	Total	122,220	105,220	64,210	81,304	0
Pacific cod	W	25,246	19,952	13,362	18,188	0
	C	39,973	31,590	21,155	28,797	0
	E	4,881	3,858	2,583	3,517	0
	Total	70,100	55,400	37,100	50,500	0
Sablefish	W	2,371	2,371	1,211	1,930	0
	C	6,768	6,768	3,457	5,508	0
	WYK	2,409	2,409	1,230	1,960	0
	SEO	3,333	3,333	1,702	2,712	0
	Total	14,880	14,880	7,600	12,110	0
Flatfish (deep water)	W	330	330	104	29	0
	C	3,340	3,340	1,628	447	0
	WYK	2,120	2,120	1,044	287	0
	EYAK/SEO	1,030	1,030	504	138	0
	Total	6,820	6,820	3,279	901	0
Rex sole	W	1,680	1,680	840	406	0
	C	7,340	7,340	3,670	1,772	0
	WYK	1,340	1,340	670	324	0
	EYAK/SEO	2,290	2,290	1,145	553	0
	Total	12,650	12,650	6,325	3,055	0
Flatfish (shallow)	W	21,580	4,500	10,790	2,192	0
	C	27,250	13,000	13,625	2,768	0
	WYK	2,030	2,030	1,015	207	0
	EYAK/SEO	1,210	1,210	605	103	0
	Total	52,070	20,740	26,035	5,270	0
Flathead sole	W	12,314	2,000	6,685	1,680	0
	C	31,616	5,000	17,163	4,314	0
	WYK	3,149	3149	1,710	430	0
	EYAK/SEO	408	408	223	56	0
	Total	47,487	10,557	25,780	6480	0
Arrowtooth flounder	W	25,835	8,000	13,261	2,034	0
	C	166,291	25,000	85,354	13,092	0
	WYK	11,601	2,500	5,955	913	0
	EYAK/SEO	9,754	2,500	5,007	768	0
	Total	213,140	38,000	109,420	16,780	0
Other slope rockfish	W	40	40	21	9	0
	C	300	300	156	68	0
	WYAK	130	130	66	29	0
	EYAK/SEO	3,430	200	1,764	769	0
	Total	3,900	670	2,007	875	0
Northern rockfish	W	755	751	381	369	0
	C	3,978	3,978	2,019	1,951	0
	E	0	0	0	0	0
	Total	4,730	4,730	2,400	2,320	0
Pacific ocean perch	W	2525	2525	1,290	2,040	0
	C	8,375	8,375	4,278	6,767	0
	WYK	813	813	415	657	0
	SEO	1,579	1,579	807	1,276	0
	E (subtotal)	2932	2932	1,222	1,933	0
	Total	13,292	13,292	6,790	10,740	0
Shortraker	W	143	155	83	143	0
	C	375	324	216	389	0
	E	235	274	135	244	0
	Total	753	753	434	781	0
Rougheye	W	191	188	110	198	0

Species	Area	Alt 1.	Alt 2.	Alt 3.	Alt 4.	Alt 5.
	C	501	557	289	520	0
	E	315	262	181	326	0
	Total	1,007	1,007	580	1,044	0
Pelagic shelf rockfish	W	366	366	183	295	0
	C	2,973	2,973	1,488	2,400	0
	WYAK	205	205	102	165	0
	EYAK/SEO	871	871	435	702	0
	Total	4,415	4,415	2,208	3,562	0
Demersal rockfish	SEO	514	410	257	410	0
Thornyhead rockfish	W	410	410	312	298	0
	C	1,010	1,010	769	733	0
	E	520	520	396	377	0
	Total	1,940	1,940	1,477	1,408	0
Atka mackerel	GW	4,700	600	2,350	232	0
Big skate	W	727	727	364	727	0
	C	2,463	2,463	1,232	2,463	0
	E	809	809	405	809	0
	Total	3,999	3,999	2,000	3,999	0
Longnose skate	W	66	66	33	66	0
	C	1,972	1,972	986	1,972	0
	E	780	780	390	780	0
	Total	2,818	2,818	1,409	2,818	0
Other skates	GW	1,327	1,327	664	1,327	0
Other species	Gulf wide	29,138	15,011	15,116	10,296	0
Total		611,900	315,239	317,441	216,212	0
Notes: Alternative 5 is the no action alternative.						

Table 2.3-2 2007 GOA TACs for Alternatives 1 through 5 (in metric tons)

Species	Area	Alt 1.	Alt 2.	Alt 3.	Alt 4.	Alt 5.
Pollock	610	34,954	31,743	21,329	29,584	0
	620	39,583	35,947	24,153	32,275	0
	630	21,523	19,547	13,134	17,559	0
	640	1,940	1,763	1,184	1,582	0
	Subtotal	98,000	89,000	59,800	81,000	0
	650	6,520	6,520	3,510	4	0
	Total	104,520	95,520	63,310	81,004	0
Pacific cod	W	18,943	16,783	12,100	15,882	0
	C	29,994	26,572	19,160	25,147	0
	E	3,663	3,245	2,340	3,071	0
	Total	52,600	46,600	33,600	44,100	0
Sablefish	W	2,215	2,215	1,230	1,885	0
	C	6,322	6,322	3,511	5,380	0
	WYK	2,250	2,250	1,250	1,915	0
	SEO	3,113	3,113	1,729	2,650	0
	Total	13,900	13,900	7,720	11,830	0
Flatfish (deep water)	W	330	330	104	29	0
	C	3,340	3,340	1,628	447	0
	WYK	2,120	2,120	1,044	287	0
	EYAK/SEO	1,030	1,030	504	138	0
	Total	6,820	6,820	3,279	901	0
Rex sole	W	1,680	1,680	840	406	0
	C	7,340	7,340	3,670	1,772	0
	WYK	1,340	1,340	670	324	0
	EYAK/SEO	2,290	2,290	1,145	553	0
	Total	12,650	12,650	6,325	3,055	0
Flatfish (shallow)	W	21,580	4,500	10,790	2,192	0
	C	27,250	13,000	13,625	2,768	0
	WYK	2,030	2,030	1,015	207	0
	EYAK/SEO	1,210	1,210	605	103	0
	Total	52,070	20,740	26,035	5,270	0
Flathead sole	W	9,252	2,000	5,821	1,649	0
	C	23,754	5,000	14,946	4,234	0
	WYK	2,336	2,336	1,489	422	0
	EYAK/SEO	308	308	194	55	0
	Total	35,680	9,644	22,450	6,360	0
Arrowtooth flounder	W	24,579	8,000	13,295	2,133	0
	C	158,441	25,000	85,706	13,751	0
	WYK	10,969	2,500	5,934	952	0
	EYAK/SEO	9,141	2,500	4,945	793	0
	Total	203,130	38,000	109,880	17,630	0
Other slope rockfish	W	40	40	21	9	0
	C	300	300	156	68	0
	WYAK	130	130	66	29	0
	EYAK/SEO	3,430	200	1,764	769	0
	Total	3,900	670	2,007	875	0
Northern rockfish	W	704	704	367	354	0
	C	3,726	3,726	1,943	1,876	0
	E	0	0	0	0	0
	Total	4,430	4,430	2,310	2,230	0
Pacific ocean perch	W	2,494	2,494	1,301	2,023	0
	C	8,293	8,293	4,316	6,710	0
	WYK	803	803	419	651	0
	SEO	1,560	1,560	814	1,265	0
	E (subtotal)	2,363	2,363	1,233	1,916	0
	Total	13,150	13,150	6,850	10,650	0
Shortraker	W	143	155	83	143	0
	C	375	324	216	389	0
	E	235	274	135	244	0
	Total	753	753	434	781	0
Rougheye	W	191	188	110	198	0

Species	Area	Alt 1.	Alt 2.	Alt 3.	Alt 4.	Alt 5.
	C	501	557	289	520	0
	E	315	262	181	326	0
	Total	1,007	1,007	580	1,044	0
Pelagic shelf rockfish	W	366	366	183	295	0
	C	2,973	2,973	1,488	2,400	0
	WYAK	205	205	102	165	0
	EYAK/SEO	871	871	435	702	0
	Total	4,415	4,415	2,208	3,562	0
Demersal rockfish	SEO	514	410	257	410	0
Thornyhead rockfish	W	410	410	312	298	0
	C	1,010	1,010	769	733	0
	E	520	520	396	377	0
	Total	1,940	1,940	1,477	1,408	0
Atka mackerel	GW	4,700	600	2,350	232	0
Big skate	W	727	727	364	727	0
	C	2,463	2,463	1,232	2,463	0
	E	809	809	405	809	0
	Total	3,999	3,999	2,000	3,999	0
Longnose skate	W	66	66	33	66	0
	C	1,972	1,972	986	1,972	0
	E	780	780	390	780	0
	Total	2,818	2,818	1,409	2,818	0
Other skates	GW	1,327	1,327	664	1,327	0
Other species	Gulf wide	26,216	13,970	14,757	9,974	0
Total		550,539	293,363	309,902	209,460	0
Notes: Alternative 5 is the no action alternative.						

2.4 Preferred 2006-2007 Specifications Compared to the 2005 Specifications

Tables 2.4-1 and 2.4-2 compare the 2006 and 2007 OFL, ABC, and TAC projections to the OFLs, ABCs, and TACs adopted by the Council in December 2004, as its preferred alternative for 2005. The tables also include projections of fisheries catch mortality for 2005.

These projections were created in April 2005, using information on catches up to that point, and historical information on average catches during the remaining part of the year. The GOA catch projections have been updated somewhat to reflect experience since April.

Table 2.4-1 BSAI Preferred Alternative OFL, ABC, and TAC Recommendations for the 2006-2007 Fisheries

Species	Area	2005				2006			2007		
		OFL	ABC	TAC	Catch**	OFL	ABC	TAC	OFL	ABC	TAC
Pollock	EBS	2,100,000	1,960,000	1,478,500	1,362,815	1,966,100	1,636,800	1,487,756	1,487,100	1,223,200	1,223,200
	Aleutian Islands	39,100	29,400	19,000	1,460	39,100	29,400	19,000	39,100	29,400	19,000
	Bogoslof District	39,600	2,570	10	0	39,600	2,570	10	39,600	2,570	10
Pacific cod	BSAI	265,000	206,000	206,000	159,353	250,700	195,000	195,000	222,000	172,200	172,200
Sablefish	BS	2,950	2,440	2,440	888	3,085	2,556	2,310	6,000	5,000	4,900
	AI	3,170	2,620	2,620	1,404	3,315	2,744	2,480			
Yellowfin sole	BSAI	148,000	124,000	90,686	90,550	139,500	117,700	90,000	130,000	109,600	109,600
Greenland turbot	Total	19,200	3,930	3,500	2,419	18,100	11,400	3,500	16,900	10,500	10,500
	BS		2,720	2,700	2,045		7,590	2,500		7,500	7,500
	AI		1,210	800	374		3,410	1,000		3,000	3,000
Arrowtooth flounder	BSAI	132,000	108,000	12,000	12,842	128,500	104,200	12,000	125,800	102,100	38,200
Rock sole	BSAI	157,000	132,000	41,500	37,168	145,100	121,700	42,000	138,400	116,100	116,100
Flathead sole	BSAI	70,200	58,500	19,500	15,138	65,900	54,900	20,000	60,800	50,600	50,600
Alaska plaice	BSAI	237,000	189,000	8,000	11,157	231,000	183,400	10,000	224,400	178,100	58,131
Other flatfish	BSAI	28,500	21,400	3,500	4,286	28,500	21,400	3,000	28,500	21,400	21,400
Pacific Ocean perch	BSAI	17,300	14,600	12,600	8,528	17,600	14,900	12,600	17,900	15,100	15,100
	BS		2,920	1,400	625		3,000	1,400		1,678	1,678
	AI total		11,680	11,200	7,903		12,000	11,200		13,422	13,422
	WAI		5,305	5,085	3,281		5,450	5,085		6,096	6,096
	CAI		3,165	3,035	2,086		3,252	3,035		3,637	3,637
	EAI		3,210	3,080	2,536		3,298	3,080		3,689	3,689
Northern rockfish	BSAI	9,810	8,260	5,000	2,743	9,800	8,200	5,000	9,700	8,200	8,200
Shortraker	BSAI	794	596	596	154	794	596	596	794	596	596
Rougheye	BSAI	298	223	223	83	298	223	223	298	223	223
Other rockfish	BSAI	1,870	1,400	1,050	398	1,870	1,400	1,050	1,870	1,400	1,400
	BS		810	460	154		810	460		810	810
	AI		590	590	244		590	590		590	590
Atka mackerel	Total	147,000	124,000	63,000	41,171	126,700	107,000	63,000	106,900	90,800	90,800
	WAI		46,620	20,000	5,555		40,230	20,000		28,825	28,825
	CAI		52,830	35,500	29,891		45,580	35,500		51,165	51,165
	EAI/BS		24,550	7,500	5,725		21,190	7,500		10,810	10,810
Squid	BSAI	2,620	1,970	1,275	1,081	2,620	1,970	1,275	2,620	1,970	1,970
Other species	BSAI	87,920	53,860	29,000	19,460	87,920	57,870	29,200	87,920	57,870	57,870
Total	BSAI	3,509,332	3,044,769	2,000,000	1,773,098	3,306,102	2,675,929	2,000,000	2,746,602	2,196,929	2,000,000

**2005 catch is through September 17, 2005 (includes CDQ). The 2006 Pacific cod ABC and TAC is rounded from 194,800 mt to 195,000 mt to be consistent with the 2006 TAC recommended at the December 2004 NPFMC meeting.

Table 2.4-2 GOA Preferred Alternative OFL, ABC, and TAC Recommendations for the 2006-2007 Fisheries

SPECIES		OFL 2005	ABC 2005	TAC 2005	Catch 2005**	OFL 2006	ABC 2006	TAC 2006	OFL 2007	ABC 2007	TAC 2007
Pollock	W (61)		30,380	30,380	18,797		35,202	35,203		31,743	31,743
	C (62)		34,404	34,404	27,613		39,865	39,865		35,947	35,947
	C (63)		18,718	18,718	10,339		21,678	21,678		19,547	19,547
	WYAK		1,688	1,688	1,879		1,955	1,955		1,763	1,763
	Subtotal	144,340	85,190	85,190	56,749	133,900	98,700	98,700	119,800	89,000	89,000
	EYAK/SEO	8,690	6,520	6,520	0	8,690	6,520	6,520	8,690	6,520	6,520
	TOTAL	153,030	91,710	91,710	56,749	142,590	105,220	105,220	128,490	95,520	95,520
Pacific Cod	W		20,916	15,687	11,242		19,952	15,173		16,783	12,763
	C		33,117	25,086	19,343		31,590	24,024		26,572	20,208
	E		4,067	3,660	13		3,858	2,934		3,245	2,468
	TOTAL	86,200	58,100	44,433	30,598	82,000	55,400	42,131	68,900	46,600	35,439
Sablefish	W		2,540	2,540	1,729		2,371	2,371		2,215	2,215
	C		7,250	7,250	6,255		6,768	6,768		6,322	6,322
	WYAK		2,580	2,580	1,741		2,409	2,409		2,250	2,250
	SEO		3,570	3,570	3,009		3,333	3,333		3,113	3,113
	TOTAL	19,280	15,940	15,940	12,734	18,000	14,880	14,880	16,900	13,900	13,900
Deep water flatfish[1]	W		330	330	3		330	330		330	330
	C		3,340	3,340	394		3,340	3,340		3,340	3,340
	WYAK		2,120	2,120	4		2,120	2,120		2,120	2,120
	EYAK/SEO		1,030	1,030	3		1,030	1,030		1,030	1,030
	TOTAL	8,490	6,820	6,820	404	8,490	6,820	6,820	8,490	6,820	6,820
Rex sole	W		1,680	1,680	574		1,680	1,680		1,680	1,680
	C		7,340	7,340	1,564		7,340	7,340		7,340	7,340
	WYAK		1,340	1,340	0		1,340	1,340		1,340	1,340
	EYAK/SEO		2,290	2,290	0		2,290	2,290		2,290	2,290
	TOTAL	16,480	12,650	12,650	2,138	16,480	12,650	12,650	16,480	12,650	12,650
Shallow water flatfish[2]	W		21,580	4,500	104		21,580	4,500		21,580	4,500
	C		27,250	13,000	4,514		27,250	13,000		27,250	13,000
	WYAK		2,030	2,030	0		2,030	2,030		2,030	2,030
	EYAK/SEO		1,210	1,210	6		1,210	1,210		1,210	1,210
	TOTAL	63,840	52,070	20,740	4,624	63,840	52,070	20,740	63,840	20,740	20,740

SPECIES		OFL 2005	ABC 2005	TAC 2005	Catch 2005**	OFL 2006	ABC 2006	TAC 2006	OFL 2007	ABC 2007	TAC 2007
Flathead sole	W		11,690	2,000	587		12,314	2,000		12,356	2,000
	C		30,020	5,000	1,833		31,614	5,000		31,721	5,000
	WYAK		3,000	3,000	0		3,149	3,149		2,336	2,336
	EYAK/SEO		390	390	0		408	408		308	308
	TOTAL	56,500	45,100	10,390	2,420	59,240	47,490	10,557	59,500	47,650	9,644
Arrowtooth flounder	W		26,250	8,000	2,345		25,790	8,000		26,935	8,000
	C		168,950	25,000	15,349		166,015	25,000		173,383	25,000
	WYAK		11,790	2,500	21		11,574	2,500		12,087	2,500
	EYAK/SEO		9,910	2,500	30		9,761	2,500		10,175	2,500
	TOTAL	253,900	216,900	38,000	17,745	249,140	213,460	38,000	260,150	222,600	38,000
Other Slope rockfish[3]	W		40	40	77		40	40		40	40
	C		300	300	531		300	300		300	300
	WYAK		130	130	70		130	130		130	130
	EYAK/SEO		3,430	200	35		3,430	200		3,430	200
	TOTAL	5,150	3,900	670	713	5,150	3,900	670	5,150	3,900	670
Northern rockfish[3]	W		808	808	567		752	752		704	704
	C		4,283	4,283	4,208		3,978	3,979		3,726	3,726
	E		0	0	0		0	0		0	0
	TOTAL	6,050	5,091	5,091	4,775	5,620	4,730	4,730	5,270	4,430	4,430
Pacific Ocean perch	W	3,076	2,567	2,567	2,339	3,019	2,525	2,525	2,985	2,494	2,494
	C	10,226	8,535	8,535	8,145	10,008	8,375	8,375	9,896	8,293	8,293
	WYAK		841	841	872		813	813		803	803
	SEO		1,632	1,632	0		1,579	1,579		1,560	1,560
	E(subtotal)	2,964				2,860			2,829		
	TOTAL	16,266	13,575	13,575	11,356	15,887	13,292	13,292	15,710	13,150	13,150
Shortraker	W		155	155	68		155	155		155	155
	C		324	324	220		324	324		324	324
	E		274	274	192		274	274		274	274
	TOTAL	982	753	753	480	982	753	753	982	753	753
Rougheye	W		188	188	51		188	188		188	188
	C		557	557	117		557	557		557	557
	E		262	262	117		262	262		262	262
	TOTAL	1,531	1,007	1,007	285	1,531	1,007	1,007	1,531	1,007	1,007

SPECIES		OFL 2005	ABC 2005	TAC 2005	Catch 2005**	OFL 2006	ABC 2006	TAC 2006	OFL 2007	ABC 2007	TAC 2007
Pelagic shelf rockfish	W		377	377	115		366	366		366	366
	C		3,067	3,067	1,842		2,973	2,973		2,973	2,973
	WYAK		211	211	215		205	205		205	205
	EYAK/SEO		898	898	3		871	871		871	871
	TOTAL	5,680	4,553	4,553	2,175	5,510	4,415	4,415	5,510	4,415	4,415
Demersal rockfish	**SEO**	640	410	410	171	640	410	410	640	410	410
Thornyhead rockfish	W		410	410	182		410	410		410	410
	C		1,010	1,010	384		1,010	1,010		1,010	1,010
	E		520	520	125		520	520		520	520
	TOTAL	2,590	1,940	1,940	691	2,590	1,940	1,940	2,590	1,940	1,940
Atka mackerel	**GW**	6,200	600	600	869	6,200	600	600	6,200	600	600
Big Skate	W		727	727	26		727	727		727	727
	C		2,463	2,463	751		2,463	2,463		2,463	2,463
	E		809	809	60		809	809		809	809
	Total	5,332	3,999	3,999	837	5,332	3,999	3,999	5,332	3,999	3,999
Longnose skate	W		66	66	15		66	66		66	66
	C		1,972	1,972	935		1,972	1,972		1,972	1,972
	E		780	780	132		780	780		780	780
	Total	3,757	2,818	2,818	1,032	3,757	2,818	2,818	3,757	2,818	2,818
Other skates	GW	1,769	1,327	1,327	646	1,769	1,327	1,327	1,769	1,327	1,327
All skates (2003)											
Other Species	GW	NA	NA	13,871	3,115	NA	NA	14,348	NA	NA	13,412
TOTAL		713,667	539,263	291,298	154,386	694,748	547,181	301,307	677,191	505,229	281,644

**Catch through September 17, 2005

1/ Deep water flatfish includes Dover sole, Greenland turbot and deepsea sole.

2/ "Shallow water flatfish" includes rock sole, yellowfin sole, butter sole, starry flounder, English sole, Alaska plaice, and sand sole.

3/ The EGOA ABC of 2 mt for northern rockfish has been included in the WYAK ABC for other slope rockfish.

* Indicates rollover from previous year (no age-structured projection data available)

4/ The ABC for sablefish has been reduced by 5 % in the SEO and added to the WYK to allow for 5% of the EGOA TAC to be made available for trawl incidental catch

NOTE:
ABCs and TACs are rounded to nearest mt.
GW means Gulfwide.
Catch data source: NMFS Blend Reports.

2.5 Comparison of Alternatives with 2005 Baseline

Figures 2.5-1 and 2.5-2 in this section, contrast the 2005 TACs for certain broad aggregates of species, with the TACs associated with each of the four, non-zero, alternatives under consideration in this EA. Separate comparisons are made for the BSAI and the GOA, and for each of the two years for which TACs are being specified (2006 and 2007). Species have been aggregated into the following categories: Pollock, Pacific cod, sablefish, flatfish, rockfish, Atka mackerel, and other species.

In the BSAI, the projected TACs under Alternative 2, the preferred alternative, are very similar to the baseline 2005 TACs in 2006. In 2007, the overall sum of TACs is projected to be the same, both years would reflect the controls associated with the 2 million metric ton BSAI OY, but the composition of the TACs would be somewhat different. A larger proportion of the 2007 TACs would be composed of flatfish and a much smaller proportion of Pollock. This result is driven by apparent declines in the Pollock ABC in 2007, and a subsequent increase in flatfish TACs to keep the sum of TACs at the 2 million metric ton level.

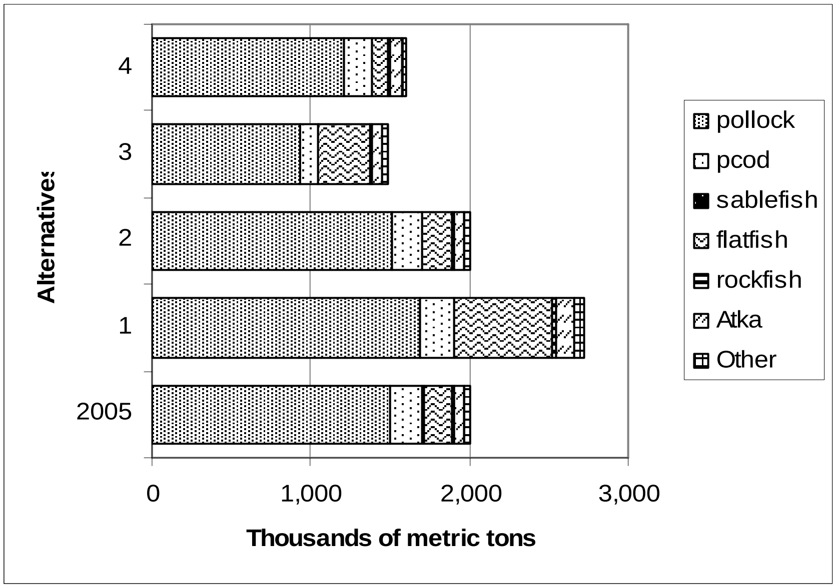
This change in BSAI TAC patterns may not translate into a perfectly corresponding change in catch patterns. In particular, it may be that the flatfish TACs will not be fully harvested. Table 2.4-1 shows that a part of this increase will be due to increased arrowtooth flounder TACs. Markets for these may be limited. Moreover, large increases in flatfish TACs may not turn out to be catchable because of halibut PSC bycatch limits. Halibut PSC limits haven’t forced the closure of many BSAI flatfish fisheries frequently in recent years. However, the fisheries have often come relatively close to the limits. Large TAC increases may lead to halibut PSC closures of flatfish fisheries in the future. If the scenario described in the figures plays out in 2007, BSAI groundfish harvests may fall significantly within the OY limit. Finally, it is important to note that, these TACs will be the TACs in place as fisheries open in 2007. The Council will revisit the 2007 TACS in December, 2006, with the additional information provided by the Summer 2006 surveys, and the Fall 2006 analysis, and new, and perhaps different, TACs for 2007 may be in place by March 2007.

The BSAI figures also indicate that, although the Alternative 1 (the maximum fishing rate consistent with the control rule) TACs significantly exceed the OY (and therefore could not all actually be caught) in 2006, they are approximately equal to the OY in 2007. Alternative 2 (the preferred alternative) and Alternative 1 have very similar implications for 2007. In part this reflects the same reduction in Pollock ABC that affects Alternative 2 in 2007. In part it reflects the biological impact on the Pollock stocks (as interpreted by the AFSC population models) of the much higher Pollock harvest under Alternative 1 in 2006. The increased harvest leaves fewer fish and less growth for exploitation in 2007.

In the GOA, both Alternative 1 (the maximum fishing rate consistent with the control rule) and Alternative 3 (one-half those rates) have a higher sum of TACs than Alternative 2 (the preferred alternative). This is due in each case to higher flatfish harvests under Alternatives 1 and 3. Halibut PSC limits currently constrain existing GOA flatfish catches below the 2005 baseline TACs. The Alternative 2 2006-2007 TACs are similar to the 2005 TACs and catches under these are also likely to be constrained by the halibut PSC limits. It is even more likely that the flatfish TACs under Alternatives 1 and 3 will not be taken because of these limits. Since the Pollock and Pacific cod TACs under Alternative 3 are lower than those under Alternative 2, it is likely that the higher overall sum of Alternative 3 TACs will be associated with lower overall harvests than under the preferred alternative.

Figure 2.5-1 BSAI Alternatives compared to 2005 TAC levels

BSAI 2005 TACS compared to 2006 Alternatives 1 to 4



BSAI 2005 TACS compared to 2007 Alternatives 1 to 4

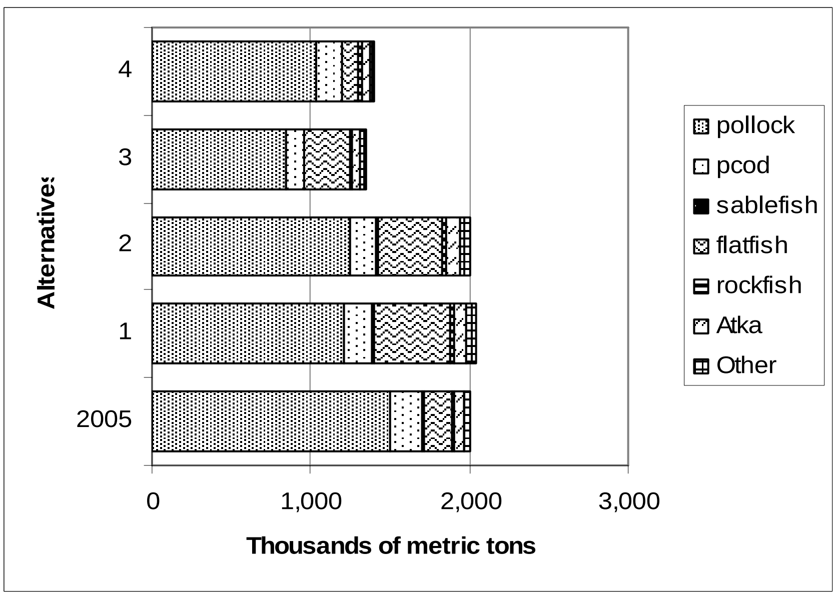
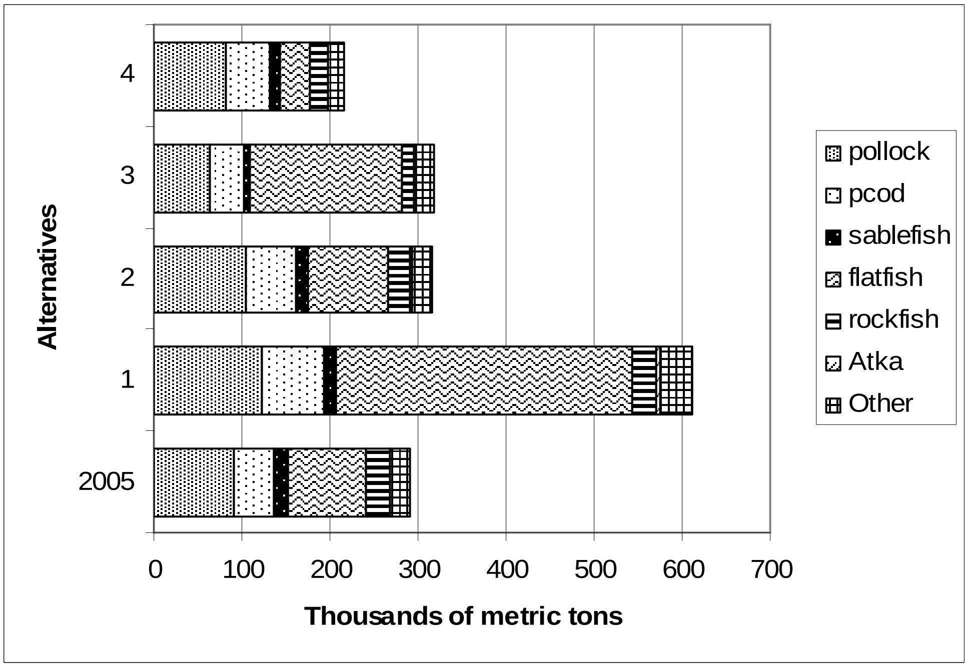
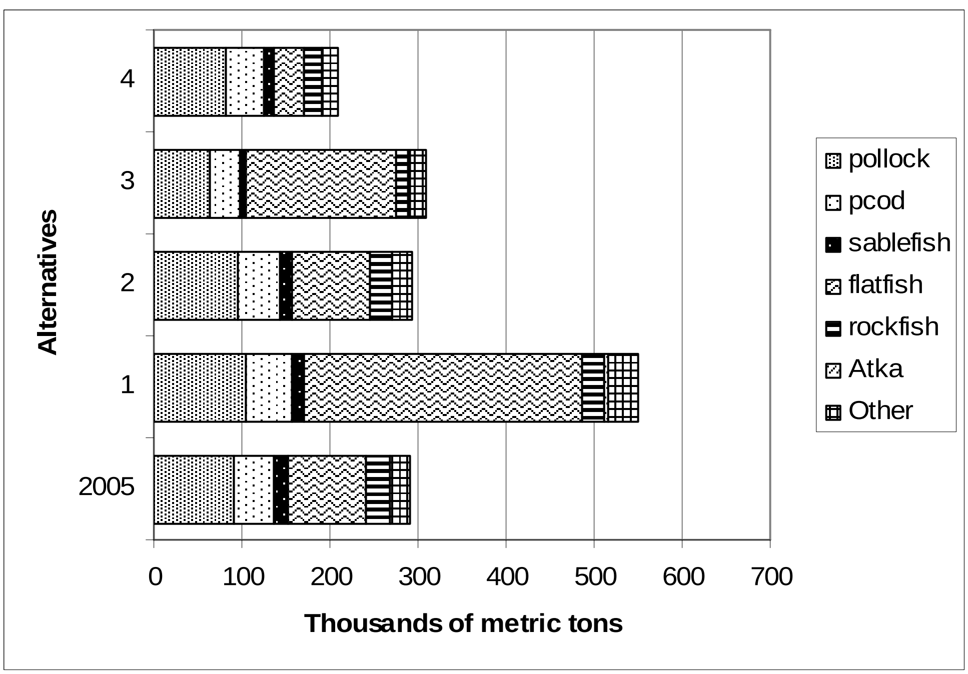


Figure 2.5-2 GOA Alternatives compared to 2005 TAC levels

GOA 2005 TACS compared to 2006 Alternatives 1 to 4



GOA 2005 TACS compared to 2007 Alternatives 1 to 4



3.0 Affected Environment

What's in this chapter:

Description of the annual specifications process	Section 3.1
List of reasonably foreseeable future actions that may affect the environmental impact of the groundfish fisheries	Section 3.2
List of species listed under the Endangered Species Act (ESA)	Section 3.3
Ecological Regime Shifts	Section 3.4

3.1 Harvest Specifications[13] and In-season management

Fishing areas and harvest controls

Harvest specifications set upper limits on total (retained and discarded) catches for a fishing year. These upper limits (OFLs, ABCs, and TACs, as defined at the start of Chapter 1) are set for each "target species" and "other species" category defined in the fishery management plans (FMPs) or harvest specifications.

Sub-allocations of the OFLs, ABCs, and TACs may be made for biological, economic, and/or socio-economic reasons according to percentage formulas established through FMP amendments. Harvest specifications may be allocated among

- districts or subareas within management areas (for example, Eastern, Central, Western Aleutian Islands; Bering Sea; Western, Central, and Eastern GOA),
- management programs (American Fisheries Act or community development quota program),
- processing components (inshore or offshore),
- gear types (trawl, non-trawl, hook-and-line, pot, jig),
- seasons,

These allocations are made according to regulations at 50 CFR 679.20, 679.23, and 679.31. TAC can be further allocated to the various gear groups, management areas, and seasons according to pre-determined regulatory actions and by regulatory announcements by NMFS, opening and closing fisheries accordingly. No foreign fisheries are conducted in the Exclusive Economic Zone (EEZ) off Alaska and therefore, the entire TAC amount is available to the domestic fishery.

[13] The process described in this section is implemented pursuant to Amendments 48/48 to the FMPs for the GOA and BSAI. Amendments 48/48 were unanimously recommended by the Council in October 2003. A notice of availability (NOA) for the FMP amendments was published on July 14, 2004 (69 *FR* 42128), and a proposed rule was published on July 27, 2004 (69 *FR* 44634). The Secretary approved the amendments, and the final rule was published on November 8, 2004 (69 *FR* 64683).

Fishing areas correspond to the defined regulatory areas within the fishery management units. The BSAI is divided into nineteen reporting areas, some of which are combined for harvest specifications purposes. The GOA is divided into eight reporting areas. The BSAI and GOA regions, with most management areas, are shown in Figures 1.2-1 and 1.2-2 in Section 1.2 of this EA.

The fishing year coincides with the calendar year, January 1 through December 31 (§679.2 and §679.23). Depending on the target species' temporal allocation, additional harvest specifications are made to particular seasons within the fishing year. Groundfish TACs not harvested during a fishing year are not rolled over from that year to the next. NMFS opens and closes fisheries by an announcement in the *Federal Register*. Closures are made when inseason information indicates the apportioned TAC, or available prohibited species catch (PSC) limit[14], has been or will soon be reached, or at the end of the specified season, if the particular TAC has not been taken.

Harvest specifications for the Federal groundfish fisheries are set each year for two years, the upcoming year and the year that follows that. The process includes review of the annual Stock Assessment and Fishery Evaluation (SAFE) reports, including the Ecosystem and Economic reports (Appendices A, B, C, and D to this EA) by the North Pacific Fishery Management Council (Council), its Advisory Panel (AP), and Scientific and Statistical Committee (SSC). Using the information from the SAFE reports and the advice from Council committees, the Council makes harvest specification recommendations in December for the next two years. The Secretary of Commerce reviews and makes a determination whether to approve the recommendations. If the Secretary approves the recommendations, NMFS implements the harvest specifications through rulemaking.

Plan Teams and SAFE documents

The groups responsible for analyzing and packaging fisheries data for Council consideration are the Council's Groundfish Plan Teams (Plan Teams). There are separate plan teams for the BSAI and GOA. These teams include NMFS scientists and managers, Alaska, Oregon, and Washington fisheries management agencies' scientists, and university faculty.

The Plan Teams use stock assessments prepared annually by NMFS and by the Alaska Department of Fish and Game (ADF&G) to calculate biomass, OFL, and ABC for each species or species group, for specified management areas of the EEZ off Alaska. Plan Team meetings are held in September to review potential model changes and are used for developing proposed ABC recommendations. In November, the Plan Teams' rationale, models, and resulting ABC and OFL calculations are documented in annual SAFE reports. Stock survey information from the field, collected the preceding summer, is an important input into these November calculations. The SAFE reports incorporate recently completed biological survey work, any new methodologies, and ABC and OFL determinations based on the most recent stock assessments. Periodically, an independent expert panel reviews the assumptions used in the stock assessments for a selected species or species group and provides recommendations on improving the assessment.

At its December meetings, the Council, its AP, its SSC, and interested members of the public, review the November SAFE and Plan Team reports and make recommendations on harvest

[14]BSAI crab, halibut, salmon, and herring limits are established in regulations and the Council recommends target fishery and seasonal apportionments of these PSC limits. The Council recommends the GOA halibut PSC limits, fishery, and seasonal apportionments.

specifications for the coming and the following year. The harvest specifications recommended by the Council, therefore, are based on scientific information, including projected biomass trends, information on assumed distribution of stock biomass, and revised technical methods used to calculate stock biomass. SAFE and Plan Team reports are part of the permanent record of the harvest specifications process.

To provide consistency between the groundfish FMPs for the harvest specifications process and flexibility during the harvest specifications process, the FMPs permit the Council to set harvest specifications for up to 2 fishing years. The stock assessment models used for determining the harvest specifications use 2-year projections for biomass and acceptable biological catch.

Proposed and final harvest specifications

The specification of the upcoming year's harvest levels is currently a two-step process. In the first step, proposed harvest specifications including OFLs, ABCs, TACs, and PSC limits are recommended by the Council at its October meeting and published in November or December in the *Federal Register* for public review and comment.

In October, most current year stock assessments are not yet available. Proposed harvest specifications for a number of target species are based on AFSC projections using stock population models and preliminary projections of current year fisheries mortality; the proposed harvest specifications for other species, for which little stock assessment information is available, are based on rollovers of the current year's harvest specifications.

For most BSAI target species, the initial TAC (ITAC) is calculated as 85 percent of the proposed TACs (50 CFR § 679.20(b)). The remaining 15 percent is split evenly between the Western Alaska Community Development Quota (CDQ) program reserve (for harvest by CDQ groups) and a non-specified groundfish reserve (to provide in-season management flexibility). Pollock is handled somewhat differently; 10% of the TAC is allocated to a CDQ reserve, and the remainder is allocated to a pollock ITAC. Sablefish is also handled differently; 20% of the sablefish hook-and-line and pot gear allocations are placed in the CDQ reserve. There are no non-specified reserves for either pollock or sablefish.

In the GOA, 20% of each TAC for pollock, Pacific cod, flatfish, and "other species" is set aside as a reserve. Since 2001, the harvest specifications have reapportioned the reserves to the full TAC for these species.

In the second step, final TAC and PSC specifications are recommended by the Council at its December meeting following completion of analysis of any new stock status information. These TAC specifications and PSC limits, and apportionments thereof, are recommended to the Secretary for implementation in the upcoming fishing year. With the BSAI final harvest specifications, many of the non-CDQ reserves are released and the final ITAC is increased by the amount of reserves released. Currently, the final harvest specifications are typically implemented in February or March, and replace the current harvest specifications as soon as they are in effect.

Rulemaking and publication of the harvest specifications

The NMFS Alaska Region's Sustainable Fisheries Division drafts the harvest specification rule packages, with review by the Region's Protected Resources Division, Habitat Conservation Division, Restricted Access Management Division, Regional Economist, the Regional NOAA Office of Law Enforcement, and the Regional Office of NOAA General Counsel.

After Regional review is completed, the rule is forwarded to NMFS Headquarters, the Office of Sustainable Fisheries in Silver Spring, Maryland, where it's reviewed within NMFS before being forwarded to NOAA General Counsel. After clearing NOAA, the rule is reviewed by the Department of Commerce (DOC) General Counsel. After the rule has cleared NOAA, and DOC, the rule is forwarded to the Office of the Federal Register.

The Headquarters review normally takes at least 30 days for a proposed rule, but can take longer depending on the complexity of the rule, degree of controversy, or other workload priorities within different review tiers. The review process is repeated for the final rule.

During its review, NMFS must determine if the final harvest specifications are a logical outgrowth of the proposed harvest specifications. If the final harvest specifications recommendations are consistent with applicable law and are a logical outgrowth of the proposed harvest specifications, the final harvest specifications may be published without additional public review and comment. If the final harvest specifications recommendations are not a logical outgrowth of the proposed harvest specifications, an additional publication of proposed harvest specifications may be needed to provide an additional opportunity for prior public review and comment under the Administrative Procedures Act (APA). In May or June of the following year, the final harvest specifications could be published based on the additional proposed harvest specifications and after consideration of public comment. Alternatively, depending on the circumstances, NMFS may find "good cause" to waive the additional publication of proposed harvest specifications for prior public review and comment. In this case, the final harvest specifications would likely become effective in February or March. At this time, NMFS has not had to make a determination that the final harvest specifications are not a logical outgrowth of the proposed harvest specifications.

To provide opportunity for an additional public comment period after the Council's final harvest specifications recommendation in December, without disrupting the fisheries, which typically begin early in the year, the groundfish fisheries in the new fishing year are initially managed on the harvest specifications that had been published previously. This is possible because the Council adopts harvest specifications for two years at a time. Each year the harvest specifications that begin the season are superseded by the new annual harvest specifications.

Harvest specifications for the hook-and-line gear and pot gear sablefish individual fishing quota (IFQ) fisheries are limited to the succeeding fishing year to ensure those fisheries are conducted concurrent with the halibut IFQ fishery. Having the sablefish IFQ fisheries concurrent with the halibut IFQ fishery reduces the potential for discards of halibut and sablefish in these fisheries. The sablefish IFQ fisheries remain closed at the beginning of each fishing year, until the final harvest specifications for the sablefish IFQ fisheries are in effect. The trawl sablefish fishery is managed using harvest specifications for two years, along with the remaining target species in the BSAI and with GOA pollock, Pacific cod, and the "other species" complex.

In-season management

The In-season Management Branch of the Alaska Region monitors the rate of catch of groundfish and prohibited species relative to the specifications. Through fishery closures and openings the branch manages the harvest schedule to attain optimum yield. The Alaska Region manages 240 TACs in the BSAI and GOA, comprised of over 50 individual species. Both retained and discarded fish is credited against species specific TACs. Quotas are managed using observer data and industry reports. Including sideboards, but not including individual fishing quotas, about 500 quotas are generated each year.

The In-season Management Branch writes the proposed and final rules that establish the annual harvest specifications. The group supports the Regional Administrator in the day-to-day operations of the fisheries using the harvest specifications and standing regulations. The branch compiles catch and production data from at-sea catcher/processor vessels, motherships, shore plants, and groundfish observers. In-season Management announces openings and closures using information bulletins and publications in the FR. Processors, vessel operators, other fishing industry servicing businesses, and the media are quickly notified of any actions through postings on the Alaska Region web site.

The In-season Management Branch determines the amount of an individual TAC necessary as incidental catch (the incidental catch account (ICA)) in other target fisheries. For example Pacific cod taken incidentally in a pollock target fishery contributes to the Pacific cod ICA. After deducting the ICA the remaining TAC is the directed fishing allowance (DFA) which allows vessels full retention of the species. Once the DFA is caught the fishery closes. Closure limits retention to a portion of other TACs open to directed fishing. That portion is called the maximum retainable amount or MRA. The MRA is a percentage of an alternate target fishery. The percentage relates to the expected rate of catch and may be used as a tool to harvest a species that is low in volume but high in value. Retention is prohibited if the total TAC is caught before the end of the year. Retention prohibition removes any incentive to increase incidental catch as a portion of other fisheries. If the ABC is taken and the trajectory of catch indicates the OFL may be approached, additional closures are imposed. To prevent overfishing, specific fisheries identified by gear and area that incur the greatest incidental catch are closed. Closures expand to other fisheries if the rate of take is not sufficiently slowed. Over fishing closures are rare.

In the Bering Sea pollock, Aleutian Island pollock and CDQ fisheries, allocations are granted to particular groups. In exchange, the recipients limit their catch rather than the agency imposing fishing time limits.

A fishery may also be closed if a PSC limit of halibut, crab, salmon, or herring is taken. Other than for scientific purposes or donations programs, prohibited species may not be retained in the groundfish fisheries.

In the BSAI, a quota reserve system plays an important role in managing the groundfish TACs. With the exception of pollock and the hook-and-line and pot gear allocation of sablefish, fifteen percent of each TAC is set aside in the reserve. The harvest specifications allocate one half of the reserve, or 7.5 percent of most species, twenty percent of the hook-and-line and pot gear allocation of sablefish, and ten percent of the BSAI pollock TACs to the Community Development Quota (CDQ) program. Required by Congress, the CDQ program provides an economic engine for development programs for qualifying communities in western Alaska. The non-CDQ portion of the reserve is not specific to a particular TAC and functions as a common pool to supplement particular fisheries. The reserve system provides a limited amount of flexibility to respond to yearly fluctuations in catch rates and maximise value to the industry. Management has the option of increasing an individual TAC beyond that originally specified, up to its ABC so long as the OY is not exceeded. In the GOA the reserve system isn't normally used, all the reserves are released back to each TAC and there is no CDQ allocation.

Management of groundfish stocks in the Alaska Region is successful. Most are considered healthy. Some stocks are currently above their long term average, and some below. In general, stock size increases and decreases with variable recruitment strengths driven to some extent by ecological and environmental conditions. Catches are closely monitored, conservatively managed, and kept within ABC limits. For many stocks, TAC is set at or less than 90% of ABC. For all stocks, ABC's are less than overfishing levels. When the OFL is approached regulations require conservative action to prevent over fishing. The Council and NMFS have developed and continue to develop programs responding to a complex of ecological, social, and economic factors.

3.2 Reasonably foreseeable future actions

3.2.1 Introduction

This section lists the reasonably foreseeable actions that may affect the groundfish fisheries in the GOA and the BSAI, and the impacts of the fisheries on the environment. The actions in the list, which is for use in the cumulative effects analysis in Chapter 4, have been grouped in the following five categories:

- Ecosystem approaches to management (Section 3.2.2)
- Fishery rationalization (Section 3.2.3)
- Fishery management and enforcement (Section 3.2.4)
- Actions by other Federal, State, and International agencies (Section 3.2.5)
- Private actions (Section 3.2.6)

The specifications "action area" includes the Federal waters of the EEZ off of Alaska. These waters lie between three and 200 miles from shore. Because some of the fish stocks managed under the specifications are found in State as well as in Federal waters, and because some of the resources that may be impacted by the specifications are also found in State waters, the action area also includes the waters from shoreline to 3 miles from shore.

A ten year time frame was chosen for the cumulative effects analysis. This is a short term action, generally having impacts on renewable resources. The second year of this action (2007) will be superseded by the publication of new specifications for 2007-2008 in the *Federal Register* in January or February of 2007. A programmatic supplemental EIS was published in 2004, and it is likely that a new PSEIS will be developed within the 10-year time frame.

Table 3.2-1 summarizes the reasonably foreseeable actions identified in this analysis. The table includes reasonably foreseeable actions that are likely to have an impact on a resource component within the action area and timeframe. Actions are human actions (e.g., a proposed rule to designate Right whale critical habitat) as distinguished from natural events (e.g., an ecological regime shift). CEQ regulations require a consideration of actions, whether taken by a government or by private persons, which are reasonably foreseeable, not merely possible or speculative. Actions have been considered reasonably foreseeable if some concrete step has been taken toward implementation, such as a Council recommendation or the publication of a proposed rule. Actions simply "under consideration" have not generally been included because they may change substantially or may not be adopted, and so cannot be reasonably described, predicted, or foreseen. Identification of actions likely to impact a resource component within this action's area and time frame will allow the public and Council to make a reasoned choice among alternatives.

The reasonably foreseeable actions identified in this analysis are summarized in the following table. Subsequent subsections in this section explain the rationale for including certain actions in this table.

Table 3.2-1 Reasonably foreseeable future actions

Ecosystem approaches to management	• Increasing understanding of the interactions between ecosystem components, and on-going efforts to bring these understandings to bear in stock assessments • Increasing protection ESA-listed and other non-target species components of the ecosystem • Increasing integration of ecosystems considerations into fisheries decision-making
Fishery rationalization	• Continuing rationalization of Federal fisheries off Alaska • Fewer, more profitable, fishing operations • Better harvest and bycatch control • Expansion of community based allocation programs
Traditional management tools	• Authorization of groundfish fisheries in future years • Increasing enforcement responsibilities • Technical and program changes that will improve efficiency of enforcement and management
Other Federal, State, and International agencies	• Future exploration and development of offshore mineral resources • Reductions in United States Coast Guard fisheries enforcement activities • Continuing oversight of seabirds and some marine mammal species by the US Fish and Wildlife Service • Expansion of State groundfish fisheries • Continuing EPA monitoring of seafood processor effluent discharges
Private actions	• Commercial groundfish fishing • Increasing levels of economic activity in Alaska's waters and coastal zone • Expansion of aquaculture

3.2.2 Developments in Ecosystem approaches to management

Key points:

- Increasing understanding of the interactions between ecosystem components, and on-going efforts to bring these understandings to bear in stock assessments
- Increasing protection for ESA-listed and other non-target species components of the ecosystem
- Increasing integration of ecosystems considerations into fisheries decision-making

Increasing understanding of the interactions between ecosystem components, and on-going efforts to bring these understandings to bear in stock assessments

Researchers are learning more about the components of the ecosystem, the ways these interact, and the impacts of fishing activity on them. Research topics include cumulative impacts of climate change on the ecosystem, the energy flow within an ecosystem, and the impacts of fishing on that flow.

Many institutions and organizations are conducting relevant research. The Alaska Fisheries Science Center (AFSC) provides a particularly important example of these efforts. The AFSC's Fishery Interaction Team (FIT), formed in 2000 to investigate the ecological impacts of commercial fishing, is focusing on the impacts of Pacific cod, Pollock, and Atka mackerel fisheries on Steller sea lion populations (Connors and Logerwell, 2005). The AFSC Fisheries and the Environment (FATE) program is investigating potential ecological indicators for use in stock assessment (Boldt 2005), page iii). The AFSC's Auke Bay Lab and RACE Division map the benthic habitat on important fishing grounds, study the impact of fishing gear on different types of habitats, and model the relationship between benthic habitat features and fishing activity (Heifetz, et al.. 2003). Other AFSC ecosystems programs include the North Pacific Climate Regimes and Ecosystem Productivity Program, the Habitat and Ecological Processes program, and the Loss of Sea Ice program (Boldt, pers. com. 9-26-05).

The interface between science and policy-making should also improve. For example, the ongoing development of multi-species population models in the Resource Ecology & Ecosystem Modeling program (Aydin and Jurado-Molina 2005) should facilitate the integration of multi-species considerations into the determination of overfishing criteria (OFLs and ABCs), and TACs for individual species. The annual Ecosystems Considerations appendix to the SAFE document has been enhanced in recent years, and the AFSC has begun to move its production forward in time, so that early versions are now being produced in the spring, rather than the fall. Moreover, a new website is under development for wider distribution of the SAFE's data sets. These developments should facilitate the use of ecological information in making policy.

Increasing protection ESA-listed and other for non-target species components of the ecosystem

Groundfish fishing may impact a wide range of other resources, such as benthic habitat, seabirds, marine mammals, and non-target species, such as crab, salmon, grenadiers, smelt, or halibut. Recent Council and NMFS actions and ongoing research suggest that the Council and NMFS will adopt measures for additional protection of some of these resources in the near future.

In February 2005, the Council adopted a preferred alternative to define and protect essential fish habitat and habitat areas of particular concern in the GOA and the AI. NMFS is adopting rules to implement these measures. Additionally, in February 2005, the Council requested the development of a problem statement on the potential for action to mitigate fishing impacts on essential fish habitat in the Bering Sea. Details are available in the Council's February 2005 newsletter available at http://www.fakr.noaa.gov/npfmc/newsletters/newsletters.htm.

The Council and NMFS are also likely to adopt measures to protect non-target fish species to a greater extent. In 2004, regulations were revised to separate skates from other species in the GOA (69 FR 26313, May 12, 2004). In 2005, the Council took final action to allow more flexibility to constrain the TAC for the remaining other species complex in the GOA. NMFS is adopting regulations to accomplish this. These regulations should become effective within the time frame for this analysis. AFSC scientists will be producing more detailed, other species specific, SAFE analyses. The breakout will occur for the BSAI other species complex in 2005. Planning is underway to breakout the GOA other species in a subsequent year. Proposed Amendment 84 would modify bycatch reduction measures for Chinook and chum salmon in the BSAI to address high levels of bycatch in the pollock fishery. In the longer term, the Council is expected to look at alternatives to analyze new regulatory savings area closures as well as individual vessel accountability programs. In conjunction with Gulf rationalization, the Council is reviewing methodology for establishing trigger limits by gear type, closures area, and hot spot management for PSC species in the GOA. (G. Merrill, personal communication. 9/26/05)

The Council has adopted measures for Improved Retention and Improved Utilization (IRIU) of fishery resources. In the near future, IRIU may apply to the BSAI flatfish fisheries, resulting in reduced discards in those fisheries. The Council has recommended, and the Secretary has approved, Amendment 79 to the BSAI FMP, which would permit the use of a groundfish retention standard in the BSAI flatfish fishery. NMFS has published a proposed rule to implement, Amendment 79 (70 FR 35054, June 16, 2005).

In 2004, NMFS published final rules to require longline vessels to adopt certain bird protection measures (69 *FR* 1930). These measures may have contributed to the reduction in bird bycatch rates for longline fishing operations. Research is currently underway to address seabird interactions with trawl fisheries.   A September 2003 Biological Opinion issued by the USFWS identifies this issue as needing additional study, requires NMFS to develop a means to assess these interactions, and recommends the development of methods to minimize seabird collisions with trawl wires.

Washington State's Sea Grant program is currently working with catcher-processors in the BSAI pollock fishery to study the sources of seabird strikes in their operations and to look for ways fishermen can reduce the rate of strikes. (Washington Sea Grant, 2004; Melvin et al. 2004) Other studies are investigating the potential for use of video monitoring of seabird interactions with trawl and longline gear (McElderry et al., 2004; Ames et al., 2005).

Changes in the status of species listed under the ESA, the addition of new listed species, and results of future Section 7 consultations may require modifications to groundfish fishing practices to reduce the impacts of these fisheries on listed species and critical habitat. In June 2005, a U. S. District Court ordered NMFS to either designate critical habitat in the Pacific Ocean for northern right whales or explain why critical habitat should not be designated (Center for Biological Diversity et al v. Evans, No. C 04-04496 WHA). NMFS also plans to conduct a status review of the northern right whale to determine whether it consists of more than one species as defined by the ESA (70 CFR 1830, January 11, 2005). This may lead to a reevaluation of the listing status for these whales. In either the designation of critical habitat or the listing of separate species, a re-initiation of Section 7 consultation will be required for the groundfish fisheries to determine if activities may adversely affect critical habitat or cause jeopardy for northern right whales.

In June 2004, the Council changed Steller sea lion fisheries restrictions for pollock and Pacific cod in the Gulf of Alaska. Fisheries were opened up at several haulout sites and further restricted at others. Measures were carefully designed to avoid adverse modification of critical habitat or jeopardy to the sea lions. Within the next few years, a re-initiation of consultation on the FMP level BiOp and Steller sea lion BiOp may be necessary due to changes in the Federal action and/or due to new information about ESA-listed species and their critical habitat. As new information becomes available for Steller sea lions, and particularly when the Steller Sea Lion Recovery Plan is finalized, NMFS may consider changes in the listing status of both the eastern and the western Distinct Population Segments (DPS) of this marine mammal.

The US Fish & Wildlife Service has recently listed the southwest Alaska DPS of the northern sea otter as threatened (70 *FR* 46366; August 9, 2005), and is considering an ESA listing for the Kittlitz's murrelet. Both species' have declined in abundance in recent years. The reasons behind the decline of the Kittlitz's murrelet population are unknown; some hypotheses that have been advanced include changes in preferred habitat due to tidewater glacial retreat, disturbance from increased marine traffic, particularly from tourist operations, in preferred habitat areas, and lack of forage (Kuletz, 2004). The reasons for the northern sea otter decline are unknown, but population studies suggest that adult mortality appears to be the major source. Listing of the sea otter and, potentially, of Kittlitz's murrelet would require NMFS to ensure that actions it authorizes (e.g., commercial groundfish fisheries) are not likely to jeopardize the existence of these species or adversely modify or destroy any listed critical habitat.

The northern fur seal population in the Pribilofs has been declining, with pup production between 2002 and 2004 down 15.7 percent on St. Paul and 4.1 percent on St. George. In June 2003 the Council appointed a Fur Seal Committee to monitor preparation of the draft EIS for subsistence harvest and to make recommendations for further Council action. The draft EIS may be viewed at www.fakr.noaa.gov. Continued concern for fur seals and potential interaction with the groundfish fisheries may result in protection measures implemented for the groundfish fisheries.

Increasing integration of ecosystems considerations into fisheries decision-making

Ecosystem assessment assesses the state of the environment, including monitoring climate–ocean indices and indicator species to detect ecosystem changes. Ecosystem-based fisheries management reflects the incorporation of ecosystem assessments into single species assessments when making management decisions and explicitly accounts for ecosystem processes when formulating management actions. Ecosystem-based fisheries management may still encompass traditional management tools, such as total allowable catch, but these tools will likely yield different quantitative results from the integration of ecosystem factors such as the impacts of climate regimes and regime shift on marine ecosystems. To integrate such factors into fisheries management, NOAA Fisheries and the Council will need to develop policies that explicitly specify decision rules and actions to be taken in response to preliminary indications that a regime shift has occurred. These decision rules need to be included in long-range policies and plans. Management actions should consider the life history of the species of interest and can encompass varying response times, depending on the species' lifespan and rate of production. Stock assessment advice needs to indicate explicitly the likely consequences of alternate harvest strategies to stock viability under various recruitment assumptions.

Both the recent Pew Commission report and the report of the U.S. Commission on Ocean Policy, point to the need for changes in the organization of fisheries and oceans management to institutionalize ecosystem considerations in policy making (Pew, 2003, page x; U.S. Commission, 2004, pages 33-37). The Oceans Commission, for example, points to the need to develop new management boundaries corresponding to large marine ecosystems and to align decision-making with these boundaries (U.S. Commission, 2004, pages 33-34).

Since the publication of the Oceans Commission report, the President has established a cabinet-level Committee on Ocean Policy by executive order. The Committee is to explore ways to structure government to implement ecosystem approaches to ocean management (Evans and Wilson, 2005). Congress is in the early stages of preparing reauthorization legislation for the Magnuson-Stevens Act. The reauthorization is widely expected to address ecosystem approaches to management.

The National Oceanic and Atmospheric Administration (NOAA) and NOAA Fisheries are both pursuing ecosystem initiatives at their different levels of focus. NOAA Fisheries is currently developing national Fishery Ecosystem Plan (FEP) guidelines. It is unclear at this time whether these will be issued as guidelines or as formal provisions for inclusion in the MSA. More details are available in the Council's June 2005 Ecosystem Committee minutes on page 2. The Full minutes are available at http://www.fakr.noaa.gov/npfmc/current_issues/ecosystem/Ecosystem.htm)

The Council recently reconstituted its Ecosystem Committee to discuss ecosystem initiatives and advise the Council on: (1) defining ecosystem-based management; (2) identifying the structure and Council role in potential regional ecosystem councils; (3)

assessing the implications of NOAA strategic plan; (4) draft guidelines for ecosystem-based approaches to management; (5) drafting MSA requirements relative to ecosystem-based management; and (6) generally coordinating with NOAA and other initiatives regarding ecosystem-based management. In June 2005, the NPFMC requested the Ecosystem Committee to examine the development of an Aleutian Islands Fishery Ecosystem Plan and to create an Aleutian Islands Ecosystem Plan Team. The Council also supported the committee's recommendation to explore the idea of an ecosystem council or similar regional collaboration. More details are available in the Council's June 2005 newsletter at http://www.fakr.noaa.gov/npfmc/newsletter/newsletter.htm.

At this writing, while it seems likely that changes in oceans management and associated changes in fisheries management will occur as a result of these discussions and debates, it is not clear what form these new changes will take.

3.2.3 Developments in Fisheries Rationalization

Key points:

- Continuing rationalization of groundfish fisheries in the BSAI and GOA.
- Fewer, more profitable, operations.
- Improved harvest and bycatch control.
- Expansion of Community Based Allocation Programs

Continuing rationalization of Federal fisheries off Alaska

Comprehensive rationalization of fisheries off Alaska has long been a goal of the Council and of NMFS's Alaska Region. The Council and Region have pursued this goal through programs such as the license limitation program (LLP), the halibut/sablefish individual fishing quota (IFQ) program, the community development quota (CDQ) program, community quota purchase programs, and fishing cooperatives. The Council's preferred alternative in the PSEIS proposes to "Maintain LLP [*license limitation program*] program and modify 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." (NMFS 2004b, page 2-68).

The Council is presently considering alternative management approaches to rationalize the GOA groundfish fisheries. While the commitment to rationalization is clear, the exact form it will take has not yet been decided. Faced with changing market opportunities and stock abundance, increasing concerns about the long-term economic health of fishing dependent communities, and the fishing industry's limited ability to respond to environmental concerns under the existing management regime, the Council may consider rationalizing the fishery through individual fishing quotas, cooperatives, allocations to communities, or some combination of these. NMFS and the Council have begun the scoping process for an Environmental Impact Statement for GOA rationalization. Information on this process is available on the web at http://www.fakr.noaa.gov/sustainablefisheries/goa_seis/default.htm .

While formulating a comprehensive rationalization program for all groundfish in the GOA, in June 2005, the Council has adopted a preferred alternative Rockfish Pilot Program to stabilize the community of Kodiak. (Council, 2005_ - June newsletter) The intent of the program is to improve processor stability, product quality, and market opportunities by extending the season and providing a constant flow of rockfish. Under authorizing legislation (Pub. Law 106-554, section 802), the Rockfish Pilot Program is designed as a short-term two-year program for immediate economic relief until comprehensive GOA rationalization can be implemented. NMFS anticipates implementing the Rockfish Pilot Program in 2007.

The Council is also considering alternatives to rationalize the non-AFA trawl CP fleet. Under Amendment 80 to the BSAI Groundfish FMP, the Council is considering measures to further reduce groundfish discards and improve retention of bycatch in the non-AFA trawl CP fleet, by making "specific groundfish allocations to this sector, and allowing the formation of cooperatives." (NPFMC, 2005c, page i). Council final action is scheduled by the end of 2005, and NMFS anticipates implementing the program by 2008.

In December 2004, the Council approved a draft problem statement and preliminary alternatives and options for a BSAI groundfish FMP amendment to review current sector allocations for Pacific cod. The Council continues to revise the analysis and the elements of the alternatives and options. The Council noted in its December problem statement that the measures were needed to protect BSAI Pacific cod fishermen while incremental rationalization proceeded in other GOA and BSAI groundfish fisheries and that "allocations to the sector level are a necessary step on the path towards comprehensive rationalization." (NPFMC, 2005d, page 1). Implementation of sector allocations program for Pacific cod may occur in 2008 or 2009.

The Consolidated Appropriations Act of 2005, authorizes the expenditure of up to $75 million for the buyback of catcher-processor operations in the BSAI. The Act allows a maximum of $36 million for the buyback of longline catcher-processors, $6 million for AFA catcher-processors, $31 million for non-AFA trawl catcher-processors, and $2 million for pot catcher-processors. It is not clear whether or not buyback programs will be implemented under this statute. (P.L. 108-447, Section 219)

Rationalization should lead to fewer, more profitable, fishing operations

Past rationalization efforts in Federal waters off Alaska have led to reductions in the number of active fishing vessels. However, in past programs, the Council has also taken steps to limit the consolidation of fishing operations, and future programs are likely to place similar limits on the extent of consolidation.

Rationalization may also change the temporal and spatial distribution of fishing, by relieving fishermen from the burden of competitive derby-style fisheries, and leading to an interest in longer fishing seasons and, perhaps, changes in the location of fishing operations. Other potential environmental impacts of rationalization may come from reduced opportunity costs of changing fishing areas in response to high bycatches of non-target species, reduced gear losses, and reduced discards. On the other hand, rationalization may also lead to increased monitoring and enforcement costs in response to increase incentives to high-grade, illegally discard bycatch, and under-report catches.

The operations remaining in the fishery are likely to be more profitable. Available species TACs, and their associated gross revenues, will tend to be divided among smaller numbers of operations. Remaining operations will be freed, to a considerable extent, from the time pressures associated with a competitive fishery. They would have more flexibility in quality control and marketing of their products, and opportunities to arrange their fishing operations to reduce their operating costs. Anecdotal evidence suggests that increased profitability for remaining fishing operations appears to have been the experience in past rationalizations, including those in the halibut, sablefish, and AFA fisheries.

Rationalization may lead to better harvest and bycatch control

The biological impacts of a rationalized fishery depend on the specific features of the rationalization program. Theoretically, a reduction in the numbers of fishing operations, an end to derby-style fishing, and increased individual control, whether through IFQs or cooperatives, could improve in-season control over fish harvests, and reduce the likelihood of a fishery exceeding specified TAC levels, or seasonal apportionments of TACs. By ensuring that fishing is conducted in a more orderly manner, rationalization allows greater attention to the impacts of bycatch of non-target species, and gear interactions with seabirds and marine mammals. The extent of these improvements depends directly on the monitoring and enforcement systems enacted for the program. Otherwise, evidence from previously implemented rationalizations programs has tended to show practices such as high-grading, illegal discarding, and under-reporting of catches occur in many quota based programs (NMFS 2004a, Crab EIS).

NMFS and the Council recognize the potential for misreporting and illegal fishing practices by building into rationalization programs safeguards for compliance, such as complex catch monitoring systems, VMS, adequate observer coverage, and enforcement. The Halibut/Sablefish IFQ program, the AFA Pollock Cooperative Program, and the Crab Rationalization Program all contain sufficient safeguards to ensure that the total weight, species composition, and catch location are reported accurately, that regulations governing the fishery are adhered to, and that there is an authoritative, timely, and unambiguous record of quota harvested (NMFS 2004a, Crab EIS). It is reasonably foreseeable that NMFS and the Council will continue to develop rationalization programs with monitoring and enforcement safeguards.

With monitoring and enforcement safeguards, cooperatives can more effectively control fishery bycatch. Fishermen may have the flexibility, through private contractual arrangements, to carry out bycatch control measures that would be more difficult to do purely through government measures. Fishermen have begun experimenting with bycatch control through cooperatives. Under the Chinook monitoring program in the AFA Pollock fisheries, fishermen contract with each other for in-season catch monitoring by a private firm, and to abide by restrictions on fishing activity when bycatch rates rise to defined levels. (NPFMC, 2005e) Without monitoring and enforcement safeguards, cooperatives can create mechanisms for misreporting bycatch, especially if the bycatch control measures limit full harvest of quota species.

Rationalization of groundfish in Alaskan waters

The Alaska legislature is currently considering legislation that would give the Alaska Board of Fisheries (BOF) and the Alaska Commercial Fisheries Entry Commission (CFEC) authority to create a dedicated access privilege program for Gulf of Alaska groundfish fisheries (SB 113) The legislation has been framed to provide opportunities for the BOF and CFEC to flexibly frame programs adapted to the needs of different groundfish fisheries, and to frame them within transparent public processes. The legislation provides more flexibility than is currently offered within the State's limited entry program. (ADF&G, 2005)

This legislation could facilitate the coordination of rationalization in the Federal groundfish fisheries in the GOA and BSAI. State rationalization of the groundfish fisheries in State waters could occur in conjunction with, or complementary to, Federal rationalization of the Federal groundfish fisheries. The State could chose to mirror Federal rationalization for groundfish fisheries occurring inside of State waters or to conduct completely separate fisheries, with separate allocations from the Federal fisheries. Separate allocations would result in additional costs for managing a separate fishery and many jurisdictional issues to manage and resolve. Because this action depends on future discretionary action by the Alaska Legislature, and because of the controversy over State access limitation efforts in the past, this action is not treated as reasonably foreseeable.

Expansion of Community Participation in Rationalization Programs

Community participation in the BSAI and GOA groundfish fisheries can be expected to expand in the coming years, either through programs that directly allocate quota to communities, or through programs that allow communities to purchase quota share. These programs increase the community-based ownership of allocation privileges for the groundfish fisheries.

The Western Alaska CDQ Program allows eligible western Alaska communities to participate in the BSAI fisheries by allocating a percentage of all BSAI quotas for groundfish, prohibited species, halibut, and crab, to communities as represented by six CDQ groups. In recent years, the Council has increased the CDQ percentage from 7.5 percent to 10 percent for the Pollock and BSAI crab fisheries. The Council is currently considering increasing the percentage of Pacific cod to 10 percent and may consider increasing the percentage of flatfish to 10 percent. (S.Bibb, personal communication 9/05)

In 2004, NMFS implemented a program to allow communities in the GOA to establish non-profit entities to purchase and hold halibut and sablefish QS for lease to, and use by, community residents (69 *FR* 23681; April 30, 2004). This program was designed to improve the effectiveness of the IFQ Program by providing additional opportunities for residents of fishery dependent communities. The communities eligible for this program were smaller rural communities along the GOA without direct road access to larger communities. (G. Merrill, pers. comm.. 9/05)

Under the GOA rationalization program, the Council is considering a Community Fisheries Quota program to directly allocate quota in the GOA groundfish fisheries to eligible communities and a Community Purchase Program to allow eligible communities to purchase GOA groundfish quota share. (G. Merrill, pers. comm.. 9/05)

In the past, the six Western Alaska CDQ groups have invested a part of their annual revenue in community based fisheries development as well as fishing asset acquisition. These investments have included numerous large commercial vessels, several inshore processing plants, as well as sport charter vessels. In addition, the CDQ groups have funded water and sewer infrastructure, gear storage facilities, commercial harbor and dock construction, dredging, boat ramps, ice machines, small boat harbor facilities, processing plant upgrades, new processing plant construction, and loans to fisheries support businesses. The CDQ groups have also provided infrastructure-matching funds and have contracted for fisheries development services (Northern Economics, 2002). An observed result of the success of community based allocation programs has been considerable development of port, harbor, and processing infrastructure, and such development can be expected in the future.

Future expansion of community participation in rationalization programs may result in economic development similar to those the CDQ program has brought about. Any capital projects could have environmental impacts associated with shoreline development, increased offal waste discharge from processing activities, and disruption of benthic habitat through port development.

It should be noted, however, that such development is subject to local, State, and Federal permit requirements. NOAA Fisheries Service conducts EFH consultations and also has the ability to make conservation recommendations on U.S. Army Corps of Engineers permit applications, such as those required for wetland development and dock or harbor developments. Such oversight reduces the cumulative environmental impact of these developments.

3.2.4 Developments in traditional management tools

Key points:

- Authorization of ground fisheries in future years
- Increasing enforcement responsibilities
- Technical and program changes that will improve enforcement and management

Authorization of groundfish fisheries in future years

The annual harvest specifications process and the associated groundfish fisheries create an important class of reasonably foreseeable actions that will take place in every one of the years considered in the cumulative impacts horizon (out to, and including, 2015). Annual TAC specifications limit each year's harvest within sustainable bounds. The overall OY limits on harvests in the BSAI and in the GOA constrain overall harvest of all species.

The process by which harvest specifications are adopted, and by which in-season management takes place, is described in detail in Section 3.1 of this chapter. This process is conducted in accordance with the mandates of the Magnuson-Stevens Act, following guidelines prepared by NMFS, and in accordance with the process for determining overfishing criteria that is outlined in Section 3.2 of each of the groundfish FMPs. Specifications are developed using the most recent fishery survey data (often collected the summer before the fishery opens) and reviewed by the Council and its SSC, AP, and plan teams. The process provides many opportunities for public comment (see Section 1.7 of this EA). The management process, of which the specifications are a part, was subject to a programmatic supplemental EIS finalized in 2004 (NMFS 2004b). Each year's specifications are subject to a NEPA review.

Annual target species harvests, conducted in accordance with the annual specifications, will impact the stocks of the target species themselves. Annual harvest activity will change total mortality for the stocks, may affect stock characteristics through time by selective harvesting, may affect interfere with reproductive activity, or, through compensatory mechanisms, increase the annual harvestable surplus, may affect the prey for the target species, or may alter essential fish habitat.

The annual target species harvests also impact the environmental components described in this EA: non-target fish species, seabirds, marine mammals, living and non-living benthic habitat, and a more general set of ecological relationships. In general, the environmental components are renewable resources subject to environmental fluctuations. Ongoing harvests of target species may be consistent with the sustainability of other resource components if the fisheries are associated with mortality rates that are less than or equal to the rates at which the resources can grow or reproduce themselves. On the other hand, some dimensions of the benthic habitat may constitute non-renewable and depletable resources, or resources renewable on such a long time frame that they are essentially non-renewable and depletable.

The on-going fisheries employ thousands of fishermen and fish processors and contribute to the maintenance of human communities, principally in Alaska and the Pacific Northwest states.

The Council will almost certainly adopt new specifications for 2007 (the second year of this two-year specifications period in this action) in December 2006. While each year, OFLs, ABCs, and TACs are specified for two years at a time, the specifications overlap. In December 2006, the Council will almost certainly recommend a set of specifications for the years 2007 and 2008. The 2007 specifications adopted at that time will supersede the 2007 specifications that the Council is expected to recommend for 2007 in December 2005. The new 2007 specifications will be subjected to the normal process of analysis, Council consideration at its October and December Council meetings, and proposed and final rulemaking. New information that becomes available between December 2005 and December 2006 will be considered in this process. In many instances, the new 2007 specifications will be based on survey data on fish stocks collected during the summer of 2006 and analyzed in the fall of 2006.

Increasing enforcement responsibilities

New rationalization programs and other new programs to protect resource components from groundfish fishery impacts will create additional responsibilities for enforcement agencies. Rationalization programs that assign privileges to harvest or process fish, or that create responsibilities to deliver fish to particular buyers, or to deliver fish harvested in designated zones to designated sites, create additional monitoring responsibilities for enforcement. Programs such as subsistence harvest allocations, charter halibut harvesting allocations, community quota shares, the rockfish pilot project in the GOA, and individual and processor crab quotas and cooperatives—all increase enforcement responsibilities, as do programs that require the discard or retention of bycatch, that impose spatial or temporal closings on fishing, or that create gear or operational performance standards. New programs of these types are likely in the near future and suggest a reasonably foreseeable increase in enforcement responsibilities.

Despite this likely increase in enforcement responsibilities, it is not clear that resources for enforcement will increase proportionately. The US Coast Guard (USCG) is expected to bear a heavy responsibility for homeland security well into the forecast period (see Section 3.2.5), is not expected to receive proportionate increases in budget to accommodate increased fisheries enforcement. Likewise, the NOAA Office of Law Enforcement (OLE) has not recently received increased resources consistent with its increasing enforcement obligations. (Passer, pers. Comm. 9/05)

However, new enforcement assistance has become available in recent years through direct Congressional line item appropriations for Joint Enforcement Agreements (JEA) with all coastal states. The State of Alaska has received a total of $4.75 million of this funding since 2001 and has used JEA money to purchase capital assets such as patrol vessels and patrol vehicles. The State has also hired new personnel to increase levels of at-sea and dockside enforcement and used JEA money to pay for support and operational expenses pertaining to this increased effort. (Passer, pers. comm. 9/05)

Additional funding will also be generated by cost recovery programs established under § 304(d)(2) of the Magnuson-Stevens Act. NMFS is required to establish a cost recovery fee system to recover actual costs directly related to the management and enforcement of IFQ or CDQ programs. NMFS has established cost recovery fee systems for the halibut/sablefish IFQ program and the Crab Rationalization Program. Fees are paid by fishery participants and are based on the ex-vessel value of species harvested under the program. Cost recovery fees are prohibited from exceeding 3 percent of the annual ex-vessel value. Cost recovery fee systems help ensure that funding is available to manage and enforce IFQ programs. It is reasonable foreseeable that NMFS will continue to establish cost recovery systems for IFQ programs.

Uncertainties about Congressional authorization of increased enforcement funding preclude any prediction of trends in the availability of resources to meet increased enforcement responsibilities. Thus, while an increase in responsibilities is reasonably foreseeable, a proportionate increase in funding is not.

Technical and program changes that will improve enforcement and management

It is reasonably foreseeable that managers will make increasing use of technologies for fisheries management and enforcement. Use of the vessel monitoring system (VMS) will increase in coming years. Vessels fishing for Pollock, Pacific cod, and Atka mackerel are already required to operate VMS units (50 CFR 679.7(a)(18). In June 2005, the Council recommended that vessels operating in the Aleutian Islands, and vessels operating with mobile bottom contact gear in the Gulf of Alaska carry VMS to assist in the enforcement of new protection measures for Essential Fish Habitat and Habitat Areas of Particular Concern NMFS/Alaska Region is currently developing regulations to implement this action. At the same meeting, the Council requested that NMFS follow up with an analysis on extending VMS requirements more generally in Federal waters off of Alaska. Details on these two actions by the Council are on page 6 of the June 2005 newsletter available at http://www.fakr.noaa.gov/npfmc/newsletters/newsletters.htm.

A joint project by NMFS AKR, the State of Alaska, and the International Pacific Halibut Commission will lead to electronic landings reporting for groundfish during 2006. When fish are delivered on shore, fishermen and buyers will be able to fill out a web-based form with the information on landings. The program will generate a paper form for industry and will forward the data to a central repository, where it will be available for use by authorized parties. Mandatory electronic reporting was implemented for crab fisheries in August 2005. A voluntary program for groundfish fishing operations is expected to begin early in 2006 with the intent that, after a reasonable period of time, the program will become a formal requirement for groundfish deliveries. The introduction of electronic reporting will allow enforcement staff to look at large masses of data for violations and trends. The web-based input form will contain numerous automatic quality control checks to minimize data input errors. The program will get data to enforcement agents more quickly, increase the efficiency of record audits, and make enforcement activity less intrusive, as agents will have less need to enter vessels or plants and review documents on the premises (J. Passer and D. Ackley, pers. comm. 9/05).

Although rationalization programs increase the monitoring obligations for enforcement, they also improve enforcement and management capabilities by shifting enforcement efforts from the water to dockside for monitoring landings and other records (J. Passer, pers. comm. 9/05). Moreover, by stabilizing or reducing the number of operations and by creating fishing and processing cooperatives, rationalization reduces the costs of private and joint action by industry to address certain management issues, particularly the monitoring and control of bycatch. For example, as noted earlier, in the Chinook monitoring program in the AFA Pollock fisheries of the BSAI, fishermen contract with each other for in-season catch monitoring by a private firm and agree to restrict fishing activity when by-catch rates rise to defined levels. In the scallop fleet, some members have formed Coops which require members to not exceed bycatch limits. Exceeding limits may result in monetary or other punitive action against a member, thereby reduing bycatch of non-target species in the scallop fishery. (N. Sagalkim per. Commun. 9/27/05)

The North Pacific Fishery Management Council and NMFS currently are drafting an EA/RIR/IRFA that analyzes options for restructuring the North Pacific Groundfish Observer Program. The analysis examines seven alternatives, six of which would create new system for procuring and deploying observers in the groundfish and halibut fisheries of the North Pacific. All of the action alternatives would replace the current pay-as-you-go system (where vessels contract directly with observer providers to meet coverage levels specified in regulation) with a program supported by broad-based user fees and/or direct Federal subsidies, in which NMFS would contract directly for observer coverage and be responsible for determining when and where observers should be deployed. Under this new program, vessel operators in fisheries with less than 100% coverage would no longer be responsible for obtaining certain levels of observer coverage specified in regulation, but instead, would be required to carry observers only at NMFS' request. Vessels and processors in fisheries that require 100% or 200% coverage will continue to operate much as they do today, except that NMFS will be responsible for observer procurement rather than the fishing companies themselves. (J. Anderson, per. Commun. 9/27/05) Pending Council action, however, it is premature to describe this as a reasonably foreseeable action. However, the possibility contributes to the overall quality of observer data to support scientific and management data needs, as well as to expectations of more general effort to improve the efficiency of existing enforcement resources.

NMFS has begun to implement the use of video monitoring to ensure compliance with full retention requirements in other Regions. In the Alaska Region, NMFS is investigating the use of video to ensure full retention of quota species under the rockfish pilot program and, depending on the outcome of these investigations, regulations may be developed to use video monitoring to supplement observer coverage in the rockfish fisheries. Electronic monitoring technology is evolving rapidly, and it is probable that video and other technologies will be introduced to supplement current observer coverage and enhance data collection in some fisheries, but the current technologies are not sufficiently developed for this use at this time. (A. Kinsolving per. Commun. 9/27/05)

3.2.5 Actions by Other Federal, State, and International Agencies

Key points for the cumulative effects analysis:

- Future exploration and development of offshore mineral resources authorized by the Mineral Management Service, Department of the Interior.
- Reductions in United States Coast Guard fisheries enforcement activities.
- Oversight of seabirds and some marine mammal species by the US Fish and Wildlife Service.
- Expansion of harvest level or location of State-managed or State parallel groundfish fisheries.
- Continuing monitoring of seafood processor effluent discharges

Future exploration and development of offshore mineral resources

The Mineral Management Service (MMS) expects that reasonably foreseeable future activities include numerous discoveries that oil companies may begin to develop in the next 15-20 years in Federal waters off Alaska. In the near future, the OCS (Outer Continental Shelf) Leasing Program will be offering two sales of about 2.5 million acres in the Cook Inlet/Shelikof Straits region in 2006 and 2007. The current MMS 5 year management plan includes authorizing leases in the Chukchi and Beaufort Seas, and Cook Inlet. The latest Cook Inlet lease sale received no bids, so the sale was not held. There is a possibility that they will again offer the lease up for sale in 2006. Potential environmental risks from the development of offshore drilling include the impacts of increased vessel offshore oil spills, drilling discharges, offshore construction activities, and seismic surveys. In an EIS prepared for upcoming sales in the OCS Leasing Program, the MMS has assessed the cumulative impacts of such activities on fisheries and finds only small incremental increases in impacts of development, unlikely to significantly impact fisheries and essential fish habitat (MMS 2003).

Reductions in United States Coast Guard fisheries enforcement activities

The United States Coast Guard (USCG) conducts fisheries enforcement activities in the EEZ off Alaska in cooperation with NMFS Enforcement. Increased responsibilities for homeland security and for detection of increasing drug-smuggling activities in waters off Alaska have limited the resources available for the USCG to conduct enforcement activities at the same level as in the recent past. Any deterrent created by Coast Guard presence in enforcing fisheries regulations and restrictions would likely be reduced, as would the opportunities for detection of fisheries violations at sea. The Council's proposed VMS would mitigate the increasingly limited USCG resources by providing immediate real-time knowledge of a vessel's location. (Cerne, pers. comm.). [citation. Commander Michael B. Cerne, USCG District 17, personal communication] For additional information, see section 3.2.4 Developments in traditional management tools.

Continuing oversight of seabirds and some marine mammal species by the US Fish & Wildlife Service

The US Fish and Wildlife Service (FWS) is the lead agency for managing and conserving seabirds and certain marine mammal species, and for administering the ESA. Under its responsibilities for the ESA, the FWS has changed the status of two species since 2002: the northern sea otter has been listed as threatened (70 *FR* 46366, August 9, 2005), and Kittlitz's murrelet has been made a candidate for listing (69 FR 24876; May 4, 2004). The status of these two species, while having no effect at present, may in the future require additional action to protect these species and their critical habitat from adverse impacts.

Expansion of State groundfish fisheries

The State may expand State-managed or State parallel groundfish fisheries. State-managed fisheries are managed exclusively under the authority of the State. Typically, the State sets the fishery quotas and opens State-managed fisheries after Federal fisheries conclude in adjacent waters. State parallel fisheries occur in State waters but are opened at the same time as Federal fisheries in the EEZ. Parallel fishery harvests are considered part of the Federal TAC and vessels move between State and Federal waters during the concurrent parallel and Federal fisheries.

The State of Alaska Board of Fisheries (BOF) has received petitions to increase the amount of Pacific cod harvested in State waters and is considering open new areas to pollock fishing. Because most of the 0 nautical miles (nm) to 3 nm waters are designated as critical habitat for Steller sea lions, potential changes in State fisheries are monitored closely with regards to changing distributions of prey species and effort.

Currently, State-managed GOA Pacific cod fisheries inside 3 nm are allocated up to 25% of the Federal TAC in each corresponding management area. The BOF has received numerous petitions from participating fishermen to increase this percentage, but has tabled any action pending

Federal action towards GOA groundfish rationalization. If the State increases the quotas for the State-managed Pacific cod fishery, some accommodation may be made by reducing the Federal TAC to ensure total harvests of the stock do not exceed the ABC.

The BOF is currently considering proposals to open State-managed and State parallel pollock fisheries in Cook Inlet, in the Western GOA near the Shumagins, and in the Aleutians near Adak. The main goal of these State waters pollock fisheries is to provide fishing opportunities to small vessels and local processors. Historical pollock fisheries occurred in State waters in these areas prior to fishing closures resulting from the Steller sea lions protection measures (50 CFR 679.22).

During the summer of 2005, the BOF and the Council reviewed these proposals through the Joint Protocol Committee to determine if any of these proposals would result in formal consultation under the ESA based on a change in the Federal action (in the case of the parallel fishery) or based on new information (in the case of the State-managed fishery). A formal consultation likely would result in a biological opinion. If a new biological opinion found that the action is likely to result in jeopardy or adverse modification of critical habitat, reasonable and prudent alternatives for the Federal fishery may be required to minimize impacts from the State waters fishery. Any significant change in the State-managed or State parallel pollock fisheries likely would result in changes to the Federal fisheries to minimize the impacts of the State fisheries on the fish stocks and on Steller sea lions. Any changes in the Federal fishery would depend on the potential impacts of the State fisheries.

Other State of Alaska actions

Several State actions that may impact habitat and those animals that depend on habitat are in early development. These potential actions will be tracked, but cannot be considered reasonably foreseeable future actions because the State has not proposed regulations. These actions include:

- State primacy for the National Pollution Discharge Elimination System Program under the Clean Water Act. The State has passed legislation to implement this program, but a primacy package has not been submitted to or approved by EPA. The program is required to be as stringent as the current federal program but the effectiveness of implementation will be the key to whether impacts on habitat may be seen.

- Amendments to the Alaska Coastal Zone Management Program. Program changes have been submitted to NOAA for review. NOAA is developing an EIS to determine whether to support the decision for approval. The State would need to propose regulations after receiving approval. Proposed changes under consideration include: revisions to state standards for coastal development, energy facilities, utility routes and facilities, sand and gravel mining and mineral processing, transportation routes and facilities, and subsistence uses; the establishment of automatic consistency for shallow gas exploration and development projects; the habitat policy; the scope and content of District Plans; and the Department of Environmental Conservation “Carve Out” resulting in direct issuance by DEC of air and water quality permits without ACMP review.

- Changes to the residue criteria under the Alaska Water Quality Standards. The State proposes to significantly generalize the language of the residues criterion and increase departmental discretion in determining what constitutes an exceedance. DEC’s proposed residues criterion eliminates the prohibition for residues to cause leaching of toxic or deleterious substances. Under the new system, any and all residue discharges would be allowed without a permit, unless some type of harm (objectionable characteristics or presence of nuisance species) is discovered. EPA has provided comments to the State regarding this proposed change and determined that major changes were needed for EPA approval.

NMFS staff will track the progress of these potential actions and will include these in cumulative effects analysis in future NEPA documents when proposed rules are issued.

Ongoing EPA monitoring of seafood processor effluent discharges

In Alaska, the EPA currently administers National Pollutant Discharge Elimination System (NPDES) permits to control discharge at shore-based seafood processing facilities. These permits involve effluent, or end-of-pipe, limitations for Alaska seafood processors. With the development of the pollock fisheries, NPDES permits were issued in 1991 and 1996 to require one mm screening of fish wastes and reduction of those wastes to fish meal, significantly reducing in the amount of solids discharged from these facilities. NPDES permits provided technology-based effluent limitations for finfish and fish meal processing and required annual surveys of dissolved oxygen and waste piles in the receiving water. Expired NPDES permits may supplemented with Total Maximum Daily Load (TMDL) plans and explicit limits of the wasteloads of BOD and settleable solid waste residues. A TMDL identifies levels of pollution control needed to achieve water quality standards. The TMDL needs to consider all sources, point, nonpoint, and background, in determining the loading capacity of a waterbody. The plan identifies preventative and remedial actions which will reduce pollutant loads to water quality-limited waterbodies. It is reasonable to assume that in the foreseeable future, the EPA will continue to require seafood processors to monitor and limit discharge of waste into coastal waters.

3.2.6 Private actions

Key points:

- Commercial fishing
- Increasing levels of economic activity in Alaska’s waters and coastal zone
- Expansion of aquaculture

Commercial fishing

Fishermen will continue to fish for groundfish and other species as authorized by the Council, NMFS, the State of Alaska, and the IPHC. This fishing constitutes the most important class of reasonably foreseeable future private actions. Additional groundfish fisheries will take place from 2008 to 2015, the years in the time horizon adopted for this action that are not covered by the 2006-2007 specifications.

In 2003, 951 catcher vessels operated in the Federal groundfish fisheries off of Alaska; 678 used hook-and-line gear, 202 used pot gear, and 169 used trawl gear. That same year, 86 catcher-processors operated off of Alaska; 42 of these used hook-and-line gear, 3 used pot gear, and 41 used trawl gear (Hiatt et al. 2004, page 79, Table 32). As noted in the section on rationalization, rationalization programs currently being implemented, or under consideration, can reasonably be expected to reduce the total number of fishing operations in Federal waters off of Alaska in coming years.

The Marine Stewardship Council (MSC) is a non-profit organization that seeks to promote the sustainability of fishery resources through a program of certifying fisheries that are well managed with respect to environmental impacts. Certification conveys an advantage to industry in the market place, by making products more attractive to consumers who are sensitive to environmental concerns. A fishery must undergo a rigorous review of its environmental impact to achieve certification. Fisheries are evaluated with respect to the potential for overfishing or recovery of target stocks, the potential for the impacts on the "structure, productivity, function and diversity of the ecosystem," and the extent to which fishery management respects laws and standards, and mandates "responsible and sustainable" use of the resource. (MSC, 2004, pages 21-23) Once certified, fisheries are subject to ongoing monitoring, and requirements for recertification.

The BSAI and GOA Pollock fisheries have recently received MSC certification. The BSAI freezer longline Pacific cod fishery is currently in the middle of an evaluation that may lead to certification. Because the program requires ongoing monitoring and re-evaluation for certification every five years (SCS, 2004, page 242), and because the program may convey a marketing advantage, MSC certification may change the industry incentive structure to increase sensitivity to environmental impacts. This certification currently may only affect the incentives for the Pollock fishery since other groundfish sectors have not yet been certified.

Increasing levels of economic activity in Alaska's waters and coastal zone

Alaska's population has grown by over 100,000 persons since 1990 (US Census Bureau web page accessed at http://www.census.gov/ on July 14, 2005). A mid-point estimate of Alaska's population in June 2005 is about 662,000. The Alaska State Demographer's mid-point projection for the end of the forecast period of this analysis (2015) is about 734,000, an 11% increase (Williams 2005, page 8). In Alaska, the success of the CDQ program and the expansion of such community based allocation programs in the future (as discussed under the earlier section on reasonably foreseeable rationalization programs) may lead to increased population in affected communities.

A growing population will create a larger environmental "footprint," and increase the demand for marine environmental services. A larger population will be associated with more economic activity from increased cargo traffic from other states, more recreational traffic, potential development of lands along the margin of the marine waters, increased waste disposal requirements, and increased demand for sport fishing opportunities.

Shipping routes from Pacific Northwest ports to Asia run across the GOA and through the BSAI, and pass near or through important fishing areas. The key transportation route from West Coast ports in Washington, Oregon, and British Columbia to East Asia (and back) passes from the GOA into the EBS at Unimak Pass, and then returns to the Pacific Ocean in the area of Buldir Island. A minimum estimate is that 2,700 large vessels use this route each year.[15] The direct routes from California ports to East Asia pass just south of the Aleutians. Continued globalization, growth of the Chinese economy, and associated growth in other parts of the Far East may lead to increasing volumes of commercial cargo vessel traffic through Alaska waters. US agriculture exports to China, for example, doubled between 2002 and 2004; 41% of the increase, by value, was

[15] Based on estimates of vessels transiting Unimak Pass provided by the U.S. Coast Guard maritime Domain Awareness Center in 2004. More recent information suggests that the actual number of vessels transiting the Pass may be two or three times as large as this. Robertson, pers. Comm..

soybeans and 13% was wheat (USDA, 2005, pages 2-4). In future years, this may be an important route for Canadian oil exports to China (Zweig and Jianhai, 2005).

The significance of this traffic for the regional environment and for fisheries was highlighted by the December 2004 grounding of the Selendang Ayu. The accident dumped the vessel's cargo of soybeans and as much as 320,000 gallons of bunker oil on the shores of Unalaska Island (U.S. Coast Guard, Selendang Ayu grounding Unified Command press release, April 23, 2005.)

Mining activities in Alaska are expected to increase in the coming years. In Southeast Alaska, the Kensington mine in Berners Bay is under construction and the Goldbelt mine at Hawk Inlet is slated for expansion. The Red Dog mine in Northwest Alaska will continue operations and a new deposit in the Bristol Bay region is being explored for possible large-scale strip mining. The continued development and/or expansion of mines, though expected, will be dependent on stable metals prices in the coming years. At present it appears such prices will be stable. (S. Miller pers. Commun. 9/05)

Oil and gas development can also be expected to increase due to the currently high oil and gasoline prices. Plans are underway for development of a gas pipeline that may include a shipping segment through the GOA. Exploration and eventual extraction development of the Arctic National Wildlife Preserve is also anticipated. It is also possible that fuel prices may create incentive for oil and gas lease sales on the continental shelf off Western Alaska, which is the prime fishing ground of the Eastern Bering Sea. (S. Miller per. Commun. 9/05)

Expansion of Aquaculture

On a national level, NMFS is working towards well-managed, environmentally-sound, and productive marine aquaculture operations in the US by developing new offshore aquaculture legislation for the EEZ. NMFS plans to develop this legislation over the next five years to establish a fully operational regulatory infrastructure for offshore aquaculture that includes a streamlined permitting process, citing criteria, and pre-approved zones for offshore aquaculture (NMFS 2005f). With this national priority for aquaculture development, it is reasonably foreseeable that aquaculture will increase in the US within the 10-year time frame.

In the near future, sablefish is groundfish species most likely to become an aquaculture product. The relatively high value of sablefish has prompted research and development into sablefish aquaculture. If sablefish aquaculture becomes commercially viable, increased sablefish supply could cause a drop in sablefish prices (e.g. as salmon aquaculture has). Available research indicates that aquaculture sablefish production of 30,000 metric tons, which is similar to current world wild production, would reduce sablefish ex-vessel prices by 37 percent. (Huppert & Best, 2004). Such a change would have direct impact on revenue earned by sablefish harvesters and may reduce effort in wild sablefish fisheries. In addition, the aquaculture industry could create environmental externalities from parasites, disease, escape, and pollution. A recent study by the Fisheries Center of the University of British Columbia concluded that, when the environmental externalities are considered, large-scale sablefish aquaculture would not be beneficial to the British Columbia economy (Sumalia, et al., 2005).

3.3 Species listed under the Endangered Species Act

Table 3.3-1 lists ESA listed species found in the fishery management areas. An FMP level Section 7 consultation BiOp was completed for the groundfish fisheries in November 2000

(NMFS 2000) for listed species managed by NMFS. This BiOp covers marine mammals, turtles, and Pacific salmon. In the BiOp, the western distinct population segment of Steller sea lions was the only ESA listed species identified as likely to be adversely affected by the groundfish fisheries. Sei whales are included because distribution information available indicates that they are widespread in the Atlantic and Pacific waters, but they have not been sited in Alaska waters.

A subsequent biological opinion on the Steller sea lion protection measures was issued in 2001 (NMFS 2001b, appendix A). The 2001 BiOp found that the groundfish fisheries conducted in accordance with the Steller sea lion protection measures were unlikely to cause jeopardy of extinction or adverse modification or destruction of critical habitat for Steller sea lions.

> The effects of the groundfish fisheries on ESA listed salmon are discussed in Section 4.5. The incidental take statement (ITS) of 55,000 chinook salmon from the 1999 BiOp (NMFS 1999) was exceeded in the 2004 BSAI groundfish fishery. NMFS Alaska Region is continuing consultation with NMFS NW Region to determine if the exceedence of the ITS is likely to adversely affect ESA listed salmon. The Region is continuing to track salmon research efforts and Council activities to reduce salmon bycatch (Lohn 2005). The NMFS NW Region determined that the current ITS continues to exempt the BSAI fisheries from ESA section 9 take prohibitions. (Lohn 2005)

Listed seabirds are under the jurisdiction of the USFWS which has completed an FMP level (USFWS 2003a) and project level BiOp (USFWS 2003b) for the groundfish fisheries. Both USFWS BiOps concluded that the groundfish fisheries and the annual setting of harvest specifications were unlikely to cause the jeopardy of extinction or adverse modification or destruction of critical habitat for ESA listed birds.

> No consultations are required for the 2006 and 2007 harvest specification on NMFS managed marine mammals and turtles or on seabirds because the proposed actions will not modify the actions already analyzed in previous BiOps, are not likely to adversely affect ESA listed species beyond the effects already analyzed, and are not likely to cause the incidental take statements of ESA species to be exceeded. Therefore the triggers to reinitiate consultation are not met. Informal consultation between the USFWS and NMFS on northern sea otters for the groundfish fisheries program and harvest specifications was initiated in September 2005. Summaries of the ESA consultations before 2004 on individual listed species are located in the section 3.0 of the PSEIS and its accompanying tables, under each ESA listed species' management overview (NMFS 2004b).

Table 3.3-1 ESA listed and candidate species that range into the BSAI or GOA groundfish management areas.

Common Name	Scientific Name	ESA Status
Blue Whale	*Balaenoptera musculus*	Endangered
Bowhead Whale	*Balaena mysticetus*	Endangered
Fin Whale	*Balaenoptera physalus*	Endangered
Humpback Whale	*Megaptera novaeangliae*	Endangered
Right Whale	*Balaena glacialis*	Endangered
Sei Whale	*Balaenoptera borealis*	Endangered
Sperm Whale	*Physeter macrocephalus*	Endangered
Steller Sea Lion (Western Population)	*Eumetopias jubatus*	Endangered
Steller Sea Lion (Eastern Population)	*Eumetopias jubatus*	Threatened
Chinook Salmon (Puget Sound)	*Oncorhynchus tshawytscha*	Threatened
Chinook Salmon (Lower Columbia R.)	*Oncorhynchus tshawytscha*	Threatened
Chinook Salmon (Upper Columbia R. Spring)	*Oncorhynchus tshawytscha*	Endangered
Chinook Salmon (Upper Willamette .)	*Oncorhynchus tshawytscha*	Threatened
Chinook Salmon (Snake River Spring/Summer)	*Oncorhynchus tshawytscha*	Threatened
Chinook Salmon (Snake River Fall)	*Oncorhynchus tshawytscha*	Threatened
Sockeye Salmon (Snake River)	*Oncorhynchus nerka*	Endangered
Steelhead (Upper Columbia River)	*Onchorynchus mykiss*	Endangered
Steelhead (Middle Columbia River)	*Onchorynchus mykiss*	Threatened
Steelhead (Lower Columbia River)	*Onchorynchus mykiss*	Threatened
Steelhead (Upper Willamette River)	*Onchorynchus mykiss*	Threatened
Steelhead (Snake River Basin)	*Onchorynchus mykiss*	Threatened
Steller's Eider [1]	*Polysticta stelleri*	Threatened
Short-tailed Albatross [1]	*Phoebaotria albatrus*	Endangered
Spectacled Eider[1]	*Somateria fishcheri*	Threatened
Kittlitz Murrelet[1]	*Brachyramphus brevirostris*	Candidate
Northern Sea Otter	*Enhydra lutris*	Threatened

[1]The Steller's eider, short-tailed albatross, spectacled eider, and Northern sea otter are species under the jurisdiction of the U.S. Fish and Wildlife Service. For the bird species, critical habitat has been established for the Steller's eider (66 FR 8850, February 2, 2001) and for the spectacled eider (66 FR 9146, February 6, 2001. The Kittlitz murrelet has been proposed as a candidate species by the USFWS (69 FR 24875, May 4, 2004)

3.4 Regime Shift Considerations

The action area for the specifications is subject to periodic climatic and ecological "regime shifts." These shifts change the values of key parameters of ecosystem relationships, and can lead to changes in the relative success of different species.

Regime shifts are natural phenomena, and are not the results of human actions, and least in an obvious way. Neither are they predictable, or reasonably foreseeable. For these reasons, they have not been considered reasonably foreseeable future actions. However, because they may have important implications for future human actions in the GOA and BSAI, the following discussion of this phenomena, from the Ecosystem Considerations chapter of the 2005 SAFE (NMFS 2005e) is excerpted here.

> **North Pacific** In the past three decades the North Pacific climate system experienced one major and two minor regime shifts (Tables 2-5). A major transformation, or regime shift, occurred in atmospheric and oceanic conditions around 1977, part of the Pacific Decadal Oscillation (PDO), which represents the leading mode of North Pacific sea surface temperature (SST) variability and is related to the strength of the Aleutian low. The first of the minor shifts occurred in 1989, primarily in the winter PDO index. The second minor shift was in 1998, and was associated with a change in the sign of the second principal mode of North Pacific SST variability, the so-called Victoria pattern, in winter and the summer PDO index. The atmospheric expression of the Victoria pattern is a north-south pressure dipole, with the negative 500-hPa height anomaly center over the eastern Aleutian Islands and the positive center over the east-central North Pacific (positive mode of the pattern). During the period 1989-1997, atmospheric pressure tended to be above normal in the high latitudes and below normal in the mid-latitudes, which translated to a relative cooling in the Bering Sea. Since 1998, the polarity of the winter north-south pressure dipole reversed. The SST field in the eastern Bering Sea became anomalously warm, whereas colder-than-normal conditions were established along the U.S. West Coast. During the summer season, the 1998 shift exhibited itself in a transition from the north-south pressure dipole to a monopole characteristic of the negative PDO pattern. In 2003 and 2004, however, the summer and winter PDO indices became positive. During the winter of 2003, the SST anomaly pattern in the North Pacific resembled neither the PDO, nor the Victoria patterns. Winter temperatures were above the 1971-2000 average in the Bering Sea and near the average in the Gulf of Alaska and the U.S. West Coast. El Ninos were present in both the winters of 2003-2004 and 2004-2005. The increase in SST along the coast of South America which is associated with El Ninos, was brief, and conditions returned to neutral in July.
> http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory, August 16, 2005).
>
> **Bering Sea** The major shift in the BS occurred after 1977, when conditions changed from a predominantly cold Arctic climate to a warmer subarctic maritime climate. The very warm winters of the late 1970s and 1980s were followed by cooler winters in the 1990s. This cooling was likely a result of a shift in the Arctic Oscillation and hence a tendency for higher sea-level pressure (SLP) over the Bering Sea. Since 1998, negative SLP anomalies have prevailed, which is indicative of greater Pacific influence and consistent with generally milder winters. The anomalously warm winter of 2005 follows similarly warm winters of 2003 and 2004. This warming becomes comparable in its scale with major warm episodes in the late 1930s and late 1970s – early 1980s. The spring transition is occurring earlier, and the number of days with ice cover after March 15 has a significant downward trend. In 2005, the ice cover index reached the record low value. The lack of ice cover over the southeastern shelf during recent winters resulted in significantly higher heat content in the water column. Sea surface temperature in May 2005 was above its long-term average value, which means that the summer bottom temperatures will likely be also above average.

Aleutian Islands Climatic conditions vary between the east and west Aleutian Islands around 170 deg W: to the west there is a long term cooling trend in winter while to the east conditions change with the PDO. This is also near the first major pass between the Pacific and Bering Seas for currents coming from the east.

Gulf of Alaska Evidence suggests there were climate regime shifts in 1977, 1989, and 1998 in the North Pacific. Ecosystem responses to these shifts in the Gulf of Alaska (GOA) were strong after the 1977 shift, but weaker after the 1989 and 1998 shifts. Variation in the strength of 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 and 1998 regime shifts did not, therefore, result in strong signals in the GOA.

There were both physical and biological responses to all 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 temperatures, increased coastal rain, and, therefore, increased water column stability. The optimal stability window hypothesis suggests that water column stability is the limiting factor for primary production in the GOA (Gargett 1997). After 1989 water temperatures were cooler and more variable in the coastal GOA, suggesting production may have been lower and more variable. After the 1998 regime shift, increased storm intensity from 1999 to 2001 resulted in a deeper mixed layer depth in the central GOA, and winter coastal temperatures were average or slightly below average. Initial data from the NMFS summer bottom trawl survey indicate that 2005 sea surface temperatures in eastern GOA were very warm (i.e., 15-16˚C; M. Martin, personal communication, NMFS).

Predictions It has been shown that the North Pacific atmosphere-ocean system included anomalies during the winter of 2004-05 that were unlike those associated with the primary modes of past variability. This result suggests a combination of two factors: (1) that the nature of North Pacific variability is actually richer in variability than appreciated previously, and (2), that there is the potential for significant evolution in the patterns of variability due to both random, stochastic effects and systematic trends such as global warming. Notably, at the time of this writing, it cannot be determined whether the North Pacific is heading into a positive PDO-like condition or some other state. The Bering Sea shows three multidecadal regimes in SAT fluctuations: 1921-1939 (warm), 1940-1976 (cold), and 1977-2005 (warm). It is worth noting that the two previous regimes had a similar pattern, when SAT anomalies were strongest at the end of the regime, right before the system switched to a new one. In the current warm regime, the magnitude of SAT fluctuations has been steadily increasing since the mid-1980s, and the Bering Sea may become even warmer before it will switch to a new cold regime. If the regime concept is true, this switch may happen anytime soon, especially given the uncertain state of the North Pacific climate, suggesting that it may be in a transition phase. It is unknown if changes observed after the 1998 shift will persist in the Gulf of Alaska and how long the current conditions in the Gulf of Alaska will last.

Predicting regime shifts will be difficult until the mechanisms that cause the shifts are understood (Minobe 2000). It will require better understanding of the probability of certain climate states in the near-term and longer term and the effects of this variability on individual species production and distribution and food webs. Future ecosystem assessments may integrate various climate scenarios into the multispecies and ecosystem forecasting models by using assumptions about the effects of climate on average recruitment of target species.

4.0 Environmental Impacts

What's in this chapter:

4.1 Significance analysis

An environmental assessment (EA) is meant to "provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact." (40 *CFR* 1508.9) An EA must evaluate whether a Federal action, and all reasonable alternatives to that action, will have a significant effect on the human environment.

Significance is determined by considering the context (geographic, temporal, and societal) in which the action will occur, and the intensity of the action. Intensity depends on the magnitude of the impact, the degree of certainty in the evaluation, the cumulative impact when the action is related to other actions, the degree of controversy, and violations of other laws. (40 *CFR* 1508.27)

Significance must be determined with respect to both direct and indirect impacts, and with respect to cumulative impacts. Direct impacts "…are caused by the action and occur at the same time and place…" (40 *CFR* 1508.8(a)), while indirect impacts "…are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable…" (40 *CFR* 1508.8(b))[16] A cumulative impact is "…the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions." (40 *CFR* 1508.7)

In this EA, the term "no impact" means a resource component (such as seabirds or habitat) is left in the condition it would be in, in the absence of a fishery. An "adverse" impact leaves the resource in a worse condition than it would be in an unfished condition. A "beneficial" impact leaves the resource in a better condition than it would be in an unfished condition. "Significant" impacts are those adverse or beneficial impacts that meet the criteria described for each resource component.

The remaining sections in this chapter evaluate the direct/indirect and cumulative impacts of each alternative on each of the resource components. This section describes the criteria by which the

[16] The CEQ regulations use the words "effects" and "impacts" synonymously [40 *CFR* 1508.8(b)].

significance of the impacts of the specifications alternatives is analyzed for each of the following resource components:

- Target species and other species
- Non-specified species
- Forage fish species
- Prohibited species
- Marine mammals and ESA listed marine mammals
- Seabirds and ESA listed seabirds
- Benthic Habitat and Essential Fish Habitat
- Ecosystem relationships

Environmental impacts are compared to a baseline to determine significance. For direct and indirect impacts, the baseline is the fishery and resource status as they were in 2005. This is the fishery status quo. In instances where 2005 information in unavailable or incomplete, the 2005 baseline has been approximated with the most recent appropriate information available. The direct and indirect impact analysis examines the significance of impacts on resource components by comparing the incremental impacts of the preferred alternative, and of each reasonable alternative, to the condition of the resource components in 2005. Past actions, such as past harvest specifications, actions placing spatial or temporal restrictions on fishing activity, actions restricting the types and characteristics of allowable fishing gear, actions specifying prohibited species catch (PSC) limits, and other actions, are accounted for, since they are incorporated into the 2005 baseline for the fishery.

The baseline for the evaluation of cumulative effects is the resource component as it would be if the 2005 baseline were changed by the set of reasonably foreseeable future actions identified in Section 3.2 of this EA. These reasonably foreseeable future actions do not include the current action, which is publication of specifications for 2006 and 2007. The cumulative baseline may be thought of, therefore, as the resource component as it would be at the end of the time frame for the analysis, 2015, if there were no fishery in 2006 and 2007, but all the other reasonably foreseeable actions (including fisheries in years 2008 to 2015) took place.

In the cumulative impacts analysis, the 2005 baseline, used in the direct and indirect impacts analysis, is modified by the incorporation of the present and reasonably foreseeable future actions described in Section 3.2 of this EA. The incremental impacts of the specifications alternatives are then evaluated, for each resource component, with respect to this new baseline, to determine cumulative significance. As noted above, the 2005 baseline incorporates the effects of the past actions that are required to be analyzed for cumulative effects.

Economic and social impacts differ in fundamental ways from impacts on other resource components examined in this EA. They deal with impacts on persons and on communities, while other impacts deal with the natural environment. Significance findings for social and economic impacts would not affect a finding of no significant impact (FONSI); see 40 *CFR* 1508.14. Economic and social impacts are described in Section 4.10. In light of 40 *CFR* 1508.14, significance determinations are not made for these impacts.

In past specifications analyses, the state groundfish fisheries were treated as a separate resource component. State harvests come from the target groundfish stocks, and environmental impacts on these are evaluated in Section 4.2. The environmental impacts on state groundfish fisheries are thus appropriately handled in that section. Distributional impacts are appropriately described under social and economic impacts.

Groundfish Targets and Other Species

As defined in the GOA and BSAI FMPs, target species are species that:

> "…support either a single species or mixed species target fishery, are commercially important, and for which a sufficient data base exists that allows each to be managed on its own biological merits. Accordingly, a specific total allowable catch (TAC) is established annually for each target species. Catch of each species must be recorded and reported…" (Section 3.1.2 of the BSAI and GOA groundfish FMPs, page 10).

In the GOA, target species include walleye pollock, Pacific cod, sablefish, shallow and deep water flatfish, rex sole, flathead sole, arrowtooth flounder, Pacific ocean perch, shortraker/rougheye rockfish, northern rockfish, "other slope" rockfish, pelagic shelf rockfish, demersal shelf rockfish, thornyhead rockfish, Atka mackerel, and skates. (NPFMC 2005b, page 10). While listed as a target in the GOA FMP, Atka mackerel has not been managed as a target fishery in recent years, but as a bycatch fishery (NPFMC 2004b, intro).

In the BSAI, target species include pollock, Pacific cod, sablefish, yellowfin sole, Greenland turbot, arrowtooth flounder, rock sole, flathead sole, Alaska plaice, "other flatfish", Pacific ocean perch, northern rockfish, shortraker rockfish, rougheye rockfish, "other rockfish", Atka mackerel, and squid. (NPFMC 2005a, page 10).

Both the BSAI and GOA FMPs have "Other species" categories:

> "Other species" are those species or "species groups that currently are of slight economic value and not generally targeted upon. This category, however, contains species with economic potential or which are important ecosystem components, but insufficient data exist to allow separate management. Accordingly, a single TAC applies to this category as a whole. Catch of this category as a whole must be recorded and reported." In the BSAI this category includes sculpins, sharks, skates, and octopus, and in the GOA it includes squid, sculpins, sharks, and octopus. (NPFMC 2005a, page 9 (BSAI definition); a similar definition for GOA in NPFMC 2005b, page 9).

Alternatives are evaluated with respect to impacts on three indicators of resource health:

- Fishing mortality: will fish harvests at the levels indicated in an alternative lead to overfishing or to overfished status for a stock by removing a sufficient portion of the spawning population from the stock?
- Genetic structure of the population: a fish stock is often a collection of genetically differentiated substocks; fishing at a constant rate on all the substocks can have greater adverse impacts on some than on others. Moreover, fishing for fish with certain characteristics (such as large size) can lead, through time, to selection for fish with certain characteristics (such as growth rate).
- Reproductive success: Fishing operations may interfere with or disturb spawning and reproductive behavior. Fish populations may exhibit density-dependent or compensatory behavior, resulting in increased reproductive success or juvenile survival rates, or dispensatory decrease in juvenile survival at low population levels, raising concerns about species survival.

- Prey availability: Harvesting activity may change the prey available to target stocks.
- Habitat: gear impacts on habitat may affect the ability of the habitat to support sustainable stock levels.

The ratings use a minimum stock size threshold (MSST) as a basis for beneficial or adverse impacts of each alternative. Any stock that is below its MSST is defined to be overfished. Any stock that is expected to fall below its MSST in the next two years is defined to be approaching an overfished condition. Overfishing is defined as any rate of fishing in excess of the maximum fishing mortality threshold (MFMT). The catch corresponding to fishing at a rate equal to the MFMT is referred to as the “overfishing level” (OFL). A thorough description of the rationale for the MSST can be found in the National Standard Guidelines 50 CFR Part 600 (Federal Register Vol. 63, No. 84, 24212 - 24237).

It is currently impossible to evaluate the status of stocks in Tiers 4 through 6 with respect to MSST, because stocks qualify for management under these tiers only if reference stock levels (such as Maximum sustainable yield or MSST) cannot be estimated reliably. For tier 4-6 species, an OFL can be determined and therefore is used to determine the significance of fishing mortality for these species. Genetic structure and reproductive success in terms of meeting the MSST cannot be determined for tiers 4-6 species. If the fishing mortality is maintained below the OFL for these species, it is likely that the effects on the genetic structure and reproductive success are not significant.

Table 4.1-1 Significance criteria for groundfish targets and other species

	Level of mortality	Genetic structure	Reproductive success	Prey availability	Habitat
No impact	No change in sustainable target fishery biomass.	No fishery induced changes in genetic structure of the stock.	No fishing impact on level of recruitment success or adult fecundity.	No fishing impact on prey availability for target species	No fishing impact on target fishery habitat.
Adverse impact	Substantial reduction in the level of the sustainable biomass because of fishing activity.	Fishing activity has differential impact on substocks in the population.	Reduced level of recruitment success due to fishing related disturbance of fish stocks during life cycle stages important to recruitment or to dispensatory impacts of fishing activity.	Current harvest levels and distribution of harvest reduce prey available for target stocks	Fishing activity will have an adverse impact on sustainable target fishery biomass because of its impact on habitat.
Beneficial impact	There is no beneficial impact from this action.	There is no beneficial impact from this action.	Increased level of recruitment success associated with density dependent or compensatory mechanisms.	Current harvest levels and distribution of harvest increase prey available to target stocks.	There is no beneficial impact from this action.
Significantly adverse impact	Level of mortality likely to exceed the maximum fishing mortality threshold (MFMT or OFL) or to decrease abundance below minimum stock size threshold (MSST).	Evidence of genetic subpopulation structure and evidence that the distribution of harvest leads to a detectible reduction in genetic diversity that jeopardizes the ability of the stock to sustain itself at or above the MSST or increases the potential for overfishing.	Evidence that the distribution of harvest leads to a detectable decrease in reproductive success such that it jeopardizes the ability of the stock to sustain itself at or above MSST or increases the potential for overfishing.	Evidence that current harvest levels and distribution of harvest lead to a change in prey availability that jeopardizes the ability of the target stock to sustain itself at or above MSST or increases the potential for overfishing..	Evidence that current levels of habitat disturbance are sufficient to lead to a decrease in spawning or rearing success such that it jeopardizes the ability of the stock to sustain itself at or above the MSST or increases the potential for overfishing..
Significantly beneficial impact	Not applicable	Not applicable	Not applicable. Increased recruitment success due to fishing activity can only be sustained with beneficial fishing activity, and biomass below unfished levels.	Evidence that current harvest levels and distribution of harvest lead to a change n prey availability such that it enhances the ability of the stock to sustain itself at or above the MSST or increases the potential for overfishing.	Not applicable
Unknown impact	Unknown fishing mortality rate	OFL or MSST and genetic structure are unknown, therefore no information to evaluate whether	OFL or MSST are unknown therefore no information regarding the potential impact of the distribution	OFL or MSST are unknown there fore no information that current harvest levels and distribution of	OFL or MSST are unknown therefore no information that current levels of habitat disturbance are

	Level of mortality	Genetic structure	Reproductive success	Prey availability	Habitat
		distribution of the catch changes the genetic structure of the population such that it jeopardizes or enhances the ability of the stock to sustain itself at or above the MSST or increases the potential for overfishing.	of the catch on reproductive success such that it jeopardizes or enhances the ability of the stock to sustain itself at or above the MSST or increases the potential for overfishing.	harvest lead to a change in prey availability such that it enhances or jeopardizes the ability of the stock to sustain itself at or above the MSST or increases the potential for overfishing..	sufficient to lead to a detectable change in spawning or rearing success such that it enhances or jeopardizes the ability of the stock to sustain itself at or above the MSST or increases the potential for overfishing.

Non-specified Species

The non-specified species category includes a large number of species, including invertebrates that are not defined in the FMP as target, other, forage, or prohibited species, except for animals protected under the MMPA or the ESA. Non-specified species include jellyfish, grenadiers (a group of deep-sea species related to hakes and cods), starfish, prowfish, smooth lumpsucker, eels, sea cucumbers, Pacific lamprey, greenling, and Pacific hagfish.

As discussed in Section 4.3 of this EA, the most important non-specified species are grenadiers (mostly taken in hook-and-line fisheries), jellyfish (mostly taken by pelagic trawlers), and starfish (mostly taken by non-pelagic bottom trawlers).

Table 4.1-2 Criteria used to estimate the significance of impacts on non-specified species

No impact	The fishery would have no impact on non-specified fish stocks if it did not reduce sustainable non-specified species biomass.
Adverse impact	A substantial reduction in the sustainable biomass of non-specified species stocks would be an adverse impact.
Beneficial impact	An increase in stocks above the levels they would reach in the absence of the fishery (perhaps due to the harvest of groundfish that compete for non-specified species prey) would be a beneficial impact.
Significantly adverse impact	Non-specified species bycatches that were not consistent with sustainable non-specified species populations would be a significantly adverse impact. For the purpose of this analysis, the bycatch of non-specified species will be assumed to be proportional to the sum of fishery TACs. A 50% increase in the harvest of target species from the baseline level is used as a proxy for an adverse significant threshold for non-specified species
Significantly beneficial impact	No benchmark is available for a significantly beneficial impact, and this is not defined in this instance.
Unknown impact	Insufficient information available to predict target fish harvest change.

Forage Fish Species

As defined in the GOA and BSAI FMPs, this resource component includes,

> “those species…which are a critical food source for many marine mammal, seabird, and fish species. The forage fish species category is established to allow

> for the management of these species in a manner that prevents the development of a commercial directed fishery for forage fish. Management measures for this species category will be specified in regulations and may include such measures as prohibitions on directed fishing, limitations on allowable bycatch retention amounts, or limitations on the sale, barter, trade, or any other commercial exchange, as well as the processing of forage fish in a commercial processing facility." (NPFMC 2005a, page 11; NPFMC 2005b, page 11).

Some target and prohibited species, such as pollock and herring, play a functional role as forage species. However, in this analysis, forage fish are those listed in the GOA and BSAI FMPs. Lists of species and species groups included, may be found in Table 3-1 in each FMP. Forage fish includes, but is not limited to, eulachon, capelin, other smelts, lanternfishes, deep-sea smelts, Pacific sand lance, Pacific sand fish, gunnels, pricklebacks, bristlemouths, and krill. Forage fish, and the impacts of the preferred programmatic FMP alternatives, are discussed in Sections 3.5.4 and 4.9.4 of the PSEIS (NMFS 2004b).

As noted in Section 4.4 of this EA, almost all forage fish taken are smelts, and almost all are taken with pollock trawl gear.

Table 4.1-3 Criteria used to estimate the significance of impacts on forage fish species

No impact	The fishery would have no impact on forage fish stocks if it did not reduce sustainable forage species biomass.
Adverse impact	A substantial reduction in the sustainable biomass of forage species stocks would be an adverse impact.
Beneficial impact	An increase in stocks above the levels it would reach in the absence of the fishery (perhaps due to the harvest of groundfish that compete for forage fish prey) would be a beneficial impact.
Significantly adverse impact	Forage fish catches that were not consistent with a sustainable forage fish population would be a significantly adverse impact. For the purpose of this analysis, the bycatch of forage fish (smelts) will be assumed to be proportional to the pollock harvest. Smelt harvests are currently believed to be small in relation to the biomass, so a large proportionate change in pollock harvests would be necessary to impact the biomass. For this purposes of this analysis, a 100% increase of the pollock TAC from baseline levels is used as a proxy for an adverse significant threshold for forage fish (note that, in light of the discussion in Section 4.4, this larger harvest may still be small with respect to the potential for impacts on biomass).
Significantly beneficial impact	No benchmark is available for a significantly beneficial impact, and this is not defined in this instance.
Unknown impact	Insufficient information available to predict change in target fish harvest levels.

In September 2005, the joint plan teams will investigate the potential application of a Tier 5 harvest control rule to forage fish. If forage fish support a Tier 5 level of analysis, it may be possible to apply target species criteria to forage fish in the future.

Prohibited Species

As defined in the GOA and BSAI FMPs, this resource component includes,

> "…those species and species groups the catch of which must be avoided while fishing for groundfish, and which must be returned to sea with a minimum of

injury except when their retention is authorized by other applicable law . . ." (NPFMC, 2005a, page 10; NPFMC, 2005b, page 10).

Both FMPs specifically list Pacific halibut, Pacific herring, Pacific salmon, steelhead, king crab, and Tanner crab as prohibited species.

Fishermen are not permitted to retain prohibited species (unless specifically provided for in regulation). Fisheries are often subject to PSC harvest thresholds, and to restrictions on fishing activity when these thresholds are triggered. These thresholds and restrictions are provided for in the GOA and BSAI FMPs in Section 3.6.2 and in regulations at 50 CFR 679.21.

These PSC limits and their associated measures were implemented under amendments to the FMPs and through regulatory amendments. EAs were prepared for these actions. These EAs determined that these groundfish fisheries restrictions would have insignificant impacts on the human environment, including PSC species. These conclusions were located in the EAs and accompanying findings of no significant impact (FONSIs).

Table 4.1-4 Criteria used to estimate the significance of impacts on incidental catch of prohibited species

	Halibut	Herring	Salmon and Steelhead	Crab
No impact	No incidental take of the prohibited species in question.			
Adverse impact	There are incidental takes of the prohibited species in question			
Beneficial impact	Natural at-sea mortality of the prohibited species in question would be reduced – perhaps by the harvest of a predator or by the harvest of a species that competes for prey.			
Significantly adverse impact	Fisheries are subject to operational constraints under PSC management measures. Groundfish fisheries without the PSC management measures would be a significantly adverse effect.			
Significantly beneficial impact	No benchmarks are available for significantly beneficial impact of the groundfish fishery on the prohibited species, and significantly beneficial impacts are not defined for these species.			
Unknown impact	Not applicable			

Marine Mammals and ESA Listed Marine Mammals

This resource component includes the following marine mammal stocks described in Table 4.1-5. Some marine mammal species are resident throughout the year, while others seasonally migrate into or out of the management areas.

Table 4.1-5 Elements of the marine mammal resource component

NMFS Managed Species		
Pinnipeds	***Species***	***Stocks***
	Steller sea lion	Western U.S., Eastern U.S.
	Northern fur seal	Eastern Pacific
	Harbor seal	Southeast Alaska, Gulf of Alaska, Bering Sea
	Spotted seal	Alaska
	Bearded seal	Alaska
	Ringed seal	Alaska
	Ribbon seal	Alaska
Cetaceans	***Species***	***Stocks***
	Beluga Whale	Beaufort Sea, Eastern Chukchi Sea, Eastern Bering Sea, Bristol Bay, Cook Inlet
	Killer whale	Eastern North Pacific Northern Resident, Eastern North Pacific transient
	Pacific White-sided dolphin	North Pacific
	Harbor porpoise	Southeast Alaska, Gulf of Alaska
	Dall's porpoise	Alaska
	Sperm whale	North Pacific
	Baird's beaked whale	Alaska
	Cuvier's beaked whale	Alaska
	Stejneger's beaked whale	Alaska
	Gray whale	Eastern North Pacific
	Humpback whale	Western North Pacific, Central North Pacific
	Fin whale	Northeast Pacific
	Minke whale	Alaska
	North Pacific right whale	North Pacific
	Bowhead whale	Western Arctic
USFWS Managed Species		
	Species	***Stock***
	Polar bear	Chukchi/Bering Seas, Southern Beaufort Sea
	Pacific walrus	Alaska
	Northern sea otter	Southeast Alaska, Southcentral Alaska, Southwest Alaska
Source: NMFS, 2004b. contents and Appendix 8.		

Direct and indirect interactions between marine mammals and groundfish harvest may occur due to overlap in the size and species of groundfish harvested in the fisheries that are also important marine mammal prey, and due to temporal and spatial overlap in marine mammal occurrence and commercial fishing activities.

Impacts of the various alternative sets of 2006 and 2007 TAC levels are analyzed by addressing three questions: (1) do the proposed harvest levels result in increases in direct interactions with marine mammals (incidental take and entanglement in marine debris); (2) Do the proposed harvest levels remove prey species at levels or in areas that could compromise foraging success of marine mammals (harvest of prey species)?; (3) do the proposed harvest levels modify marine mammal behavior (disturbance)?

Significant incidental take of marine mammals is determined by predicting whether the proposed harvest levels will result in a take that exceeds the potential biological removal (PBR) The PBR is the maximum number of animals that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population. The PBR is used for marine mammals because it is the value determined through the marine mammal stock assessments (Angliss and Lodge 2004) to identify the level at which animals may be removed from the stocks while the stocks achieves sustainable populations. As long as take is maintained within the PBR, the take is considered not significant. Significance ratings for each question are summarized in Table 4.1-6.

Table 4.1-6 Criteria for determining significance of impacts to marine mammals.

	Incidental take and entanglement in marine debris	Harvest of prey species	Disturbance
No impact	No incidental take by fishing operations, and no entanglement in marine debris	No competition for key marine mammal prey species by the fishery.	No disturbance of mammals or their prey.
Adverse impact	Mammals are taken incidentally to fishing operations, or become entangled in marine debris	Fisheries reduce the availability of marine mammal prey.	Fishing operations disturb marine mammals or the prey of marine mammals.
Beneficial impact	There is no beneficial impact.	There are no beneficial impacts.	There is no beneficial impact.
Significantly adverse impact	Incidental take is more than PBR	Competition for key prey species likely to constrain foraging success of marine mammal species causing population decline.	Disturbance of mammal or prey field such that population is likely to decrease.
Significantly beneficial impact	Not applicable	Not applicable	Not applicable
Unknown impact	Insufficient information available on take rates	Insufficient information as to what constitutes a key area or important time of year	Insufficient information as to what constitutes disturbance.

Seabirds

This resource component includes the seabird populations that nest within, or that migrate into and spend time within, the action area. The US Fish and Wildlife Service (USFWS) is the Federal agency with primary responsibility for seabird management. The USFWS Alaska Region’s website identifies the species listed in Table 4.1-7, as species that either nest in Alaska or that “visit Alaskan waters then they are not breeding.”

Table 4.1-7 Species included in the seabird resource component

Species nesting in Alaska	
Tubnoses-Albatrosses and relatives Northern fulmar, Fork-tailed storm-petrel, Leach's storm-petrel	***Kittiwakes and terns*** Black-legged kittiwake, Red-legged kittiwake, Arctic tern, Aleutian tern
Pelicans and cormorants Double-crested cormorant, Brandt's cormorant, Pelagic cormorant, Red-faced cormorant	***Auks*** Common murre, Think-billed murre, Black guillemot Pigeon guillemot, Marbled murrelet, Kittlitz's murrelet, Ancient murrelet, Cassin's auklet, Parakeet auklet, Least auklet, Wiskered auklet, Crested auklet Rhinoceros auklet, Tufted puffin, Horned puffin
Jaegers and gulls Pomarine jaeger, Parasitic jaeger, Bonaparte's gull Mew gull, Herring gull, Glaucous-winged gull, Glaucous gull, Sabine's gull	
Seabirds that visit Alaskan waters when they are not breeding	
Tubenoses Short-tailed albatross, Black-footed albatross Laysan albatross, Sooty shearwaters Short-tailed shearwater	***Gulls*** Ross's gull, Ivory gull
Source: (USFWS web site "Seabirds. Species in Alaska. Accessed at http://alaska.fws.gov/mbsp/mbm/seabirds/species.htm on May 16, 2005).	

Seabirds have been grouped for analytical purposes as follows: northern fulmar, short-tailed albatross, spectacled and Steller's eiders, albatrosses and shearwaters, piscivorous seabird species, and all other seabird species not already listed. Impacts on the northern fulmar are considered because this species accounts for the vast majority of incidental take that occurs in the hook-and-line fisheries of the BSAI and GOA and is one of the most abundant species that breeds in Alaska colonies. Due to special management concerns for animals listed under the ESA, the impacts of the alternatives on the short-tailed albatross, spectacled eider, and Steller's eider will be considered in this analysis. Except for considerations of critical habitat, the impacts on other seaducks such as scoters, long-tailed ducks, and harlequin ducks would be similar to the impacts on these two eider species. The other seabird species or species groups with the greatest potential for interactions with Alaskan groundfish fisheries are albatrosses and shearwaters (migratory birds that do not breed in Alaska) and piscivorous seabird species (fish-eating seabirds that do breed in Alaska, including murres, kittiwakes, gulls, rhinoceros auklets, puffins, cormorants, jaegers, terns, guillemots, and murrelets). All other seabird species not listed above, such as storm-petrels, crested auklet, and least auklet, are considered as a separate group. (NMFS 2001a, page 4-236, SSL EIS)

Three species of seabirds in the action area are listed under the Endangered Species Act. These include the endangered short-tailed albatross (*Phoebastria albatrus*), the threatened spectacled eider (*Somateria fisheri*), and the threatened Steller's eider (*Polysticta stelleri*). (NMFS 2001a, page 3-90 – SSL EIS) ESA listed seabirds are under the jurisdiction of the USFWS, which has completed an FMP level (USFWS 2003b) and a project level BiOp (USFWS 2003a) for the groundfish fisheries and the setting of annual harvest specifications. Both BiOps concluded that the groundfish fisheries and the annual setting of harvest specifications were unlikely to cause the jeopardy of extinction or adverse modification or destruction of critical habitat for ESA listed birds.

Alternatives are evaluated with respect to impacts on three indicators of seabird resource health:

- Takings: Seabirds can be killed (taken) when they are attracted to baited hooks as they are being set, and become entangled in the gear, or caught on the hooks. They are taken when they are attracted to trawling operations, perhaps by the presence of offal discards

from fishing operations, and become entangled in the lines connecting the trawl to the vessel or in the trawl mesh. Hook-and-line and trawl gear account for most seabird takings, pot gear for very little.
- Prey availability: Fisheries may reduce the biomass of prey species available to seabird populations, or they may create feeding opportunities by the discard of fish or fish processing wastes (offal).
- Benthic habitat used by seabirds. Fishing gear may disturb bottom habitat used by bottom feeding seabirds, reducing available prey. Bottom trawl gear is the primary source of concern for an indirect impact through benthic habitat disturbance. (see Section 4.7 of this EA)

Because the action is applied throughout the BSAI and the GOA and individual colony impacts are difficult to relate to overall population impacts, the impacts on most seabirds are analyzed in terms of impacts on the population in the same manner as analysis in the PSEIS (NMFS 2004b).

The exception is ESA listed eiders which have critical habitat designated. Because critical habitat has been identified separately for these species, impacts on benthic habitat may be considered at the colony level. Impacts at the colony level for an ESA listed species are more likely to result in impacts on the population level compared to seabirds that are not at population levels that warrant ESA listing. The USFWS collects reproduction and population information for selected colonies for many seabird species (USFWS 2003b). The population trends are specific to the colonies and may or may not be representative of the overall population trend in the BSAI and GOA, as population trends for a species in a particular year on several colonies may differ. Because the ESA populations are reduced compared to other seabirds and overall population information is available for ESA listed species, information at the colony level for ESA listed species is more likely to be understood in terms of overall population trends and may be considered for significance criteria for impacts that may be localized.

Table 4.1-8 outlines the significance criteria or thresholds that are used for determining if an impact has the potential to create a significant impact on seabirds.

Table 4.1-8 Criteria used to determine significance of impacts on seabirds.

	Incidental take	Prey availability	Benthic habitat
No impact	No bycatch of seabirds during the operation of fishing gear.	No change in forage available to seabird populations.	No gear impact on benthic habitat used by seabirds for foraging
Adverse impact	Non-zero take of seabirds by fishing gear.	Reduction in forage fish populations, or the availability of forage fish, to seabird populations.	Gear contact with benthic habitat used by benthic feeding seabirds reduces amount or availability of prey.
Beneficial impact	No beneficial impact can be identified.	Availability of offal from fishing operations or plants may provide additional, readily accessible, sources of food.	No beneficial impact can be identified.
Significantly adverse impact	Trawl and hook-and-line take levels increase substantially from the baseline level, or level of take is likely to have population level impact on species.	Food availability decreased substantially from baseline such that seabird population level survival or reproduction success is likely to decrease.	Impact to benthic habitat decreases seabird prey base substantially from baseline such that seabird population level survival or reproductive success is likely to decrease. (ESA listed eider impacts may be evaluated at the colony level).
Significantly beneficial impact	No threshold can be identified.	Food availability increased substantially from baseline such that seabird population level survival or reproduction success is likely to increase.	No threshold can be identified.
Unknown impacts	Insufficient information available on take rates or population levels.	Insufficient information available on abundance of key prey species or the scope of fishery impacts on prey.	Insufficient information available on the scope or mechanism of benthic habitat impacts on food web.

Benthic Habitat and Essential Fish Habitat

Benthic habitat is the bottom living and non-living habitat between the shoreline and the 200 mile outer limit of the US EEZ. As noted in Section 3.2, this is the action area considered in this EA. Additional discussions of the impact of fishing on habitat may be found in this EA in Section 4.6 on marine mammals, in Section 4.7 on seabirds, and in the discussion of functional and structural diversity in Section 4.9 on ecosystem relationships.

In this analysis, Essential Fish Habitat (EFH), as defined in the Magnuson-Stevens Act, is used as a proxy for benthic habitat. Most of the seafloor off of Alaska has been designated as EFH for at least one Council managed species, and the 2005 EFH EIS provides a recent and comprehensive analysis of the effects of fishing activity on EFH. The EFH EIS evaluates the long term effects of fishing on benthic habitat features, as well as the likely consequences of those habitat changes for each managed stock based on the best available scientific information. The present analysis assumes that habitat modifications that have more than minimal and temporary impacts on managed fish populations also would have adverse impacts on other habitat-dependent species, including mammals, seabirds, invertebrates, and living components of the habitat such as corals and sponges. Conversely, this analysis assumes that habitat modifications that result in minimal or temporary effects on managed fish populations also would have negligible effects on other components of the ecosystem that rely upon the same habitats. Therefore, in this analysis EFH impacts are considered a proxy for overall habitat impacts.

EFH is defined in the Magnuson-Stevens Act as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." For the purpose of interpreting the definition of EFH, the EFH regulations at 50 CFR 600.10 specify that "waters" include aquatic areas that are used by fish and their associated physical, chemical, and biological properties and may include areas historically used by fish where appropriate; "substrate" includes sediments, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means the habitat required to support a sustainable fishery and a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' entire life cycle. Benthic habitat is used synonymously with EFH in this analysis because virtually all of the seafloor in the area of active groundfish fisheries off Alaska has been designated as EFH for one species or another.

The baseline for purpose of this EA, against which the criteria are applied, is the status quo impact on habitat, in 2005 (NMFS 2005c).

The criterion for significantly adverse effects on habitat is derived from the requirement at 50 CFR 600.815(a)(2)(ii) that NMFS must determine whether fishing adversely affects EFH in a manner that is more than minimal and temporary in nature. This standard determines whether Councils are required to act to prevent, mitigate, or minimize any adverse effects from fishing, to the extent practicable. Fishery impacts on benthic habitat are therefore rated as insignificant if the fishery impacts are minimal or temporary in nature.

The final rule revising the regulations for essential fish habitat (67 *FR* 2343; January 17, 2002) does not define minimal and temporary, although the preamble to the rule states that "Temporary impacts are those that are limited in duration and that allow the particular environment to recover without measurable impact. Minimal impacts are those that may result in relatively small changes in the affected environment and insignificant changes in ecological functions." (67 *FR* 2354) This EA follows the usage and criteria used in the Essential Fish Habitat EIS (NMFS, 2005c).

Table 4.1-9 Significance Criteria for Essential Fish Habitat

	Fishery Impact on EFH
No impact	Fishing activity has no impact on EFH
Adverse impact	Fishing activity causes disruption or damage of EFH
Beneficial impact	Beneficial impacts of this action cannot be identified
Significantly adverse impact	Fishery induced disruption or damage of EFH that is more than minimal and not temporary.
Significantly beneficial impact	No threshold can be identified
Unknown impact	No information is available regarding gear impact on EFH.

Ecosystem

Other resource components each deal with a discrete and separate natural resource. The ecosystem impacts address systemic relationships between components of the ecosystem, examining predator/prey relationships, energy flow and balance, and biological diversity. A separate set of criteria are prepared and used for the examination of these relationships. These are described in Table 4.1-10. Ecosystem impacts evaluated include (1) predator-prey relationships, (2) energy flow and balance, and (3) Diversity.

Table 4.1-10 Significance criteria for fishery induced impacts on ecosystem attributes.

Issue	Impact	Significance criteria	Indicators
Predator-prey relationships	Pelagic forage availability	Fishery induced changes outside the natural level of abundance or variability for a prey species relative to predator demands	• Population trends in pelagic forage biomass (quantitative – pollock, Atka Mackerel, catch/bycatch trends of forage species, squid and herring)
	Spatial and temporal concentration of fishery impact on forage	Fishery concentration levels high enough to impair the long term viability of ecologically important, non-resource species such as marine mammals and birds	• Degree of spatial/temporal concentration of fishery on pollock, Atka mackerel, herring, squid and forage species (qualitative)
	Removal of top predators	Catch levels high enough to cause the biomass of one or more top level predator species to fall below minimum biologically acceptable limits.	• Trophic level of the catch • Sensitive top predator bycatch levels (quantitative: sharks, birds; qualitative: pinnipeds) • Population status of top predator species (whales, pinnipeds, seabirds) relative to minimum biologically acceptable limits.
	Introduction of nonnative species	Fishery vessel ballast water and hull fouling organism exchange levels high enough to cause viable introduction of one or more nonnative species, invasive species	• Total catch levels
Energy flow and balance	Energy redirection	Long-term changes in system biomass, respiration, production or energy cycling that are outside the range of natural variability due to fishery discarding and offal production practices	• Trends in discard and offal production levels (quantitative for discards) • Scavenger population trends relative to discard and offal production levels (qualitative) • Bottom gear effort (qualitative measure of unobserved gear mortality particularly on bottom organisms)
	Energy removal	Long-term changes in system-level biomass, respiration, production or energy cycling that are outside the range of natural variability due to fishery removals of energy	• Trends in total retained catch levels (quantitative)

Issue	Impact	Significance criteria	Indicators
Diversity	Species diversity	Catch removals high enough to cause the biomass of one or more species (target, nontarget) to fall below or to be kept from recovering from levels below minimum biologically acceptable limits	• Population levels of target, nontarget species relative to MSST or ESA listing thresholds, linked to fishing removals (qualitative) • Bycatch amounts of sensitive (low potential population turnover rates) species that lack population estimates (quantitative: sharks, birds, HAPC biota) • Number of ESA listed marine species • Area closures
	Functional (trophic, structural habitat) diversity	Catch removals high enough to cause a change in functional diversity outside the range of natural variability observed for the system	• Guild diversity or size diversity changes linked to fishing removals (qualitative) • Bottom gear effort (measure of benthic guild disturbance) • HAPC biota bycatch
	Genetic diversity	Catch removals high enough to cause a loss or change in one or more genetic components of a stock that would cause the stock biomass to fall below minimum biologically acceptable limits	• Degree of fishing on spawning aggregations or larger fish (qualitative) • Older age group abundances of target groundfish stocks

4.2 Effects on Target Species

As defined in the GOA and BSAI FMPs, this resource component includes species that

> "…support either a single species or mixed species target fishery, are commercially important, and for which a sufficient data base exists that allows each to be managed on its own biological merits. Accordingly, a specific total allowable catch (TAC) is established annually for each target species. Catch of each species must be recorded and reported…" (NPFMC 2005a, 2005b - Section 3.1.2 of the BSAI and GOA groundfish FMPs, page 10).

In the GOA, target species include walleye pollock, Pacific cod, sablefish, shallow and deep water flatfish, rex sole, flathead sole, arrowtooth flounder, Pacific ocean perch, shortraker rockfish, rougheye rockfish, northern rockfish, "other slope" rockfish, pelagic shelf rockfish, demersal shelf rockfish, thornyhead rockfish, Atka mackerel, and skates. (NPFMC 2005b, page 10)

In the BSAI, target species include pollock, Pacific cod, sablefish, yellowfin role, Greenland turbot, arrowtooth flounder, rock sole, flathead sole, Alaska plaice, "other flatfish", Pacific ocean perch, northern rockfish, shortraker rockfish, rougheye rockfish, "other rockfish", Atka mackerel, and squid. (NPFMC 2005a, page 10).

In each area there is also an “other species” target fishery. As defined in the BSAI and GOA FMPs, this includes:

> “Other species” are those species or “species groups that currently are of slight economic value and not generally targeted upon. This category, however, contains species with economic potential or which are important ecosystem components, but insufficient data exist to allow separate management. Accordingly, a single TAC applies to this category as a whole. Catch of this category as a whole must be recorded and reported.” In the BSAI this category includes sculpins, sharks, skates, and octopus, and in the GOA it includes squid, sculpins, sharks, and octopus. (NPFMC 2005a, page 9 (BSAI definition); a similar definition for GOA in NPFMC 2005b, page 9).

The general impacts of fishing mortality within FMP Amendment 56/56 ABC/OFL definitions are discussed in Section 4.1.3 of the PSEIS (NMFS 2004b), and apply to all fish species for which a TAC is specified. Since 2002, a modified harvest control rule has applied to the directed fisheries for pollock, Pacific cod, and Atka mackerel. This rule closes directed fishing when the spawning biomass is estimated to be less than 20% of the projected unfished spawning biomass. This harvest control rule was evaluated in the Steller Sea Lion Protection Measures SEIS (NMFS 2001a).

Detailed stock assessment and fishery evaluation analyses are prepared for each stock, species, or species group in the BSAI and the GOA. These may be found in the stock assessment and fishery evaluation (SAFE) reports, considered as Appendices A and B to this EA. Copies of the reports are available online at http://www.afsc.noaa.gov/refm/stocks/assessments.htm.

The criteria used to estimate the significance of direct and indirect impacts of TAC setting Alternatives 1 through 5 on the BSAI and GOA stocks of target species are summarized in Section 4.1 and in Table 4.1-1. The criteria utilize a minimum stock size threshold (MSST) for tier 1-3 species and the OFL for tiers 4-6 species as a basis for beneficial or adverse impacts of each alternative. A thorough description of the MSST is in the National Standard Guidelines 50 CFR Part 600 (Federal Register Vol. 63, No. 84, 24212 - 24237).

4.2.1 Direct and Indirect Effects

Under all alternatives, the spawning stock biomass of all target species that have calculated spawning stock biomasses are expected to be above their MSST. The probability that overfishing would occur is low for all of the stocks. The expected changes that would result from harvest at the levels proposed are not substantial enough to expect that the genetic diversity or reproductive success of these stocks would change. None of the alternatives would allow overfishing of the spawning stock. Therefore the genetic integrity and reproductive potential of the stocks should be preserved. For tier 4-6 stocks, none would experience overfishing and are unlikely to have changes in genetic structure or reproductive success based on fishing activities.

For these reasons, impacts to target species stocks, species, or species groups, are predicted to be insignificant for all target fish evaluated under Alternatives 1, 2, 3, and 4. This action is not expected to: (1) jeopardize the capacity of the stock to produce maximum sustainable yield on a continuing basis; (2) alter the genetic sub-population structure such that it jeopardizes the ability of the stock to sustain itself at or above the minimum stock size threshold or experience overfishing; (3) decrease reproductive success in a way that jeopardizes the ability of the stock to sustain itself at or above the minimum stock size threshold; (4) alter harvest levels or distribution of harvest such that prey availability would jeopardize the ability of the stock to sustain itself at or above the minimum stock size threshold or experience overfishing, and (5) disturb habitat at a level that would alter spawning or rearing success such that it would jeopardize the ability of the stock to sustain itself at or above the minimum stock size threshold or prevent overfishing. Detailed information may be found in the SAFE documents described above.

Alternative 5 would not allow fishing in 2006 and 2007. The impact of this action on fishing mortality is insignificant because the cessation of fishing for two years is not likely to result in stocks returning to their unfished biomass, especially for long-lived species. No fishing in 2006 and 2007 is likely to allow for only modest increases in genetic diversity, reproductive success, increased prey availability, and a reduction on impacts on habitat that may enhance reproductive success. The effects of Alternative 5 on these measurements of target species health are insignificant.

4.2.2 Cumulative Effects

Ecosystem approaches to management: Ecosystem approaches to management are likely to be beneficial to target stocks. The specific content of actions that will be taken to implement an ecosystem policy for fisheries management are unknown at this time, therefore the significance of cumulative effects of ecosystem policy implementation on spatial and temporal distribution of the fisheries, changes in prey availability and changes in habitat suitability are unclear. However, these may enhance the ability of stocks to sustain themselves at or above MSST, as ways are found to introduce ecosystem issues into the management process.

An example of the ways new information may change our perspectives was suggested at a workshop on multi-species and ecosystem approaches to management held at the February 2005 Council meetings. Multi-species and ecosystem projections of biomass impacts from eliminating fishing mortality for 20 years were compared to similar estimates made with single-species models. "Results…were similar for top predators such as Pacific cod and Greenland turbot. However, results for walleye pollock, a key forage species, showed different results when predator/prey interactions were included. Both the multi-species and ecosystem models predicted much more modest increases in pollock biomass than did the single-species model, as predation increased to compensate for the increase in food supply." (NMFS 2005e, page 23) Predation here refers to cannibalism by larger Pollock on juvenile Pollock. To the extent that the implementation of ecosystem approaches to management will likely result in modified fishing that reflect improved ecosystem understanding, the adverse impacts of the proposed action on the target stocks will be reduced.

In 1998, the State of Alaska recommended that the Council revise management of sharks and skates in the EEZ off Alaska to prevent development of directed fisheries on these long-lived, slow recruiting species. The Council expanded this initiative, first to all components of the other species category in 2002, and then to all non-target species in 2003. The Council's Non-Target Species Committee was formed in October 2003 to develop improved measures to manage non-target species. The Council's non-target species initiative has led to three FMP amendments: (1) GOA Amendment 63 in 2004 separated skates from the GOA "other species" category; (2) GOA Amendment 69 in 2005 led to a more conservative approach to "other species" TAC setting (as discussed below); (3) a BSAI and GOA "other species" assemblage amendment scheduled for analysis in 2006. Initiation of a fourth amendment for a long term solution for managing BSAI and GOA non-target groundfish has been suspended until final revised guidelines for National Standard 1 are published (the proposed rule was published on June 22, 2005 (70 FR 36242). In 2005, the AFSC will prepare separate SAFE documents for the individual species in the BSAI "other species" complex. Similar reports for individual other species in the GOA should appear in the future. Also as part of revising the nontarget species management, the Council has requested that rockfish be used as a test case in applying a new management regime for target and nontarget species. The Nontarget Species Committee is developing a rockfish management analysis that describes management issues and alternatives for rockfish species in the BSAI and GOA. The analysis is under Council review so this is not a reasonably foreseeable future action at this time. If the Council takes recommended action, it is likely to provide more protection to rockfish species by improving management.

In June 2005 the Council adopted GOA Amendment 69, which will allow it to set a TAC for the "other species" complex in the GOA below the current standard of 5% of the sum of all other target species TACs in the GOA. Additional information is available in the Council's June 2005 Newsletter at http://www.fakr.noaa.gov/npfmc/newsletters/newsletters.htm. NMFS is presently developing a FMP and regulatory amendments to implement the new, more conservative, approach to "other species" harvest specifications for 2005.

Rationalization: Fisheries rationalization would have large changes on the way the fisheries are managed and would primarily affect the allocation of harvest amounts. The future effects on target species are minimal because rationalization would not change the setting of TACs, which control the impacts of the fisheries on fishing mortality. However, to the extent rationalization improves fishing practices and the manageability of the fisheries, it could reduce the adverse effects of the proposed action on target species.

Traditional management tools: Future harvest specifications will primarily affect fishing mortality as the other significance criteria for target species (temporal and spatial harvest, prey availability, and habitat suitability) are primarily controlled through regulations in 50 CFR 679. The setting of harvest levels each year is controlled to ensure the stock can produced MSY on a continuing basis and to prevent overfishing. Each year's setting of harvest specifications include the consideration of past harvests and future harvests based on available biomass estimates. Specifications and the regulations governing in-season management of the fisheries are structured to that a fishery is closed when the ABC for the weakest species harvested is reached. The 2 million mt OY in the BSAI also contributes significantly to preventing overharvests. The controls on fishing mortality in setting harvest specifications ensure the stocks are able to produce MSY on a continuing basis.

Other government actions: The State may expand State-managed or State parallel groundfish fisheries. While the state sets its quotas in its state managed fisheries, adjustments are typically made to Federal TACs to keep combined State and Federal harvests of the relevant species below the ABC and OFL for the species. State parallel fisheries are conducted within the Federal TACs. The State is considering opening new Pollock fisheries in Cook Inlet, in the Western Gulf near the Shumagin Islands, and in the Aleutians Islands near Adak. At the current writing (September 2005) it is possible that the state will take some sort of action, but the details of that action cannot be considered reasonably foreseeable. Depending on the action the state takes, the action could have little impact on Pollock stocks.

Private actions: Fishing activity by private fishing operations, carried out under the authority of the annual harvest TAC specifications, are an important class of private action. The impact of these actions has been considered under traditional management tools.

A private action not treated above, is the MSC certification of the Pollock fishery. While this is a past action, whose impact is reflected in the 2005 baseline, the certification will have to be renewed in the future. If it turns out that MSC environmental certification has important marketing benefits, this will increase industry incentives to address the environmental issues connected with the fishery. In this context, it may tend to lengthen industry's time horizon, and increase its interest in target stock sustainability.

Increasing economic activity in and off of Alaska may affect future fisheries. The high levels of traffic between the West Coast and East Asia raise concerns about pollution incidents, or the introduction of invasive species from ballast water. Pollution issues were highlighted in December 2004, when the Selendang Ayu was wrecked on Unalaska Island. Alaskan economic development can affect the coastal zone, and species that depend on the zone. However, Alaska remains relatively lightly developed compared to other U.S. states. Marine transportation associated with that development may be more of a concern than in other states, due to the relatively greater importance of marine transportation to Alaska's economy.

The development of aquaculture may affect prices for, and the harvest of, some species. For example, the development of sablefish aquaculture may reduce wild sablefish prices and reduce interest in sablefish harvests in high operating cost areas in the BSAI, where sablefish TACs are currently not fully harvested.

Cumulative impacts: Increased attention to ecosystem considerations, because of improved understanding of ecosystem relationships, and because of increased attention to ecosystem issues within the harvest specifications process should reduce the adverse impacts of fishing. The Council's actions with respect to "other species," will tend to moderate potential adverse impacts on these. Rationalization, if coupled with adequate enforcement measures, should also tend to reduce adverse impacts. Harvests from fisheries in subsequent years will put continuing pressure on groundfish stocks. However, these fisheries are expected to be conducted sustainably, subject to OFL and ABC levels determined in accordance with the Tier system. The fisheries will be conducted under a set of regulations that is substantially the same as those in place today. Regulatory changes associated with improved understanding of ecosystem considerations, should be at least as precautionary as those in place today. Expansion of state fisheries will most likely result in a reduction in the Federal TAC, or a greater harvest of an existing Federal TAC within state waters. Based on past experience, it would not be expected to lead to fishing in excess of OFL, ABC, or TAC levels. However, prediction of the actual impact depends on a knowledge of the details of an actual state decision. Among private actions, MSC re-certification requirements may increase the incentive of Pollock fishermen to support sustainable fisheries management. Ongoing development of Alaska's economy, and its associated marine activity, and West Coast-East Asia maritime traffic, have the potential to adversely affect groundfish fisheries to some extent. However, onshore development in Alaska remains low compared to development in many lower-48 states. For these reasons, the reasonably foreseeable actions discussed here do not appear to require a change in the direct-indirect significance determinations for the five alternatives.

4.3 Effects on Incidental Catch of Non-specified Species

The non-specified species category contains many species, including invertebrates, that are not defined in the FMP as target, other, forage, or prohibited species, except for animals protected under the MMPA or the ESA. Grenadiers, jellyfish, and starfish, appear to have dominated non-specified catches in recent years. Other non-specified species caught in recent years include prowfish, smooth lumpsucker, eels, sea cucumbers, Pacific lamprey, greenling, and Pacific hagfish. Although sea birds are included in this category, seabirds are dealt with separately in Section 4.7 of this EA.

As noted in Tables 4.3-1 and 4.3-2 below, non-specified bycatches have been dominated by jellyfish, grenadiers, and starfish in the BSAI, and by grenadiers in the GOA. The BSAI Pollock fishery accounted for most of the jellyfish bycatch, and BSAI bottom trawl fisheries for flatfish accounted for most of the starfish bycatch. Hook-and-line fisheries, particularly those for sablefish in the GOA and BSAI, and for Greenland turbot in the BSAI, accounted for most of the grenadier harvest.

Table 4.3-1 Estimated BSAI non-specified species bycatch for key species, 1997-2002

Species	Average bycatch, 1997-2002 (metric tons)	Percent of 1997-2002 non-specified bycatch	Key fisheries responsible for take, 1997-2002
Jellyfish	6,600	31%	Pollock trawl accounts for 83% of the bycatch
Grenadiers	5,900	28%	Hook-and-line gear accounted for 95% of the grenadier take: Turbot hook-and-line accounted for 50%, and sablefish hook-and-line accounted for 35%
Starfish	3,900	19%	The yellowfin sole trawl fishery accounts for 65% of this bycatch, rock sole accounts for 14%, and flathead sole accounts for 10%.
Other non-specified fish	1,400	7%	Trawl fisheries account for 93% of this category. Bycatch is distributed among a wide range of trawl fisheries. Yellowfin sole fisheries account for 25% of this. Other fisheries with bycatch include those for other flatfish, pollock, and Pacific cod.
Tunicates	1,100	5%	The yellowfin sole fishery accounts for 85% of tunicates, the flathead sole fishery accounts for 9%, the rock sole fishery accounts for 4%.
Source: Estimates based on blend data supplied by S. Gaiches of the AFSC.			

Table 4.3-2 Estimated GOA non-specified species bycatch for key species, 1997-2002

Species	Average bycatch, 1997-2002 (metric tons)	Percent of 1997-2002 non-specified bycatch	Key fisheries responsible for take, 1997-2002
Grenadier	11,600	77%	93% from sablefish hook-and-line
Other non-specified fish	2,300	15%	61% from sablefish hook-and-line, 10% from rockfish trawl
starfish	900	6%	35% from Pacific cod hook-and-line, 35% from Pacific cod pot, 14% from sablefish hook-and-line
Source: Estimates based on blend data supplied by S. Gaiches of the AFSC.			

The information available for non-specified species is much more limited than that available for target fish species. Estimates of biomass, seasonal distribution of biomass, and natural mortality are unavailable for most non-specified species. Management concerns, data limitations, research in progress, and planned research to address these concerns are discussed in Section 5.1.2.6 of the PSEIS (NMFS 2004b).

Grenadiers, the most important non-specified species by weight in the EEZ, were the subject of a chapter in the 2004 Ecosystem SAFE. Three species of grenadier are taken as bycatch off of Alaska, but most of the catch is the "giant grenadier" species. While Grenadiers are the subject of targeted fisheries in New England and the U.S. Pacific coast, directed fishing for grenadiers hasn't been successful off of Alaska. Annual grenadier bycatch from the BSAI and GOA appear to range between 13,000 and 21,000 mt between 1997 and 2001. These are bycatches, taken mainly in hook-and-line fisheries. The hook-and-line fisheries with the largest bycatches are the sablefish and Greenland turbot fisheries. In the spring of 2005 two commercial trawl vessels in Kodiak (GOA) explored targeting giant grenadiers landing approximately 70 mt through August, 2005 (Pearson, pers. Comm. 9/05.).

Evidence from targeted fisheries suggests that, because of their long lives and slow growth, it may be possible to overfish grenadier stocks. Grenadier stocks off of Alaska appear to be large, and probably occupy an important ecological niche. The SAFE notes that, in addition to overfishing concerns, the fishery may be selecting for females. On the other hand, large parts of the grenadier population appears to live in waters deeper than those normally exploited by hook-and-line operations. Stocks in these waters may act as a "reserve to replenish giant grenadier removed by the fishery in shallower water." (NMFS 2005e, pages 193-211). Additional discussion of grenadier biology and management can be found in Section 3.5.5.1 of the Final PSEIS (NMFS 2004b).

Walters reported an index of large medusae jellyfish biomass for the EBS in the 2004 Ecosystems SAFE document (NMFS 2005e, page 185). Abundance had increased over the period from 1989 to 2000, and then decreased to lower levels in the period 2001 to 2004. Overall area biomass index for 2004 was about 66,000 mt. Walters noted that it was "unknown whether this decline is due to a change in availability of actual abundance."

4.3.1 Direct and indirect impacts

The key direct impact is the bycatch of non-specified species, particularly grenadiers, jellyfish, and starfish, in the different fisheries. The PSEIS indicates that bycatches within the range evaluated under the preferred alternative bookends are probably low with respect to the population (NMFS 2004b, page 3.5-246, 3.5-247). Indirect effects include habitat disturbance by fishing gear and disruption of food web interactions by disproportionate removal of one or more trophic levels. Insufficient information is available to estimate the direct effects of changes in the incidental catch of non-specified species.

The fishery would have no impact on non-specified stocks if it did not reduce the sustainable non-specified species biomass, affect the availability of prey, or affect non-specified fish habitat. A substantial reduction in the level of the sustainable biomass because of fishing activity would be an adverse impact. An increase in stocks above the unfished level (perhaps due to the harvest of groundfish that compete for non-specified species prey, or that prey on non-specified species) would be a beneficial impact. Non-specified species catches that were not consistent with sustainable non-specified species populations would be a significantly adverse impact. No benchmark is available for a significantly beneficial impact, and this is not defined in this instance.

For the purpose of this analysis, the impact of the fishery on the bycatch of non-specified species is assumed to be proportional to the sum of the TACs in a region. Bycatch is currently believed to be small in relation to the biomass, so a large proportionate change in TACs would be necessary to impact the biomass. For this purposes of this analysis, an increase of 50 percent in the overall TACs from 2005 levels would be used as a proxy for an adverse significant threshold for non-specified species. As noted, no beneficial significant threshold can be defined in this instance.

Alternatives 1 to 4 have positive harvests, and therefore would be associated with some bycatch of non-specified species. These alternatives probably have a small impact. However, none of these alternatives is associated with a 50 percent increase in TAC levels of the target species from the status quo, therefore none of them are significant. No target species are harvested under Alternative 5; therefore this alternative has no impact on non-specified species.

4.3.2 Cumulative effects

Ecosystem approaches to management: Ecosystem research, and increasing attention to ecosystem issues, should lead to increased attention to the impact of fishing activity on non-target resource components, including non-specified species. In April 2005, the Council took concrete steps to address non-specified species issues, by requesting that “grenadiers and other non-specified species category” be considered as an option in a broader study to evaluate separate harvest specifications for the species in the “other species” complex. Additional information is available in the Council’s April Newsletter, page 5, at http://www.fakr.noaa.gov/npfmc/newsletters/newsletters.htm. The nature of ultimate Council action on this issue, however, is not reasonably foreseeable.

Rationalization: Rationalization actions do not appear to interact meaningfully with non-specified species issues. Rationalization of a fishery that took grenadiers might slow the fishery down and permit marketing of the catch. However, most grenadiers are taken in the hook-and-line sablefish fishery, which is already rationalized under an individual quota program.

Traditional management tools: Future harvest specifications will affect non-specified species fishing mortality. Aggregate TAC in target fisheries is used as the proxy for direct and indirect fishery impacts. BSAI groundfish TACs are equal to the OY level, and cannot grow further unless the statutory OY is relaxed. The bulk of the non-specified harvest in the GOA appears to be grenadiers, taken as incidental catch in the sablefish fishery. The 2004 Sablefish SAFE projects that the highest annual sablefish yield within the time period for this analysis is only 12% greater than the yield projected for 2005. (NPFMC, 2004b, page 276 – GOA SAFE). On the basis of this proxy, there doesn't appear to be a reason to expect an increase in non-specified species catches.

State, Local and international organizations: Actions identified under this category do not appear to interact meaningfully with non-specified species issues.

Private Actions: On going fishing activity in 2008 to 2015 will continue to take non-specified species as bycatch. This issue has been discussed above in the future harvest specifications analysis. Ongoing economic development of Alaska, and increasing levels of marine transportation activity may interact adversely with populations of non-specified species. However, as noted in Section 3.2, development in Alaska remains small compared to development in other coastal states. Note, however, that grenadiers are the subject of targeted fisheries elsewhere, and were the subject of an experimental harvest in the GOA in 2005. If a directed fishery for grenadiers should develop and environmental concerns exist, an emergency rule could be used to constrain harvests. A directed fishery cannot be considered reasonably foreseeable at this time.

Cumulative effects: Increased attention to ecosystem considerations should reduce the adverse impacts of future targeted groundfish fishing. The Council may take action to bring non-specified species within its specification process under the non-target species initiatives, although this is not currently reasonably foreseeable. It is not evident that non-specified bycatch will increase through the medium of changes in target species TACs. Economic development may impact non-specified stocks in unknown ways, although development in Alaska remains small compared to development in other coastal states. A new targeted fishery on grenadiers may impact stocks and affect the impact of target species bycatch, however, while the development of such a fishery is possible, it is not currently reasonably foreseeable, and potential adverse impacts could be addressed through an emergency rule. Consideration of these factors does not suggest that the direct and indirect significance conclusions need to be modified because of cumulative factors.

4.4 Effects on Forage Fish Species

As defined in the GOA and BSAI FMPs, this resource component includes,

> …those species…which are a critical food source for many marine mammal, seabird, and fish species. The forage fish species category is established to allow for the management of these species in a manner that prevents the development of a commercial directed fishery for forage fish. Management measures for this species category will be specified in regulations and may include such measures as prohibitions on directed fishing, limitations on allowable bycatch retention amounts, or limitations on the sale, barter, trade, or any other commercial

exchange, as well as the processing of forage fish in a commercial processing facility. (NPFMC 2005a, page 11; NPFMC 2005b, page 11).

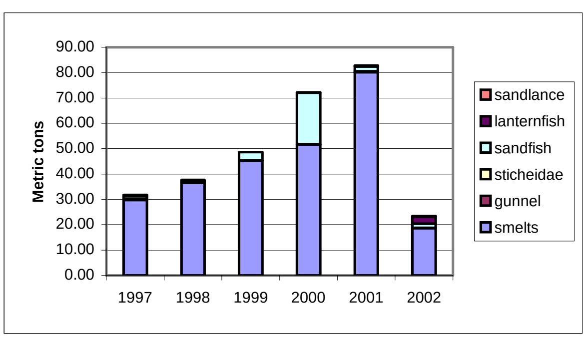
Some target or prohibited species, such as pollock and herring, play a functional role as forage species. However, in this analysis, forage fish are those species as defined in the GOA and BSAI FMPs. Lists of species and species groups included, may be found in Table 3-1 in each FMP. Forage fish includes, but is not limited to, eulachon, capelin, other smelts, lanternfishes, deep-sea smelts, Pacific sand lance, Pacific sand fish, gunnels, pricklebacks, bristlemouths, and krill. A complete list may be found in Table 2c to CFR 679. Forage fish, and the impacts of the preferred programmatic FMP alternatives, are discussed in Sections 3.5.4 and 4.9.4 of the PSEIS (NMFS 2004b).

Regulations at 50 CFR 679.20(i) prohibit directed fishing for, and the sale of, forage fish species, except for the maximum retainable amount (MRA), which may be made into fishmeal and sold. The MRA for forage fish species has been set at 2 percent of the directed target fishery retained catch.

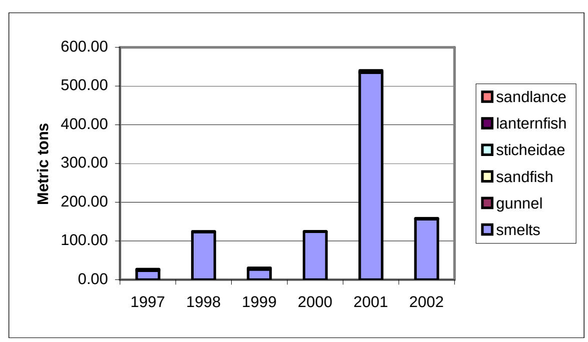
Aggregate catches of forage fish species can be estimated from observer data. Figure 4.4-1 summarizes AFSC estimates of aggregate forage fish species catch by year and species for the BSAI and GOA, for 1997 to 2002. These are disaggregated versions of the forage fish data contained in the 2003 Ecosystem SAFE section on “Time Trends in Non-Target Species Catch” (Gaichas and Boldt, Appendix C, page 258). Further information on forage fish may be found in the 2004 Ecosystem SAFE section on forage fish (Boldt, Appendix C, pages 116 – 126). Almost all the GOA forage fish incidental catch, and most of the BSAI incidental catch, consists of smelts (*osmeridae* family, including capelin, eulachon, and other smelts). Significant volumes of sandfish were also taken in the BSAI fishery, but only in 2000. BSAI incidental catch ranged between just over 20 and just over 80 metric tons per year. The GOA incidental catch was often between 100 and 200 metric tons, and in one of the years rose over 500 metric tons.

Figure 4.4-1 Estimated aggregate annual incidental catch of forage fish species, 1997-2002

BSAI



GOA



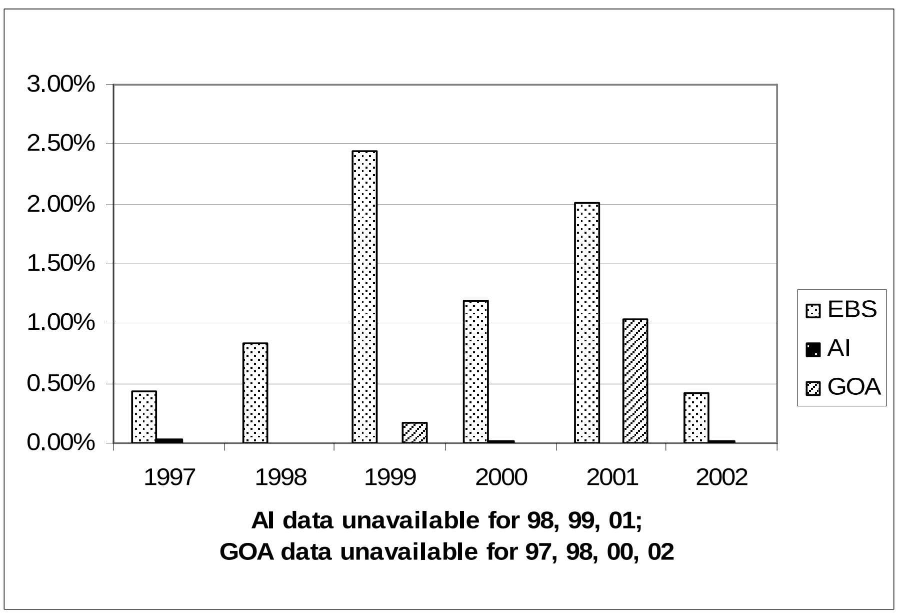
Source: Estimates based on data supplied by S. Gaiches, AFSC, from blend data

An examination of the data indicates that most of this incidental catch has been taken by pollock trawls. In the BSAI, 86% of the 1999-2002 smelt incidental catch was taken by pollock trawlers, while in the GOA, 99% of the smelt catch was taken by Pollock trawlers during the same period.

Bottom trawl surveys of groundfish conducted by NMFS are not designed to assess the biomass of forage fish species. Estimates of biomass and seasonal distribution of biomass are poor for forage fish species, therefore the effects of different levels of target species harvest on forage fish species are not quantitatively described. The PSEIS notes that there is some evidence smelt biomass has been at relatively low levels during the last 20 years (NMFS 2004b, page 3.5-247). Nelson estimates that smelt incidental catch in the central GOA, the region with the "vast majority" of GOA smelt bycatch, was probably less than 1% of the biomass in 1999 and 2001 (NMFS 2003, page 763).

The key direct impact is the incidental catch of smelts by the pollock trawl fishery. As Figure 4.4-1 indicates, smelt catches are relatively low in both the GOA and BSAI. The PSEIS indicates that incidental catches of forage fish within the range evaluated under the preferred alternative bookends are probably very low with respect to the forage fish populations (NMFS 2004b, page 3.5-246, 3.5-247). This is also indicated by Figure 4.4-2 below, which shows smelt bycatch by management area as a percent of estimated management area eulachon biomass. Indirect effects include habitat disturbance by fishing gear and disruption of food web interactions by disproportionate removal of one or more trophic levels. Insufficient information is available to estimate the indirect effects of changes in the incidental catch of forage species.

Figure 4.4-2 Smelt bycatch as a percent of estimated eulachon biomass



Source: data supplied by M. Sigler, September 22, 2005.

In September 2005, the joint plan teams will investigate the potential application of a Tier 5 harvest control rule to forage fish. If forage fish support a Tier 5 level of analysis, it may be possible to apply target species criteria to forage fish in the future.

The fishery would have no impact on forage fish stocks if it did not reduce the sustainable forage fish biomass, affect the availability of prey, or affect forage fish habitat. A substantial reduction in the sustainable biomass of forage stocks would be an adverse impact. An increase in stocks above unfished levels (perhaps due to the harvest of groundfish that compete for forage fish prey) would be a beneficial impact. Forage fish catches that were not consistent with a sustainable forage fish population would be a significantly adverse impact. No benchmark is available for a significantly beneficial impact, and this is not defined in this instance.

4.4.1 Direct and indirect impacts

For the purpose of this analysis, the impact of the target fisheries on incidental catch of forage fish (smelts) will be assumed to be proportional to the pollock harvest. Smelt bycatch is currently believed to be small in relation to the biomass, so a large proportionate change in pollock harvests would be necessary to impact the biomass. For this purposes of this analysis, a 100 percent increase in the pollock TAC from 2005 levels would be used as a proxy for an adverse significant threshold for forage fish (note that a 100 percent increase in the incidental catch of forage fish – particularly in the BSAI – may still be small with respect to the potential for impacts on biomass). As noted, no beneficial significant threshold can be defined in this instance.

Alternatives 1 to 4 have positive pollock harvests, and therefore may be associated with some effects on smelts. However, none of these alternatives is associated with a 100 percent increase in the pollock harvest proxy, therefore none of them are significant. No pollock are harvested under Alternative 5; therefore this alternative has no impact on forage fish.

4.4.2 Cumulative Effects

Ecosystem approaches to management: Ecosystem research, and increasing attention to ecosystem issues, should lead to increased attention to the impact of fishing activity on non-target resource components, including forage species. This is likely to result in reduced adverse impacts.
Rationalization: Rationalization actions do not appear to interact meaningfully with forage species issues.

Traditional management tools: Future harvest specifications will affect forage species fishing mortality. Pollock trawl incidental catches of smelt appear to be the main source of groundfish fishery mortality on forage stocks. BSAI Pollock TACs are at high levels and are unlikely to increase. GOA pollock TACs are expected to decrease and then increase over the period for this analysis. In later years of the period, the increase in pollock TAC may be substantially greater than current levels, if the TAC is set at the Author's recommended F, however even in these later years, GOA Pollock TACs will not increase by 100%. (NPFMC 2004b). Thus future harvests in some years may have a greater impact on smelts than the harvests projected in this action. However, smelts are a renewable resource, and incidental take by pollock fishermen may be relatively small compared to biomass, as noted. The current preferred alternative is unlikely to trigger the significance criterion once the direct and indirect baseline has been modified to incorporate reasonably foreseeable future pollock TACs.

State, local and international actions: Actions identified under this category do not appear to interact meaningfully with forage species issues.

Private actions: On going fishing activity in 2008 to 2015 will continue to take forage fish species as bycatch. This issue has been discussed above in the future harvest specifications analysis. Ongoing economic development of Alaska, and increasing levels of marine transportation activity may interact adversely with populations of forage species. However, as noted in Section 3.2, development in Alaska remains small compared to development in other coastal states.

Cumulative impact analysis: Increased attention to ecosystem considerations should reduce the adverse impacts of future targeted groundfish fishing. The pollock proxy for impact on forage fish stocks does not appear to trigger the significance threshold, although increased Pollock fishery impacts on smelt may occur in the GOA. Economic development may impact non-specified stocks in unknown ways, although development in Alaska remains small compared to development in other coastal states. Consideration of these reasonably foreseeable actions, in combination with the past and present actions implicit in the 2005 baseline, suggests that Alternatives 1 to 4 do not have significant impacts. No pollock are harvested under Alternative 5; therefore this alternative has no impact on forage fish.

4.5 Effects on Prohibited Species

Prohibited species in the groundfish fisheries include Pacific salmon (Chinook, coho, sockeye, chum, and pink and ESA listed salmon in Table 3.3-1), steelhead trout, Pacific halibut, Pacific herring, and Alaska king crab, Tanner crab, and snow crab.

The effects of the groundfish fisheries in the BSAI and GOA on prohibited species are primarily managed by conservation measures developed and recommended by the Council over the entire history of the FMPs for the BSAI and GOA and implemented by Federal regulation. These measures can be found at 50 CFR 679.21 and include prohibited species catch (PSC) limitations on a year round and seasonal basis, year round and seasonal area closures, gear restrictions, and an incentive plan to reduce the incidental catch of prohibited species by individual fishing vessels.

These management measures are discussed in the final EIS for Essential Fish Habitat (NMFS 2005c, April 2005), Section 3.5 of the PSEIS (NMFS 2004b), the Final EIS for Bering Sea and Aleutian Islands Crab Fisheries (NMFS 2004a), and in a review paper by Witherell and Pautzke (1997). The most recent review of the status for the prohibited species and the effects of the groundfish fisheries on the stocks can be found in Section 3.5 of the PSEIS (NMFS 2004b) and for crab in the EIS for Bering Sea and Aleutian Islands Crab Fisheries (NMFS 2004a). The Council has prepared a draft EA/RIR/IRFA for proposed Amendment 84 to the BSAI FMP to modify the existing Chinook and chum savings areas in the BSAI (NPFMC 2005a, May, 2005). This document contains the most recent information on the status of salmon stocks in the BSAI and the impacts of the BSAI groundfish fishery on salmon stocks in the BSAI.

Table 4.5-2 presents the total catch of groundfish by target, area, and gear, and the prohibited species catch that was incidental to those groundfish fishing activities in 2005. Table 4.5-2 is subdivided into subordinate tables 4.5-2a to 4.5-2h. The subordinate tables summarize information on PSC bycatch by gear type, and by the GOA and BSAI management areas. The subordinate tables with information on the BSAI (Tables 4.5-2a through 4.5-2d) include the groundfish catch and associated prohibited species incidental catch in the Community Development Quota (CDQ) fisheries. CDQ allocations are based on 10 % of the annual pollock TAC and 7.5 % of other target species TACs in the BSAI. A proportionate share of the PSC limits is also allocated to the CDQ fisheries in the BSAI.

Steelhead trout Only one steelhead trout has been observed taken in the groundfish fisheries. No specific management measures to prevent bycatch of steelhead trout exist beyond the prohibited retention that applies to all prohibited species under 679.21(b)(4). Because of the extreme rarity of occurrence, any potential effect of the groundfish fisheries on steelhead trout is likely very insignificant and will not be further analyzed.

Pacific salmon Pacific salmon are managed by the State of Alaska on a sustained yield principal. Predetermined escapement goals for each salmon stock are monitored on an inseason basis to insure long term sustainable yields. When escapement levels are low, commercial fishing activities are curtailed. If escapement levels exceed goals, commercial fishing activities are enhanced by longer open seasons. In instances where minimum escapement goals are not met, sport and subsistence fishing activities may also be curtailed.

The effect of the groundfish fisheries on Pacific Northwest salmon and ESA-listed salmon is limited to incidental take during groundfish harvest. Designated critical habitat for ESA-listed salmon does not occur in the EEZ. The potential impacts of implementation of Steller sea lion protection measures on ESA-listed salmon was determined to be insignificant in the Steller sea lion protection measures SEIS (Section 4.6.4, NMFS 2001b). Additional information is available on the effects of the groundfish fisheries on Pacific Northwest and listed salmon, and can be found in Section 3.4 of the PSEIS (NMFS 2004d).

Through August 20, 2005, Chinook salmon incidental catch in the BSAI is estimated to be 39,321 fish in the BSAI groundfish fisheries, of that amount 78 percent were taken in the pollock fishery. Chinook salmon incidental catch in the GOA fisheries is estimated to be 19,115 fish, of that amount 85 percent were taken in the pollock fishery. Catches of “other” salmon (mostly chum) through August 20, 2005 is estimated to be 513,151 in the BSAI groundfish fisheries, of that amount 99 percent were taken in the pollock fishery. “Other” salmon (mostly chum) incidental catch in the GOA fisheries is estimated to be 15,781 fish, none of which occurred in the pollock fishery. Recent historical incidental catches of salmon and groundfish in the groundfish fisheries (1999 –2005) by gear type are presented in Table 4.5-1.

Table 4.5-1 Incidental Catch of Salmon in the BSAI Groundfish Fisheries. (includes CDQ fisheries)

Year	Gear Type	Groundfish (mt)	Chinook salmon (#'s)	"Other" salmon (#'s) Primarily chum salmon
2004	Trawl	1,816,853	62,407	456,674
	Hook and Line	124,077	64	211
	Pot Gear	18,356	0	0
	Jig	215	0	0
	TOTAL	1,959,501	62,471	456,885
2003	Trawl	1,807,391	54,898	197,032
	Hook and Line	138,441	13	59
	Pot Gear	23,594	0	0
	Jig	156	0	0
	TOTAL	1,969,582	54,911	197,091
2002	Trawl	1,787,189	36,360	81,329
	Hook and Line	131,365	25	135
	Pot Gear	16,398	0	6
	Jig	0	0	0
	TOTAL	1,934,952	36,385	81,470
2001	Trawl	1,658,935	40,531	60,678
	Hook and Line	137,128	17	46
	Pot Gear	17,858	0	7
	Jig	0	0	0
	TOTAL	1,813,921	40,548	60,731
2000	Trawl	1,461,212	8,219	59,306
	Hook and Line	126,200	4	16
	Pot Gear	20,136	0	5
	Jig	0	0	0
	TOTAL	1,607,548	8,223	59,327
1999	Trawl	1,295,548	14,583	47,199
	Hook and Line	112,107	7	35
	Pot Gear	17,096	9	0
	Jig	0	0	0
	TOTAL	1,424,751	14,599	47,234

Numbers were generated using blend reports, CDQ catch reports, and queries on the catch accounting databases. Estimates prepared by NMFS, Sustainable Fisheries, Alaska Region. Data up to 11-15-04.

Chinook salmon incidental catch in the BSAI in 2004 was 62,471 fish in the BSAI groundfish fisheries. Chinook salmon incidental catch in the GOA fisheries in 2004 was 17,784 fish. In 2004 Incidental catch in the BSAI area was above the amount stated in the incidental take statement for ESA listed salmon. That amount is 55,000 total Chinook salmon of all origins; the amount is a proxy for a possible impact on ESA-listed salmon. The vast majority of Chinook salmon taken in the groundfish fisheries in Alaska are not likely to be ESA-listed salmon. In 2004 approximately 86 percent and 69 percent of the incidental catch of Chinook salmon were taken in the pelagic trawl fisheries targeting pollock in the BSAI and GOA, respectively. In 2004 in the BSAI 456,857 "other" salmon (mostly chum) were incidentally taken, 98 percent in the pelagic trawl fisheries targeting pollock. In the GOA in 2004, 5,811 "other" salmon (mostly chum) were incidentally caught, 10 percent in the pelagic trawl fisheries targeting pollock.

Regulations at 50 CFR part 679 authorize the incidental catch of no more than 29,000 Chinook salmon, annually, in the Chinook Salmon Savings Areas (CSSAs) of the BSAI by trawl vessels targeting pollock. In early August 2005, NMFS announced the closure of the CSSAs for non-

Community Development Quota (CDQ) trawl pollock fishing effective September 1, 2005 through December 31, 2005, to prevent exceeding the 2005 non-CDQ limit of Chinook salmon. Through August 20, 2005, approximately 26 % of the 42,000 non-Chinook salmon PSC limit in the Catcher Vessel Operating Area (CVOA) is estimated to have been taken.

In 2004 the incidental catch of Chinook salmon in the BSAI pollock trawl fishery exceeded the 29,000 fish limit and as a result the CSSAs were closed to pollock trawling September 5, 2004. On September 14, 2004, the chum salmon savings area was also closed, due to the trawl fishery reaching the 42,000 non-Chinook salmon PSC limit in the Catcher Vessel Operating Area (CVOA). The high incidental catch of salmon in the BSAI in 2004 may well have been exacerbated by the closure of the salmon savings areas. Following these closures, the pollock fleet moved into areas where they experienced higher incidental catch rates of salmon. It is not known if 2004 and 2005 were anomalously high years for the incidental catch of salmon in the BSAI or if similar rates of incidental take of salmon during the 2006 and 2007 groundfish fisheries can be expected. The higher incidental catch of salmon may also reflect an increased abundance of salmon in the BSAI. In western Alaskan rivers, salmon stocks of concern (Chinook and chum) met escapement goals in 2004 and 2005. In 2005, salmon runs exceeded escapement goals. The Alaska Department of Fish and Game does not provide stock projections for Chinook or chum salmon, which are likely to be taken in the BSAI groundfish fisheries (Plotnick and Eggers 2004). Information is not available to compare the take of Chinook and chum salmons to stock abundance.

The most recent information available for determining an abundance benchmark for ESA-listed salmon is the escapements listed in the 1999 biological opinion (NMFS 1999). Because of the changes in the environment and the age of the data, the authors question the usefulness of using these data for benchmark purposes today. The ESA incidental take statement for listed salmon is 55,000 Chinook salmon in the BSAI and 40,000 Chinook salmon in the GOA. (NMFS, 1999) NMFS has requested re-initiation of formal Section 7 consultation of the ESA listed Chinook salmon incidental takes in the 2004 BSAI groundfish fishery because the groundfish fisheries exceeded the amount stated in the incidental take statement in 2004 (Balsiger). Based on coded wire tag studies for the past 15 years on surrogate ESA-listed Chinook salmon stocks, the likelihood of taking any ESA-listed Chinook salmon in the BSAI groundfish fisheries is very remote and therefore the criteria for significance for ESA-listed and non ESA-listed salmon are the same.

For salmon species that are not listed under the ESA, the criteria used to determine the significance of effects on salmon stocks, under each alternative was whether salmon would be incidentally taken (an adverse effect), or not taken (no effect), or if the natural at-sea mortality would be reduced (a beneficial effect) by the groundfish fisheries. A significantly adverse effect would be expected to result if management measures designed to reduce incidental catch were not implemented when PSC limits were reached. Because no benchmarks to determine significantly beneficial effects are available they are not defined for prohibited species (Table 4.1-4).

Halibut The International Pacific Halibut Commission (IPHC) is responsible for the conservation of the Pacific halibut resource. The IPHC uses a policy of harvest management based on constant exploitation rates. The constant exploitation rate is applied annually to the estimated exploitable biomass to determine a constant exploitation yield (CEY). The CEY is adjusted for removals that occur outside the commercial directed hook-and-line harvest (incidental catch in the groundfish fisheries, wastage in halibut fisheries, sport harvest, and subsistence use) to determine the commercial directed hook-and-line quota.

Incidental catch of halibut in the groundfish fisheries results in a decline in the standing stock biomass, a lowering of the reproductive potential of the stock, and reduced short and long term yields to the directed hook-and-line fisheries. Beginning in 1997 the IPHC divided the halibut bycatch mortality into two size groups, legal-sized halibut (greater than 32 inches in length) and sublegal-sized halibut (less than 32 inches in length), these groupings are based on length samples collected by observers each year. To compensate the halibut stock for these removals over the short term, the legal sized halibut mortality in the groundfish fisheries is deducted on a pound for pound basis each year from the directed hook-and-line quota. The sublegal-sized halibut mortality results in further impacts on the long-term reproductive potential of the halibut stock. The impact of sublegal-sized halibut mortality is addressed within the target exploitation rate used by the IPHC to set harvest policy. In essence, the target harvest rate is reduced to account for the sublegal halibut mortality. Currently this amount is approximately 2 percent. Clark and Hare, 1998, discuss this method in greater detail.

The most recent halibut stock assessment was conducted by the IPHC in December 2004. The halibut resource is considered to be healthy, with total catch near record levels. For 2005, the exploitable halibut biomass in Alaska was estimated to be 149,687 mt. In January 2005, the IPHC set commercial catch limits totaling 34,460 mt (round weight equivalents) in Alaskan waters for 2005. Through September 1, 2005, catch of halibut in the commercial fisheries totaled 26,555 mt (round weight equivalents) in Alaskan waters. This amount is 77 percent of the 2005 commercial catch limit, which closes on November 15, 2005. Additional information on the life history of halibut and management measures in the groundfish fisheries to conserve halibut stocks can be found in Section 3.5 of the PSEIS (NMFS 2004b). Through August 20, 2005, halibut mortality in the groundfish fisheries totaled 3,561 mt of the annual 4,575 mt PSC limit in the BSAI. Through August 20, 2005, halibut mortality in the groundfish fisheries totaled 1,521 mt of the annual 2,300-mt PSC limit in the GOA. At its January 2006 annual meeting, the IPHC will set halibut catch limits for the 2006 commercial fishery. Similar levels of halibut incidental catch during the 2005 groundfish fisheries are expected for the 2006 and 2007 groundfish fisheries.

For halibut, the criteria used to determine the significance of effects on the halibut stock, under each alternative was whether halibut would be incidentally taken (an adverse effect), or not taken (no effect), or if the natural at-sea mortality would be reduced (a beneficial effect) by the groundfish fisheries. A significantly adverse effect would be expected to result if management measures designed to reduce incidental catch were not implemented when PSC limits were reached. Because no benchmarks to determine significantly beneficial effects are available they are not defined for prohibited species (Table 4.1-4).

<u>Pacific herring</u> Pacific herring are managed by the State of Alaska on a sustained yield principal. Pacific herring are surveyed each year and the Guideline Harvest Levels (GHLs) are based on an exploitation rate of 20% of the projected spawning biomass, these GHLs may be adjusted in-season based on additional survey information to insure long-term sustainable yields. The ADF&G has established minimum spawning biomass thresholds for herring stocks that must be met before a commercial fishery may occur.

The most recent herring stock assessment for the EBS stock was conducted by ADF&G in December 2004. For 2005 and 2006, the herring biomass in the EBS is estimated to be 201,180 mt. Additional information on the life history of herring and management measures in the groundfish fisheries to conserve herring stocks can be found in Section 3.5 of the PSEIS (NMFS 2004b). In the BSAI, the herring PSC limit for the groundfish trawl fisheries is set at one percent (2,013 mt) of the estimated herring biomass. Through August 20, 2005 an estimated 489 mt of the 2,103-mt herring PSC limit had been taken. In 2004, 1,095 mt of the 1,876 mt PSC limit of herring in the groundfish trawl fisheries in the BSAI was incidentally caught. The 2006 and 2007 the BSAI herring PSC limits will be based upon the results December 2005 EBS herring stock assessment conducted by ADF&G. Similar levels of herring incidental catch during the 2005 groundfish trawl fisheries are expected for the 2006 and 2007 groundfish trawl fisheries.

For herring, the criteria used to determine the significance of effects on the EBS herring stock, under each alternative was whether herring would be incidentally taken (an adverse effect), or not taken (no effect), or if the natural at-sea mortality would be reduced (a beneficial effect) by the groundfish fisheries. A significantly adverse effect would be expected to result if management measures designed to reduce incidental catch were not implemented when PSC limits were reached. Because no benchmarks to determine significantly beneficial effects are available they are not defined for prohibited species (Table 4.1-4).

Crab Alaska king, Tanner, and snow crab stocks in the BSAI and GOA are managed by the State of Alaska (with Federal oversight in the BSAI) on a sustained yield principal. The crab stocks are surveyed each year (by NMFS in the BSAI and by ADF&G in the GOA) and Guideline Harvest Levels (GHLs) are established for each stock, based on an exploitation rate that varies with the abundance of legal sized male crab in each stock. These GHLs may be adjusted in-season, based on additional harvest information, to insure long-term sustainable yields.

The most recent stock assessment for eastern Bering Sea crab stocks was conducted by NMFS in November 2004. Additional information on the life history of crab and management measures in the groundfish fisheries to conserve crab stocks can be found in Section 3.5 of the PSEIS (NMFS 2004b) and in the EIS for Bering Sea and Aleutian Islands Crab Fisheries (NMFS 2004a). Four stocks of crab; Saint Matthew Island blue king crab, Pribilof Islands blue king crab, Bering Sea Tanner crab (C. bairdi) and Bering Sea snow crab (C. opilio), are presently being managed under rebuilding plans, approved by the NPFMC. The Aleutian Islands golden king crab fishery opened August 15, 2005 with a GHL of 5.7 million pounds. This is the first crab fishery in the BSAI to be managed under the crab rationalization system. ADF&G intends to announce the GHLS for the additional crab fisheries in the BSAI October 1, 2005.

In addition to area closures for trawl gear in both the BSAI and GOA, in the BSAI PSC limits have been established for the trawl groundfish fisheries in several areas. These PSC limits and areas are described in 50 CFR 679.21. In 2005 in the C. opilio bycatch limitation zone (COBLZ), the 2005 trawl PSC limit was set at 4,858,992 animals. Through August 20, 2005 an estimated 3,237,013 crab had been taken. 3,005,338 (93 percent of the total) were taken in the yellowfin sole fishery. In Zone 1 of the Bering Sea the 2005 PSC limit for Bairdi Tanner crab was set at 980,000 animals. Through August 20, 2005 an estimated 232,042 crab had been taken. In Zone 2 of the Bering Sea, the 2005 PSC limit for Bairdi Tanner crab was set at 2,970,000 animals. Through August 20, 2005 an estimated 458,661 crab had been taken. In Zone 1 of the Bering Sea, the 2005 PSC limit for red king crab was set at 197,000 animals. Through August 20, 2005 an estimated 94,942 crab had been taken. Similar levels of crab incidental catch during the groundfish trawl fisheries are expected for the 2006 and 2007 groundfish fisheries.

For crab, the criteria used to determine the significance of effects on crab stocks, under each alternative was whether crab would be incidentally taken (an adverse effect), or not taken (no effect), or if the natural at-sea mortality would be reduced (a beneficial effect) by the groundfish fisheries. A significantly adverse effect would be expected to result if management measures designed to reduce incidental catch were not implemented when PSC limits were reached. Because no benchmarks to determine significantly beneficial effects are available they are not defined for prohibited species (Table 4.1-4).

Table 4.5-2 Catch of Groundfish and Prohibited Species in the Groundfish Fisheries in the BSAI and GOA in 2004 by Target, Area, and Gear Type

Table 4.5-2a Groundfish and Prohibited Species Catch by Trawl Gear in the BSAI

Target	Total Catch[1] (mt)	Halibut Mortality (mt)	Numbers[2] of Bairdi Crab	Numbers of Red King Crab	Numbers of Chinook Salmon	Numbers of Other Salmon[3]
Atka mackerel	64,816	65	348	37	648	346
Pacific cod	109,014	1519	211,566	1,786	5582	990
Other flatfish	2,640	55	8,597	0	0	0
Flathead sole	28,473	427	163,625	68	499	174
Rock sole	46,756	515	165,756	37,820	657	0
Greenland turbot	285	2	0	0	0	0
Arrowtooth	3,389	81	3,901	45	846	9
Yellowfin sole	98,487	459	257,807	39,137	29	520
Rockfish	10,430	57	197	0	0	0
Sablefish	124	2	99	0	0	0
Other species	182	7	2,625	0	18	19
Pollock (bottom)	19,527	3	14	17	640	1,745
Pollock (midwater)	1,433,838	92	1,192	10	53444	185,578
Unidentified Target					44	9,482
Total	1,817,962	3,283	815,727	78,920	62,408	456,692

Target	Total Catch[1] (mt)	Numbers of Snow crab[2]	Herring (mt)
Rock sole, flathead sole, and other flatfish	77,869	312,286	7
Pacific cod	109,014	88,028	8
Pollock, Atka mackerel, and other species	1,518,363	13,070	997
Yellowfin sole	98,487	1,388,007	3380
Rockfish	10,430	0	0
Greenland turbot, sablefish, and arrowtooth	3798	1,034	1
Total	1,817,962	1,802,425	1094

Table 4.5-2b Groundfish and Prohibited Species Catch by Hook-and-Line Gear in the BSAI

Target	Total Catch[1] (mt)	Halibut Mortality (mt)	Numbers[2] of Bairdi Crab	Numbers of Red King Crab	Numbers of Chinook Salmon	Numbers of Other Salmon[3]
Pacific cod	126,808	440	9962	14,550	39	91
Greenland turbot	1,669	21	11	0	17	80
Sablefish	742	9	0	0	0	8
Rockfish	4	0	0	0	0	6
Other species	129	3	6	26	0	0
Arrowtooth	0	0	0	0	0	0
Other groundfish	13	0	0	0	0	0
Total	129,365	472	9979	14,576	56	184

Table 4.5-2c Groundfish and Prohibited Species Catch by Pot Gear in the BSAI.

Target	Total Catch[1] (mt)	Halibut Mortality (mt)	Numbers[2] of Bairdi Crab	Numbers of Red King Crab	Numbers of Chinook Salmon	Numbers of Other Salmon[3]
Pacific cod	17489	3	28025	299	0	0
Sablefish	727	1	45	11	0	0
Total	18,390	4	28,071	309	0	0

Table 4.5-2d Total Groundfish and Prohibited Species Catch by All Gear Types in the BSAI.

Target	Total Catch[1] (mt)	Halibut Mortality (mt)	Numbers[2] of Bairdi Crab	Numbers of Red King Crab	Numbers of Chinook Salmon	Numbers of Other Salmon[3]
All	1,965,932	3,759	853,777	93,806	62,408	456,857

Table 4.5-2e Groundfish and Prohibited Species Catch by Trawl Gear in the GOA.

Target	Total Catch[1] (mt)	Halibut Mortality (mt)	Numbers[2] of Bairdi Crab	Numbers of Red King Crab	Numbers of Chinook Salmon	Numbers of Other Salmon[3]
Pacific cod	16,650	969	1,179	0	979	52
Deep water flatfish	1,185	58	0	0	0	2
Rex sole	3,521	189	9,016	0	496	1,048
Flathead sole	3,075	63	7,276	0	1,392	91
Shallow water flatfish	3,871	347	10,018	0	461	3,405
Arrowtooth	8,482	298	32,989	0	294	2
Rockfish	25,735	298	1,416	272	866	446
Other species	552	24	0	0	0	0
Sablefish	156	2	0	0	0	0
Pollock (bottom)	11,041	8	879	58	5,362	165
Pollock (midwater)	52,118	1	139	0	7,922	433
Total	126,387	2,256	62,911	331	17,772	56,44

Table 4.5-2f Groundfish and Prohibited Species Catch by Hook-and-Line Gear in the GOA.

Target	Total Catch[1] (mt)	Halibut Mortality (mt)	Numbers[2] of Bairdi Crab	Numbers of Red King Crab	Numbers of Chinook Salmon	Numbers of Other Salmon[3]
Pacific cod	11143	295	0	0	13	8
Rockfish	263	7	0	0	0	0
Other species	339	0	0	0	0	0
Sablefish	15733	259	31	0	12	158
Arrowtooth	2	0	0	0	0	0
Deep water flatfish	0	0	0	0	0	0
Total[4]	27,481	561	31	0	25	166

Table 4.5-2g Groundfish and Prohibited Species Catch by Pot Gear in the GOA.

Target	Total Catch[1] (mt)	Halibut Mortality (mt)	Numbers[2] of Bairdi Crab	Numbers of Red King Crab	Numbers of Chinook Salmon	Numbers of Other Salmon[3]
Pacific cod	25,148	24	8,866	36	0	0
Total	25,296	24	8,866	36	0	0

Table 4.5-2h Total Groundfish and Prohibited Species Catch by All Gear Types in the GOA.

Target	Total Catch[1] (mt)	Halibut Mortality (mt)	Numbers[2] of Bairdi Crab	Numbers of Red King Crab	Numbers of Chinook Salmon	Numbers of Other Salmon[3]
All	182,509	2,841	71,808	367	17,797	5,811

Source: NMFS 2005 catch accounting system through November 22, 2004
Notes:
[1] Total catch includes all groundfish harvested, the targeted species as well as incidental catch of all other groundfish.
[2] Numbers are estimates of individual animals and include estimates (in the case of crab) all animals, male and female, juvenile and adult, and should not be interpreted as an estimate of legal sized males that are targeted in directed crab fisheries.
[3] other salmon numbers include pink, chum, coho, and red salmon, but the vast majority of other salmon are chum.
[4] The halibut mortality estimates includes those from the pot and hook-and-line sablefish fisheries, which are exempt from halibut PSC limits.

4.5.1 Direct and Indirect Impacts

Alternative 1. Under Alternative 1, catch quotas would be set at the $maxF_{abc}$ levels. In the GOA, the sum of TACs would amount to 610,997 mt for 2006, and 547,820 mt in 2007. In both years TACs would fall within the optimum yield range of 116,000 mt to 800,000 mt. However, in the BSAI TACs would sum to about 2,673,000 mt in 2006, and 2,001,000 mt in 2007. In both years these sums would exceed the BSAI upper limit established for optimum yield of 2,000,000 mt (50 CFR § 679.20(a)).

Alternative 1 sets groundfish TACs at the highest levels considered. In practice, PSC limits established for the BSAI by regulation, and halibut PSC limitations recommended by the Council for the GOA in 2006 and 2007, along with other factors such as market demand for the different groundfish targets, will likely constrain the harvest of groundfish in both the BSAI and the GOA as in 2005 and previous years. In the worst case, the entire PSC limit for each prohibited species would be reached in both the BSAI and GOA, and in the GOA, for prohibited species without PSC limits, incidental catch rates would be expected to similar to those in 2005 (Tables 4.5-2d and h).

Alternative 1 could be associated with TAC levels and harvests that would exceed the 2 million mt OY level in the BSAI. As noted earlier, market and PSC constraints may prevent harvests from equaling the high TAC levels under consideration under this alternative, even if the OY constrain was not binding.[17] Nevertheless, because the existing measures to protect PSC species were adopted following analyses that assumed the sum of TACs would be within the OY in the BSAI, Alternative 1 has been given an unknown significance rating.

[17] TACs that sum to more than the OY are illegal, and contrary to the requirements of the BSAI FMP. Thus, in practice they would not be seen. However, an alternative does not need to be permitted by current regulations to be a reasonable alternative for NEPA purposes. This alternative provides a useful high level alternative to compare to other alternatives.

Alternatives 2 to 4 Under Alternative 2, TACs for the 2006 and 2007 specifications would be set at levels recommended by the Council at its December 2005 meeting. In the BSAI this amounts to a total of 2,000,000 mt in both 2006 and 2007, in the GOA total TACs would amount to 300,331 mt in 2006 and 283,694 mt in 2007. The effect of Alternative 2 on stocks of prohibited species is rated adverse but not significant because PSC limits, even if reached, would not have a significant impact on stocks of prohibited species.

Under Alternative 3, catch quotas would set TACs to produce *F* equal to 50% of the $maxF_{abc}$ level for stocks at or above Tier 3, and set TACs equal to 50% of TACs associated with the $maxF_{abc}$ level for stocks at or below the Tier 4 level. In the BSAI this would amount to 1,453,356 mt, and in the GOA 316,874 mt, for 2006, and somewhat lower values in 2007. For the reasons discussed under Alternative 1 and 2, the effect of Alternative 3 on stocks of prohibited species is rated adverse, but not significantly so (Table 6.0-1), because PSC limits, even if reached, would not have a significant impact on stocks of prohibited species.

Under Alternative 4, catch quotas would be set at levels equal to the most recent 5 year average actual *F* for stocks at a Tier 3 level and above, and at the recent 5 year average actual catch for stocks at a Tier 4 level and below. In the BSAI, this would amount to 1,594,718 mt, and in the GOA 215,708 mt in 2006, with somewhat lower levels in 2007. Alternative 4 sets TAC at levels that fall within the range of 1,400,000 to 2,000,000 mt in the BSAI and 116,000 mt to 800,000 mt in the GOA, established for optimum yield.

The significance criteria for PSC species are described in Table 4.1-4 in Section 4.1. Alternatives 2, 3, and 4 set TACs at levels similar to those in the status quo year 2005. The fisheries would involve incidental takes of the PSC species. Thus, the fisheries would have adverse impacts. The fisheries would be conducted under the regulations, including the regulations meant to impose constraints on the harvest of PSC species, that were in place in 2005. Because the TACs would be similar to those observed in 2005, the impact on PSC species in 2006 and 2007 are expected to be similar to those observed in 2005. Although the fisheries are expected to take PSC species, and are thus expected to have an adverse impact, they will take place subject to operational constraints implemented under the FMPs and under regulations adopted in accordance with the FMP requirements. Therefore, while the fisheries will have adverse impacts, these impacts have not been rated significantly adverse under these alternatives.[18]

Alternative 5: Under Alternative 5, groundfish TACs would be equal to zero. The effect of this alternative would be to close directed fishing for groundfish for the 2006 and 2007 fishing years. The adoption of this alternative is considered unlikely, given the size of the adverse impact on the groundfish fishing industry, and on communities dependent on the groundfish fisheries, and because harvest levels would be set at levels below the lower limits established for optimum yield in the BSAI of 1,400,000 mt and in the GOA of 116,000 mt. Alternative 5 would reduce incidental catch of prohibited species in the groundfish fisheries to zero. Since there are no takes of PSC species, there are no adverse impacts on PSC resources under this alternative.

[18] The Council is likely to adopt BSAI FMP Amendment 84, modifying the salmon PSC measures, before the start of the 2006 fishery. FMP and regulatory amendments will then be needed to implement the Council's intent. Because this action has not yet taken place, it is treated in this EA as a reasonably foreseeable future action, and is addressed in the cumulative effects analysis, rather than here in the direct and indirect effects analysis.

4.5.2 Cumulative Effects

Ecosystems approaches to management: Ecosystem research, and increasing attention to ecosystem issues, should lead to increased attention to the impact of fishing activity on non-target resource components, including forage species. This is likely to result in reduced adverse impacts. For example, pending funding for analysis, starting in mid-2005, the North Pacific Groundfish Observer Program and Auke Bay Lab collection and analysis of salmon tissue samples will help identify the natal streams of origin from salmon bycatch, and help clarify the dimensions of the environmental impact. The Council is currently considering Amendment 84, with alternatives to provide more flexibility and adaptivity for in-season management. One alternative would suspend the annual Chinook and chum salmons catch limits and area closure triggers. Such a modification in the PSC rules may reduce the likelihood that fishermen will move into areas with relatively higher salmon bycatch rates. Such a suspension would be contingent on the existence of pollock cooperative and CDQ group and voluntary rolling hot spot closure systems to avoid salmon bycatch. The Council has prepared a draft EA/RIR/IRFA for proposed Amendment 84 to the BSAI FMP to modify the existing Chinook and chum salmon savings areas in the BSAI (NPFMC 2005a, August 2005).

Rationalization: PSC species overall may be beneficially impacted by the future implementation of fisheries rationalization. Fisheries rationalization may allow for better incidental catch controls and monitoring in the groundfish fisheries. To the extent rationalization improves fishing practices and reduces incidental catch, it would reduce the adverse effects of the proposed action on prohibited species. Therefore, the 2006 and 2007 harvest specifications, in combination with fisheries rationalization, would have an insignificant cumulative effect on prohibited species. The Council has also begun investigations into establishing PSC limits for salmon and crab in the GOA. It is possible that additional PSC limits for the GOA would be included in a Council plan for rationalizing the groundfish fisheries in the GOA.

Traditional management tools: The Council will adopt TAC specifications in the years 2008 to 2015. In addition, the Council will adopt new specifications for 2007 (one of the years covered in this action) in December 2006. These annual specifications will authorize annual groundfish fishing activity, and associated annual incidental catches of PSC species. The improvement of the Catch Accounting System has made it possible for NMFS to maintain more timely and accurate information regarding the incidental catch of prohibited species. This information can be used by NMFS and the industry to reduce incidental catch of prohibited species by tracking when and where it is occurring and react quickly to reduce the potential for additional incidental catch.

Other Federal, state or international agencies: Actions identified under this category do not appear to interact meaningfully with prohibited species issues.

Private sector actions: Fishing activity will continue in future years within the time period considered in this analysis (until 2015) as constrained by fishing regulations and the ABCs and TACs set by the Council in each year. This fishing activity is expected to result in annual incidental catches of the PSC species, subject to the FMP and regulatory measures that constrain groundfish fishery PSC bycatch. MSC certification of the pollock fishery may add to pollock industry incentives to minimize Chinook and chum salmons bycatch. Additionally, the current development and future use of salmon and halibut excluder devices for trawl vessels by private industry may result in decreases of Chinook salmon, chum salmon, and halibut incidental catch. The initial reports of the prototype excluder resulted in 43 percent escapement of Chinook and 9 percent for Chum salmon (Gauvin personal communication 11/24/04). Improvements in the excluder in 2005 may increase the amount of escapement, providing a beneficial impact, especially for Chinook salmon.

Cumulative effects: Ongoing groundfish fishing activity and associated bycatch of PSC species will have an adverse impact on PSC species. However, other actions will tend to reduce the impact of fishing PSC bycatch, and particularly on the bycatch of Chinook and chum salmon. These other actions include Council action under Amendment 84 to provide additional flexibility for salmon bycatch management in the BSAI pollock fishery, rationalization of additional groundfish fisheries, MSC certification and the need for recertification, and the ongoing development of salmon excluder technologies for pelagic trawl nets. These reasonably foreseeable future actions will not affect the significance findings from the direct and indirect analysis. The cumulative significance findings are unknown for Alternative 1, adverse but not significant for Alternatives 2, 3 and 4, and not adverse for Alternative 5.

4.6 Effects on Marine Mammals and ESA-Listed Marine Mammals

The BSAI and GOA support one of the richest assemblages of marine mammals in the world. Twenty-six species are present from the orders Pinnipedia (seals, sea lion, and walrus), Carnivora (sea otter and polar bear), and Cetacea (whales, dolphins, and porpoises). Most species are resident throughout the year, while others seasonally migrate into or out of the management areas. Marine mammals occur in diverse habitats, including deep oceanic waters, the continental slope, and the continental shelf (Lowry et al. 1982). The Alaska Groundfish Fisheries Final Programmatic SEIS (NMFS 2004b) provides descriptions of the range, habitat, diet, abundance, and population status for these marine mammals. The most recent marine mammal stock assessments were completed in 2004 based on 2003 data (Angliss and Lodge 2004) and a draft 2005 stock assessments also is being developed. This information is incorporated by reference.

The groundfish fisheries are evaluated under the Marine Mammal Protection Act (MMPA) and are included in the List of Fisheries for 2004, most recently published in the Federal Register on August 10, 2004 (69 FR 48407). All groundfish fisheries are listed as Tier II, Category III fisheries in 2004, based on the criterion that each fishery interacts with marine mammal stocks with annual mortality and serious injury less than or equal to 1 percent of the marine mammal's potential biological removal (PBR) level.[19] Category II fisheries have a level of mortality and serious injury that exceeds 1% but is less than 50% of the stock's PBR level. On December 2, 2004, NMFS proposed to split the categories of Alaska fisheries listed and to move several Alaska groundfish fisheries into Category II (occasional incidental mortality and serious injury) (69 FR 70094). These fisheries proposed to be listed as Category II are Bering Sea and Aleutian Islands (BSAI) flatfish trawl, BSAI Greenland turbot longline, BSAI pollock trawl, Bering Sea sablefish pot, and Gulf of Alaska Pacific cod longline. NMFS has not issued a final rule for the new List of Fisheries.

This analysis will look at the effects of the groundfish fisheries on marine mammals for each alternative in comparison to the significance criteria presented in section 4.1. The information contained in this analysis, including the SAFE reports (Appendices A, B and C), comprises the information necessary from the action agency to the consulting agency under Section 7 of the

[19] The MMPA (16 U.S.C. 1362 (20)) defines the PBR level as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population.

Endangered Species Act. NMFS is both the action and the consulting agency for ESA-listed species under NMFS' jurisdiction, including Steller sea lions.

In 2000, NMFS determined that the groundfish fisheries were likely to jeopardize the western distinct population segment (DPS) of Steller sea lions and adversely modify its critical habitat (USFWS 2003b, NMFS 2000 and NMFS 2001a). Implementation of the groundfish fisheries must be done in compliance with the Steller sea lion protection measures (68 FR 204, January 2, 2003) to avoid the likelihood of jeopardizing the population or adversely modifying Steller sea lion critical habitat. No other ESA-listed marine mammal has been subject of a jeopardy determination by NMFS. A new program level BiOp (i.e. FMP level) is likely to be reinitiated in 2006. NMFS also is currently consulting with the USFWS on the southwest Alaska DPS of northern sea otters.

4.6.1 Direct and Indirect Effects

The potential effects of the three alternatives will be evaluated with respect to (1) the extent of direct take of marine mammals by fishing operations, (2) competition between the fisheries and marine mammals for food, and (3) disturbance by fishing vessels. Table 4.1-6 contains the criteria for determining significance of impacts to marine mammals. This analysis determines (a) whether or not takings, prey competition, or disturbance occur under each alternative, and (b) if they do occur, whether or not they have impacts that exceed the significance criteria described in Section 4.1.

Incidental Take/Entanglement in Marine Debris

Since 1990, the BSAI and GOA groundfish fisheries have incidentally taken the following marine mammal species: Steller sea lions, harbor seals, northern elephant seals, northern fur seals, spotted seals, bearded seals, ribbon seals, ringed seals, Dall's porpoise, harbor porpoise (BSAI), Pacific white sided dolphins, killer whales, humpback whales, walrus, and sea otters (Angliss and Lodge 2004, Appendix 5). Marine mammals that are not included on this list, are assumed to be unaffected by any of the five alternatives due to the absence of incidental take and entanglement. These are predominantly cetaceans.

The stock assessment reports for marine mammals can be used to determine the possible effects of incidental takes on population. Stock assessment reports are completed by the National Marine Mammal Laboratory (NMML) every few years for marine mammals occurring in waters in and off Alaska (Angliss and Lodge 2004). The reports are available at the NMFS NMML website at
http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/individual_sars.html.

These reports provide population estimates, population trends, and estimates of potential biological removals. The reports also identify potential causes of mortality and whether the stock is considered a strategic stock under the MMPA. The following information is derived from the Alaska Marine Mammal Stock Assessments, 2003 (Angliss and Lodge 2004) and from the 2005 draft stock assessments which are available at
http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/sars_draft.html.

Annual levels of incidental mortality are estimated by comparing observed incidental takings that result in mortality to observed groundfish catch (stratified by area and gear type). Incidental bycatch frequencies also reflect locations where fishing effort is highest. In the Aleutian Islands and GOA, incidental takes are often within Steller sea lion critical habitat. In the Bering Sea, takes are farther off shore and along the continental shelf. Otherwise there seems to be no apparent “hot spot” of incidental catch disproportionate with fishing effort. Therefore, estimated incidental take and entanglement, based on estimated TACs are appropriate.

The following table compares the estimated incidental take of marine mammals to the potential biological removal (PBR) established in the draft 2005 Marine Mammal Stock Assessments (http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/sars_draft.html.). The PBR is the maximum number of animals that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population. The Marine Mammal Protection Act requires fisheries to reduce marine mammal mortality to a level approaching zero mortality, which is defined as 10% of PBR The PBR is used as the measure of significance of potential impact, as described in section 4.1.

Table 4.6-1 Estimated mean annual mortality of marine mammals from the BSAI and GOA groundfish fisheries compared to the total mean annual human-caused mortality, Potential Biological Removal (PBR) for each stock.
(Mean annual mortality includes both incidental takes and entanglements, as data are available) (data from http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/sars_draft.html.)

Marine Mammal	Mean annual mortality from BSAI and GOA groundfish fisheries	Total mean annual human-caused mortality*	PBR
**Steller sea lions (western stock)	10.6	218.5	231
**Steller sea lions (eastern stock)	1.37	52.8	1,967
Northern fur seal	.48	885	14,546
Harbor seal (BSAI)	4	192	379
Harbor seals (GOA)	.6	827	868
Spotted seal	0	5,265	unknown
Bearded seal	1.2	6,789	unknown
Ringed seal	.71	9,567	unknown
Ribbon seal	.8	193	unknown
Killer whale (resident)	2.54	2.5	11.2
Killer whale (transient)	2.54	2.5	3.1
Pacific white-sided dolphin	.8	4	unknown
Harbor porpoise (BSAI)	1.1	4	393
Dall’s porpoise	5.9	38	1,537
**Humpback whale (Western North Pacific stock)	.49	.69	1.3

Marine Mammal	Mean annual mortality from BSAI and GOA groundfish fisheries	Total mean annual human-caused mortality*	PBR
**Humpback whale (Northern portion of the Central North Pacific stock)	.49	4.95	12.9
**North Pacific Right Whales	0	0	0
Minke whale, Alaska stock	.3	.3	Unknown
**Sperm whales, North Pacific stock	.45	.45	unknown
**Fin whale, Northeast Pacific stock	.59	.8	11.4
Blue Whale Eastern N. Pacific Stock	0	0	2.8
Walrus	1.2	5,794	unknown
Sea otter (Southcentral Alaska stock)	0	297	1,396
**Sea otter (Southwest Alaska stock)	.2	97	830
** ESA-listed stock Note: Other human-caused mortality is predominantly subsistence harvests for seals, otters and walrus.			

Under all the alternatives, existing area closures protect Steller sea lions and other marine mammals by providing spatial dispersion of the groundfish fisheries, reducing the potential for incidental take of marine mammals by reducing fisheries-mammal interactions. NMFS modified groundfish fisheries management to comply with ESA considerations for Steller sea lions (NMFS 2001a). The currently available data show, the minimum estimated groundfish fishery Steller sea lion mortality and serious injury are well below the PBR, and therefore are insignificant impacts.

The currently available data show the minimum estimated groundfish fishery northern fur seal mortality and serious injury are well below the PBR. In the past, northern fur seal entanglement in marine debris was more common than for any other species of marine mammals in Alaskan waters. However, discarded net debris from Alaskan groundfish fisheries appears to have declined over the past decade. Although the effect of entanglement in discarded debris has been a factor in the past, it now appears to occur at lower levels. The effect of marine debris on fur seals is insignificant (NMFS 2005d, FEIS for Northern fur seals). Overall, the incidental take and entanglement of fur seals is less than the PBR and is insignificant.

Bearded seals, spotted seals, ringed seals, ribbon seals, Pacific white sided dolphin, and walrus are not classified as strategic stocks under the MMPA because of the lack of information suggesting that subsistence hunting is adversely affecting these stocks, and because of the minimal interactions between these stocks and any U.S. fishery. Minke whales also are not strategic and no subsistence hunting occurs for this stock. The Bering Sea and GOA stocks of harbor seals, Killer whales, Dall's porpoise, and BSAI harbor porpoise are not classified as strategic stocks because based on the best scientific information available, the estimated level of human-caused mortality and serious injury is not known to exceed the PBR. (Anglis and Lodge 2004) Additionally, these stocks are not listed as depleted under the MMPA or listed as threatened or endangered under the ESA. The overall groundfish fisheries mortality and injury on all of these stocks is a very small to zero portion of the human caused mortality for these species. Even though the PBRs are unknown for some of these species, the impact of the groundfish fisheries is so minor that the effect is very likely to be insignificant. Therefore, the current level of incidental take and entanglement is considered not significant for all of these stocks.

The humpback whale, fin whale, sperm whale, blue whale, and northern right whale are listed as endangered under the ESA and depleted under the MMPA. Except for the sperm whale, the fishery incidental take of these stocks does not exceed the PBR. Three blue whales were documented in the GOA for the first time in 30 years (2005 draft Stock Assessment Report Available from http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/sars_draft.html). A PBR has not been determined for the sperm whale. The fishery incidental take for sperm whale is based on observing one animal in 2000 trailing fishing gear, and therefore, the estimated take of sperm whale is very small. Considering the level of risk to the population and because the estimate of minimum abundance is not available, the PBR for the north Pacific stock of right whale is zero. No records of Alaska groundfish fisheries takes of northern right whales or blue whales exist. NMFS is currently developing a proposal for critical habitat for the northern right whale in Alaskan waters and is considering listing the North Pacific right whale as a separate species from the Atlantic right whale (70 FR 1830, January 11, 2005). Because the fisheries estimated incidental take for these stocks is either very small or less than the PBR, the impacts of the groundfish fisheries on these stocks are likely not significant.

The southwest Alaska distinct population segment (DPS) of northern sea otter is listed as threatened under the ESA (70 FR 46365, August 9, 2005). Overall, this DPS has declined by more than half since the 1980s and by 90 percent in some locations. Northern sea otters are not likely to interact with groundfish fisheries in the Alaska EEZ because the areas of fishing and the types of prey preferred by otters do not overlap with the groundfish fisheries. Otters feed primarily in the rocky near shore areas on invertebrates, while groundfish fisheries are conducted further offshore on groundfish species (Funk 2003). Otters may also feed on clams in federal waters in the soft sediment substrate of Bristol Bay and Kodiak areas (70 FR 46365, August 9, 2005). Portions of the EEA used by sea otters in the Bristol Bay are closed to trawling (50 CFR 679.22(a)(9)). This trawl closure reduces potential interaction between trawl vessels and sea otters and ensures the clam habitat used by sea otters is not disturbed. NMFS observers monitored incidental take in the 1990–2000 groundfish trawl, longline, and pot fisheries**.** No mortality or serious injuries to sea otters were observed in the EEZ. One sea otter mortality in the trawl fishery of the BSAI was reported in 1997, but no other sea otter mortality in the groundfish fisheries in the EEZ off Alaska has been reported (Funk 2003). The USFWS is developing a recovery plan for the southwest Alaska DPS of northern sea otters under the ESA. The USFWS has determined that, based on available data, sea otter abundance is not likely to be significantly affected by commercial fishery interaction at present (Angliss and Lodge 2004), and commercial fishing is not likely a factor in the population decline (70 FR 46365, August 9, 2005). Based on this information, it is unlikely that the groundfish fisheries would have a significant impact on sea otters through incidental take. In September 2005, NMFS initiated consultation for this species with the USFWS to determine if further conservation action is necessary.

Alternatives 2, 3, and 4: Figures in Section 2.5 of this EA compare the 2006 and 2007 TAC levels for key species in the BSAI and GOA against the similar levels for the baseline year 2005. Overall TAC levels, and the composition of those TACs under Alternative 2, the preferred alternative, are very similar to those in 2005. The overall TAC levels for Alternatives 3 and 4 are either similar to, or lower than, 2005 levels. These TAC alternatives are likely to be associated with fisheries that are similar to those in 2005, and that are therefore likely to have an impact that is not substantially different from that in 2005.

The fishery impact on marine mammals is adverse per the significance criteria in section 4.1 because the fisheries do incidentally take some species of marine mammals, as shown in Table 4.6-1. TACs under Alternatives 2 through 4 are similar to, or less than, past harvest amounts and are unlikely to result in marine mammal incidental takes and entanglement levels beyond those seen previously. Because mortality amounts are likely to be the same or less than those experienced in 2005, and the fisheries will be conducted under existing protection measures, TACs established under Alternatives 2 through 4 are not likely to result in incidental takes that exceed the PBRs and therefore are not significant.

Alternative 1: Alternative 1 would provide for higher amounts of TAC than in 2005. This increase in TACs raises concerns that the amount of incidental take and entanglement may also be higher than under the other alternatives, because of the increased amount of effort necessary to harvest the additional TAC. For most marine mammal species, a small increase in take would not have population level impacts because, most likely, the level of take would still not exceed the PBRs. For some species, such as killer whales or humpback whales, where the level of take is close to the PBR, any additional take of these species may be a concern.

However, while the impacts of Alternative 1 are considered adverse, they are not considered significant. It may not be possible to market the increased quantities of many of these species (for example, increased arrowtooth flounder TACs). In other instances, incidental catch constraints for PSC species, like halibut, may limit the industry's ability to catch the increased TACs. Additionally, the existing protection measures will remain in place under Alternative 1 and may limit the amount of groundfish harvested.

Alternative 5: Alternative 5, the no fishing alternative, would eliminate the fishing activities and the potential for incidental take (note that marine debris from previous years' fishing activity may still be present, posing an entanglement risk for Steller sea lions and for other marine mammals, even with the fisheries not operating). Under Alternative 5, no adverse effects of the groundfish fisheries on marine mammals are likely.

Harvest of Prey Species

BSAI and GOA groundfish fisheries' harvests of marine mammal prey species may limit foraging success through localized depletion and dispersion of prey. Reduction in local abundance could be more energetically costly to foraging marine mammals. Thus, the timing and location of fisheries, relative to foraging patterns of marine mammals, may be more of a relevant management concern than total removals. The groundfish fisheries are known to harvest the key prey species of the following marine mammals: Steller sea lions, northern fur seals, harbor seals, spotted seals, sperm whales, and resident killer whales.

Based on existing scientific information presented in the PSEIS (NMFS 2004b), the BSAI and GOA groundfish fisheries do not compete for key prey species with the following marine mammals: bearded seals, ringed seals, ribbon seals, walrus, northern elephant seals, transient killer whales, beluga whales, white-sided dolphins, Dall's porpoise, beaked whales, harbor porpoise, baleen whales, and sea otters. Because groundfish fisheries do harvest small amounts of forage species in relation to biomass and may change predator and prey relationships in ways that we may not be able to understand, it is likely some minor effect may occur. Therefore, it is reasonable to conclude that the BSAI and GOA groundfish fisheries have an insignificant effect on the foraging success of these marine mammals.

<u>Steller Sea Lions</u>: Steller sea lion protection measures require the control of overall harvests of pollock, Pacific cod, and Atka mackerel, which are considered key Steller sea lion prey species (50 CFR 679.20(d)(4)). If the spawning biomass of a prey species is predicted to fall below 20 percent of its unfished spawning biomass, directed fishing for that species would be prohibited. The harvest control rule is analyzed in the Steller sea lion protection measures SEIS (NMFS 2001a). The global harvest of pollock, Pacific cod, and Atka mackerel would be controlled by the harvest control rule for Alternatives 1 through 4, and the global harvest would be below the harvest control rule for Alternative 5. Therefore, based on the significance criteria, impacts from Alternatives 1 through 5 on the harvest of Steller sea lion prey species are insignificant.

The GOA pollock fishery impacts on Steller sea lions may be of concern due to the magnitude of change in the pollock population in the GOA. The estimated female spawning biomass has rebounded recently, from model estimates of 28% of the spawning biomass in 2003 to 37% in 2005. However, the spawning biomass is projected to decline in future years. (Appendix B). The harvest control rule threshold is 20 percent limit of unfished spawning biomass. (50 CFR 679.20(d)(4)).

<u>Northern Fur Seals</u>: The BSAI groundfish fisheries spatially and temporally overlap with northern fur seal foraging areas and likely compete with fur seals for prey, predominantly pollock and Pacific cod. The EIS for Setting the Annual Subsistence Harvest of Northern Fur Seals on the Pribilof Islands has identified the harvest of northern fur seal prey by the BSAI groundfish fisheries as having the potential to have a conditionally significant cumulative effect when considered with the fur seal subsistence harvest (NMFS 2005d). The EIS notes that the following factors lower the probability of adverse impacts stemming from spatial or temporal concentration of fisheries in northern fur seal foraging areas: (1) 45 percent of the catch from both fisheries occurs during the A season in winter when female and juvenile male fur seals are not commonly found in the areas used by fisheries; (2) the pollock fisheries do not target fish younger than 3 years of age, which is the size preferred by foraging fur seals; and (3) the Pribilof Islands Habitat Conservation Zone limits prey removals in waters surrounding the Pribilof Island rookeries. The EIS concludes that conditionally significant adverse effects could occur with changes in harvesting activity and/or concentration of harvesting activity in space and time, such as increased groundfish fishing in fur seal habitat during June – August.

Alternatives 2, 3, and 4 represent minor reductions in the pollock and Pacific cod TACs from the 2005 TAC levels. Figures in Section 2.5 of this EA compare the 2006 and 2007 TAC levels for key species in the BSAI and GOA against the similar levels for the baseline year 2005. These TAC alternatives are likely to be associated with fisheries that are similar to those in 2005, and that are therefore likely to have an impact that is not significantly different from that in 2005. Additionally, the same portion of the TACs will be harvested in the A and B seasons, the size of the pollock targeted will remain the same, and the Pribilof Islands Habitat Conservation Zone will remain closed to groundfish fishing. Because no changes will occur in harvesting activity or concentration that may constrain the foraging success of fur seals causing a population decline, the impacts from Alternatives 2, 3 and 4 on the harvest of prey species are considered to be adverse, but not significant.

Alternative 1 would provide for higher amounts of TAC than in 2005, which may cause a change in harvesting activity and concentration. The magnitude of change will be tempered by the fact that the larger TACs will be apportioned between the A and B season in the current ratio. So, the question is whether the portion of the increased TAC levels harvested in the B season may constrain the foraging success of fur seals causing a population decline. Based on the available information, it is unlikely that Alternative 1 would have a significant effect on the prey of fur seals because the increase in the B season pollock TAC would be relatively small and spatially distributed among all of the areas fished in the B season. Alternative 5 would eliminate the potential adverse effects of competition with fur seals and would not have an adverse effect.

Harbor Seals: Approximately 10 percent of the Harbor seal diet includes pollock, Atka mackerel, and Pacific cod. Although there is overlap in species/size classes taken by the groundfish fisheries and by harbor seals, the seals also consume a large amount of other prey species and forage primarily in nearshore waters. Pollock removals by fisheries are less than 10 percent of the biomass estimate and primarily in the EEZ, suggesting that in terms of volume and location, the unharvested fraction of Pollock is sufficient to satisfy harbor seal foraging needs (NMFS 2004b, PSEIS).

Under Alternatives 2, 3 and 4, 2006 and 2007 harvest levels will be similar to or less that the 2005 baseline level. No evidence suggests that the current level of harvest constrains foraging success of harbor seals and is causing a population decline, therefore, the effects of these alternatives are adverse, but not significantly adverse. Under Alternative 1, TAC levels in 2006 and 2007 will be greater than in 2005, however, given the constraints on the actual harvests and the fact that the fisheries would still be removing a relatively small portion of the total biomass, the effects on harbor seal foraging success are not significant. Alternative 5 would eliminate the adverse effects of competition with harbor seals and would not have an adverse effect.

Sperm Whales and Resident Killer Whales: Based on information presented in the PSEIS (NMFS 2004b), sperm whales and resident killer whales compete with the longline groundfish fisheries. In the GOA, sperm whales have been observed feeding off longline gear targeting halibut and sablefish. The interaction with commercial longline gear does not appear to have an adverse impact on sperm whales since no mortalities have been observed. On the contrary, the whales appear to have become more attracted to these vessels in recent years as reliable and easy sources of food. In the BSAI, killer whales have been observed feeding off longline gear targeting sablefish and Greenland turbot. Consumption of other groundfish species by resident killer whales not interacting with gear is largely unknown. The importance of groundfish as prey items for killer whales is unknown, but no evidence exists suggesting exclusive reliance on commercially important groundfish species.

Under Alternatives 2, 3 and 4, 2006 and 2007 harvest levels will be similar to or less than the 2005 baseline level. No evidence suggests that the current level of harvest constrains foraging success of sperm whales or resident killer whales, therefore, the effects of these alternatives are not significant. Under Alternative 1, TAC levels in 2006 and 2007 will be greater that in 2005, however, given the constraints on the actual harvests and the fact that the fisheries would still be removing a relatively small portion of the total biomass, the effects on sperm whale or resident killer whale foraging success are not significant. Alternative 5 would eliminate the adverse effects of competition with sperm whales and resident killer whales and would not have a significant effect.

Disturbance Effects

Vessel traffic, nets moving through the water column, or underwater sound may all affect marine mammal behavior. Foraging could be affected, not only by interactions between vessels and species, but also by changes in fish schooling behavior, distributions, or densities, in response to harvesting activities. In other words, disturbance of the prey base may be as relevant a consideration as disturbance of the predator itself. For the purposes of this analysis, some level of prey disturbance may occur as a fisheries effect. The impact on marine mammals using those schools for prey is a function of both the amount of fishing activity and its concentration in space and time, neither of which may be extreme enough under any alternative to represent population level concerns. To the extent that fishery management measures do impose limits on fishing activities inside critical habitat (for Steller sea lions) and the Bristol Bay no trawl zone (for sea otters and other marine mammals), protection is provided from these disturbance effects.

The level of disturbance is based on the locations of fishing activities and on whether closed areas remain closed. Alternatives 1 through 4 would not open additional areas where disturbance may increase at particular locations, compared to 2005. Alternative 1 allows for more fishing effort than 2005, which in turn may result in more disturbance by increasing the amount of time vessels may be in contact with marine mammals, but the level of disturbance is not expected to increase to a level that would cause a marine mammal population to decrease. Thus, the effect under Alternatives 1 through 4 is insignificant. Effects on all marine mammals under Alternative 5 would eliminate the adverse effects of fishing because there would be no interaction between marine mammals and vessels fishing for groundfish.

4.6.2 Cumulative effects

The following reasonably foreseeable future actions may have a continuing, additive and meaningful relationship to the direct and indirect effects of the alternatives on marine mammals. These actions are described in Section 3.2. As discussed in Section 4.1, past actions are incorporated into the 2005 baseline used in the direct and indirect impacts analysis. This baseline includes all past management measures adopted by the Council through 2005, including area closures, effort reduction, and gear modification measures.

<u>Ecosystem approaches to management</u>: Increased attention to ecosystem approaches to management is likely to lead to more consideration for the impact of the groundfish fisheries on marine mammals and more efforts to ensure the ecosystem structure that marine mammals depend upon is maintained, including prey availability. Increasing the potential for observers collecting marine mammals and groundfish fisheries interaction information, and any take reduction plans, may lead to less incidental take and interaction with the groundfish fisheries, thus reducing the adverse effects of the groundfish fisheries on marine mammals.

Changes in the status of species listed under the ESA, the addition of new listed species, and results of future Section 7 consultations may require modifications to groundfish fishing practices to reduce the impacts of these fisheries on listed species and critical habitat. In either the case of designating critical habitat for northern right whales or separate species listing, a re-initiation of Section 7 consultation may be required for the groundfish fisheries if activities may affect critical habitat or the northern right whale species. The consultation would identify any right whale protection measures needed for the groundfish fisheries. This potential future action is likely to increase the protection for northern right whales.

Modifications to Steller sea lion protection measures may result in re-initiation of the Section 7 consultations. These changes may be a result of recommendations by the Council based on a review of the current protection measures, potential State actions or recommendations of the Steller Sea Lion Recovery Plan. Any change in protection measures likely would have insignificant effects because any changes would be unlikely to result in the PBR being exceeded.

The listing of sea otters as a threatened species is likely to improve the protection of sea otters. It is unlikely that protection measures would be developed for the Alaska groundfish fisheries conducted in the EEZ and the minimal impacts from the groundfish fisheries on sea otters are likely to remain unchanged.

Future actions for improved management of fur seals will likely result from the increased concern that has been demonstrated by the Council in the formation of the Fur Seal Committee and the continued development of information regarding groundfish fishery interactions and fur seals. The timing and nature of potential future protection measures for fur seals are unknown, but any action is likely to reduce the adverse effects of the groundfish fisheries on fur seals.

<u>Fisheries Rationalization</u>: Many of the resulting changes to the prosecution of the fisheries under rationalization would potentially reduce impacts of the fisheries on marine mammals. Future rationalization of the groundfish fisheries is expected to reduce fishing effort and improve manageability of the fisheries through better harvest and bycatch controls. A rationalization program would reduce the number of vessels that participate in the groundfish fisheries, thus decreasing the potential for incidental take, reducing the amount of marine debris, and reducing vessel disturbance. A rationalization program would also potentially reduce the effects of the fisheries on marine mammals by providing fishermen the time to improve fishing practices and avoid sensitive areas, such as rookeries. Increases in monitoring and observer coverage from implementing a rationalization program would increase our understanding of the impacts of these fisheries on marine mammals by providing better incidental take information and fishery locations. To the extent that the implementation of fisheries rationalization will likely result in reduced effort or modified fishing, the adverse direct and indirect impacts of the proposed action will be reduced.

<u>Traditional management tools</u>: The cumulative impact of the 2006 and 2007 harvest specifications in combination with future harvest specifications may have lasting effects on marine mammals. However, as long as future incidental takes remain at or below the PBR, the stocks will still be able to reach or maintain their optimal sustainable population. Additionally, since future TACs will be set with existing or enhanced protection measures, it is reasonable to assume that the effects of the fishery on harvest of prey species and disturbance will likely decrease in future years. Improved monitoring and enforcement through the use of technology would improve the effectiveness of existing and future marine mammal protection measures by ensuring the fleet complies with the protection measures, and, thus, reducing the adverse direct and indirect impacts of the alternatives.

<u>Actions by other Federal, State, and International Agencies</u>: Expansion of State pollock fisheries may increase overall effects on marine mammals. However, due to ESA requirements, any expansion of State groundfish fisheries may result in reductions in Federal groundfish fisheries to ensure the total removals of these species does not jeopardize Steller sea lions or adversely modify their critical habitat.

<u>Private actions</u>: Subsistence harvest is the primary source of direct mortality for many species of marine mammals. Current levels of subsistence harvests, represented in column 3 of Table 4.6-1,

are monitored and controlled only for fur seals. Subsistence harvest information is collected for other marine mammals and considered in the stock assessment reports. Subsistence harvests of marine mammals may or may not continue at current rates for the next 10 years .

Other factors that may impact marine mammals include continued commercial fishing, ongoing non-fishing commercial, recreational, and military vessel traffic in Alaskan waters, and tourism and population growth that may impact the coastal zone. Little is known about the impacts of these activities on marine mammals in the GOA and BSAI. However, Alaska's coasts are currently relatively lightly developed, compared to coastal regions elsewhere. Despite the likelihood of localized impacts, the overall impact of these activities on marine mammal populations during the period under consideration is expected to be modest.

Conclusions: The cumulative effects analysis proceeds by modifying the 2005 baseline used for the direct and indirect effects analysis to account for the reasonably foreseeable future actions described above. (As noted, past actions are considered to be reflected in the 2005 baseline). The 2006-2007 action is then compared to this revised baseline to see if the direct-indirect significance conclusions would change in light of the reasonably foreseeable future actions. As noted above, the direct-indirect impacts of this action on some marine mammals appear to be adverse per the significance criteria of section 4.1, but not significant.

The continuing fishing activity and continued subsistence harvest in the years 2008 to 2015 is potentially the most important source of additional annual adverse impacts on marine mammals, as described by section 4.1. Since both of these activities are monitored and not expected to increase beyond the PBR, they have been determined not to be significant. The extent of the fishery impacts would depend on the size of the fisheries, the protection measures in place, and the level of interactions between the fisheries and marine mammals. However, a number of factors will tend to reduce the impacts of fishing activity on marine mammals in the future. These include the trend towards ecosystems management and fisheries rationalization. Ecosystem approaches to management are likely to increase understanding of marine mammal populations, and institutionalization of ecosystems considerations into fisheries governance. Fisheries rationalization may lead to reduced interactions to the extent that fewer operations remain in a fishery, and the remaining operations are better able to comply with protection measures. The effects of actions of other Federal, State and International Agencies are likely to be less important when compared to the direct interaction of the commercial fisheries and subsistence harvests with marine mammals.

Based on this analysis, the cumulative effects of the 2006-2007 fishery when added to the past actions reflected in the 2005 baseline, and the reasonably foreseeable future actions during the analytical time period, have been rated adverse, but not significant.

4.7 Impacts on Seabirds

This resource component includes the seabird populations that nest within, or that migrate into and spend time within, the action area. The US Fish and Wildlife Service (USFWS) is the Federal agency with primary responsibility for seabird management. The USFWS's Alaska Region's website identifies the species listed in Table 4.1-7 (in the first section of this chapter), as species that either nest in Alaska or that "visit Alaskan waters when they are not breeding."

In this section, seabirds within the action area have been grouped for analytical purposes as follows: northern fulmar, short-tailed albatross, spectacled and Steller's eiders, albatrosses and shearwaters, piscivorous seabird species, and all other seabird species not already listed. The reasons for this grouping were explained in the discussion of seabird significance criteria in Section 4.1 of this chapter.

The impacts of groundfish fisheries on seabirds are difficult to predict due to the lack of information on many aspects of seabird ecology. A summary of known information, both general and species-specific, can be found in the PSEIS, (Section 3.7) An analysis of the impacts of the preferred alternative is in Section 4.9.7 (NMFS 2004b).

Three species of seabirds in the action area are listed under the Endangered Species Act. These include the endangered short-tailed albatross (*Phoebastria albatrus*), the threatened spectacled eider (*Somateria fisheri*), and the threatened Steller's eider (*Polysticta stelleri*). (NMFS, 2001a, page 3-90 – SSL EIS) ESA listed seabirds are under the jurisdiction of the USFWS, which has completed an FMP level (USFWS 2003a) BiOp for the groundfish fisheries and a project level BiOp (USFWS 2003b) for the setting of annual harvest specifications. Both BiOps concluded that the groundfish fisheries and the annual setting of harvest specifications were unlikely to cause the jeopardy of extinction or adverse modification or destruction of critical habitat for ESA listed birds.

The criteria used to evaluate the environmental significance of the alternatives' seabird impacts are described in Section 4.1, and summarized in Table 4.1-8. Three classes of resource impacts have been identified for analysis: (1) direct impacts of incidental take (in gear and vessel strikes), and indirect impacts on (2) prey (forage fish) abundance and availability, (3) benthic habitat.

4.7.1 Direct and Indirect Impacts

Incidental take

The incidental take of seabirds during 2006 and 2007 is projected to have adverse, but not significantly adverse, direct impacts on seabird populations under Alternatives 1 to 4. It does not appear to have adverse impacts under Alternative 5, under which there would be no fishing.

Seabirds can be killed when they are attracted to baited longline hooks as these are being set, and become entangled in the gear, or caught on the hooks. Average longline bycatch from 1993 to 2003 was about 13,000 seabirds in the BSAI, and about 900 in the GOA. In the BSAI, 59% of the bycatch was fulmars, 20% gulls. In the GOA, 46% of the bycatch was fulmars and 30% albatrosses. (NMFS 2005g, pgs 6-9, Tables 3 and 4 – summary handout from web) Despite increasing groundfish longline[20] effort as measured by numbers of hooks and hours of gear set, aggregate longline bycatch of seabirds has tended to decline since 1998. The bycatch rate (birds per '000 hooks) has also tended to decline since 1998. NMFS 2005g, pg 11, Figure 2 – summary handout from web The reasons for the declining bycatch rates are not well understood. They may be due, in part, to the introduction of new measures for reducing bird contacts with longline gear. Research by Melvin et al. at the Washington Sea Grant Program found that streamer lines are effective in reducing longline seabird bycatch. (Melvin, et al., 2001) Many operations began to voluntarily adopt these measures starting in 2002. (NMFS 2005g, pages 233-235; Coon, pers comm.) Revised bycatch avoidance measures have been required in the hook-and-line groundfish

[20] Here and elsewhere in this discussion, longline refers to groundfish longline activity (targeting Pacific cod, Greenland turbot, and sablefish). A halibut longline fishery also exists in the GOA and BSAI.

fisheries of the BSAI and GOA since February 12, 2004 These regulations require all hook-and-line vessels over 55 feet to use paired streamer lines. (69 *FR* 1930).

Due to observer sampling protocols and methodologies, it has been necessary to calculate two alternative sets of estimates for incidental take in trawls, based on the smallest and largest sizes of sampling effort recorded. Although it is not known with certainty which of the two sets of estimates is more accurate, the level of seabird bycatch on trawl vessels during the 1990s probably lies somewhere between the two sets of estimates.

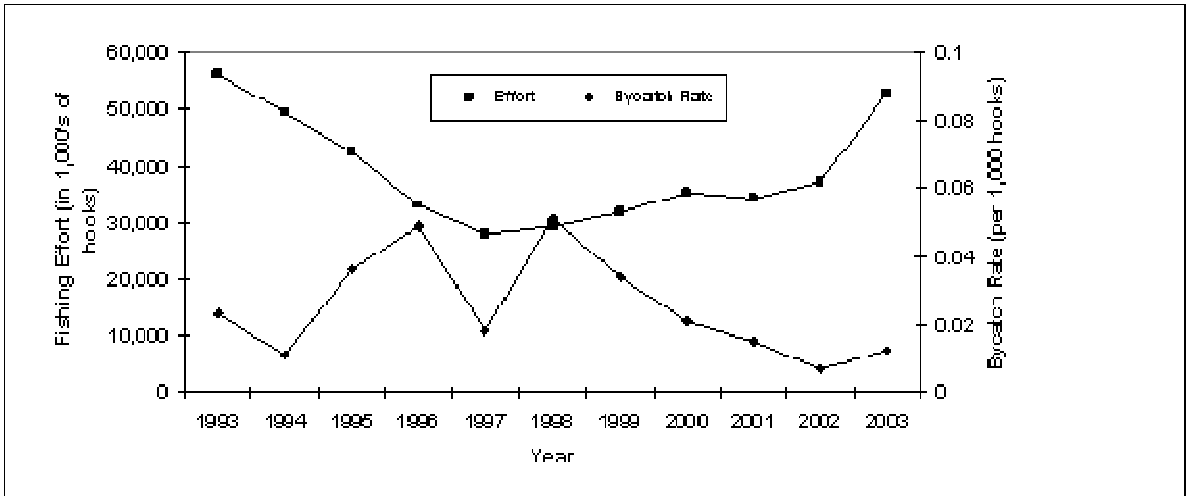
The average mortality over 1999 to 2003, using the approach producing the low estimates of mortality, generates an estimated average annual take of about 1,300 birds; 75% of the estimated number of birds taken using this approach were northern fulmars. The approach producing the high estimates of take mortality generated average annual take estimates of 15,343 seabirds; 80% of these were northern fulmars. Under this second approach another 8% of the mortality, about 1,200 seabirds, were unidentified shearwaters. Data collection protocols were revised in 2004, such that a single estimate should be possible. (NMFS 2005g, page 3, Table 5, page 10 – summary handout from web)

The trawl mortality estimates described above are based on sampling the contents of the trawl nets. Anecdotal evidence indicates that additional seabird mortalities occur from collisions with the trawl sonar cable and main net cables. The extent of that mortality is currently unknown, as observers are fully tasked with sampling the catch. In the trawl fleet, improved instructions to observers should help refine the estimates, which will in turn allow a better assessment of whether the numbers taken pose a conservation concern. In addition, there is research underway into electronic monitoring of seabird trawl interactions, and on ways to mitigate these interactions (McElderry *et al. 2004*, Melvin *et al.* 2004, Ames *et al*. 2005).

Only small numbers of seabirds have been taken with pot gear. The average annual estimated bycatch with pot gear between 1993 and 2003, inclusive, was 55 birds. Northern fulmar comprised the majority of the take. (NMFS 2005g, Table 4, page 9 – summary handout from web; NMFS 2005e, page 237) Because pot gear only takes very small numbers of seabirds, it is not considered further in this analysis.

Longline effort in the EBS has been increasing since 1990. To some extent the effort increases in recent years have been offset by declines in effort in the AI. However, more importantly, the increasing effort levels in recent years have tended to be more than offset by decreasing seabird bycatch rates, leading to generally declining longline seabird bycatch. Whereas the average seabird bycatch in the longline fisheries was about 15,000 seabirds per year from 1993 to 1998, the average was about 10,000 between 1999 and 2003. This comparison of averages may understate the actual decline in bycatch by 2002-2003, since bycatches were at their lowest in the 2003-2003 period. (NMFS 2005g, pages 6-6 – Summary bird sheet) The average annual estimates in 2002 and 2003 were in the 1,000s (3,800 to 5,300).

Figure 4.7-1 BSAI groundfish longline effort and seabird bycatch rate, 1993 through 2003



Source: 2005 Ecosystem SAFE Figure 104 (NMFS 2005_).

The available information on observed takes and on seabird populations in the BSAI and GOA, summarized in the PSEIS, suggests that seabird bycatch is low relative to seabird populations in 2002. Information on seabird takes is based on extrapolations of observer samples of catches and bycatches. Information on vessel strikes is limited, and for trawlers, the data do not include potential mortalities from interactions with trawl cables or 'third wires." Population estimates are likewise very rough. The PSEIS compared takes from the 1990s and early 2000s to population estimates from the early 2002s. Fulmar mortality was estimated to be less than a percent of the BSAI and GOA population (NMFS 2004b, 4.9-233), no shorttailed albatross have been taken in the BSAI and GOA since 1998 (NMFS 2004b, 4.9-225), Spectacled and Steller's eider takes are "at levels approaching zero," (NMFS 2004b, 4.9-247 other albatross and shearwater takes are less than a percent of the populations at risk NMFS 2004b, 4.9- 231, bycatch of the piscivorous species red-legged kittiwakes, and Marbled and Kittlitz's murrelets is rare, catches of other piscivorous species including alcids, gulls, and cormorants are all low compared to populations (NMFS 2004b, 4.9-237, 240), and takes of other seabirds, including storm-petrels and auklets are also low compared to population levels (NMFS 2004b, 4.9- 244). For some species, such as spectacled eiders, Steller's eiders, and cormorants, there is little overlap between seabird habitat and the location of groundfish operations. (NMFS 2004b, 247, 240)

<u>Alternatives 2, 3, and 4:</u> TAC levels under Alternatives 2, 3, and 4 are similar to, or smaller than, those in the 2005 baseline.[21] These alternatives retain the same restrictions on methods, locations and amounts of fishing as the baseline fishery. These alternatives are likely to require similar levels of effort to those involved in 2005 in order to take the available TACs. Although EBS longline fishing effort may continue to increase in 2006 and 2007, as it did between 1990 and 2003, lower bycatch rates, and possibly lower effort levels in the AI, may offset much of this increased effort. The impacts on incidental take of seabirds under these alternatives are likely to be similar to those in 2005. As noted above, seabirds takes do not currently appear to be high

[21] As noted in Section 2.5, while Alternative 3 has slightly higher TACs in the GOA, these are due to increases in flatfish TAC, and marketing and halibut PSC limits make it unlikely they would be fully harvested.

relative to their populations. For these reasons, seabird takes are rated adverse, but not significant.

Alternative 1: Under Alternative 1, the sum of BSAI TACs would be higher than the baseline in 2006 and about the same as the baseline in 2007. GOA TACs will be larger than the baseline in both years. As noted in Section 2.5, it isn't clear that total GOA catches will increase proportionately to TACs under Alternative 1, because a large part of any flatfish TAC increase is likely to go uncaught. However, Pollock and Pacific cod TACs would both be larger under Alternative 1, and actual catches could increase, if not increase proportionately to overall TACs. Alternative 1 could be expected to have larger adverse impacts than the 2005 baseline. However, for the reasons given under Alternatives 2 to 4, these have been rated adverse, but not significant.

Alternative 5: By eliminating fishing effort there would be no incidental take of seabirds. This should reduce or eliminate the adverse impacts on seabirds compared to the 2005 baseline. This alternative has been rated as having no adverse impact on seabird populations.

Prey availability

Catches and bycatches of seabird prey during 2006 and 2007 appear to have adverse, but not significantly adverse, indirect impacts on seabird populations under Alternatives 1 to 4. They do not appear to have adverse impacts under Alternative 5, under which there would be no fishing.

Fisheries management measures affecting abundance and availability of forage fish or other prey species can affect seabird populations (NMFS 2004b; NMFS 2001a). Seabirds feed on a variety of fish species in the water column and in the benthic habitat. Groundfish fishing operations may target some of these species, and take others as bycatch, thereby reducing the supply of forage foods. By selectively harvesting certain species, groundfish operations may impact predator-prey balances, and by that means, may also impact seabird prey availability. Groundfish operations may also disturb stocks of seabird prey, altering their availability. Groundfish operations that alter benthic habitat may change its productivity and impact prey availability as well. Groundfish operations may fish down the food chain from larger predator species to smaller forage species that may tend to constitute seabird prey. Section 3.7.1 of the PSEIS describes the impacts of prey abundance and availability on seabirds. (NMFS 2004b). There is considerable uncertainty about the mechanisms by which groundfish fishing can impact seabird prey and prey availability, and consequent impacts on seabird populations.

Evidence summarized in the PSEIS suggests that there is not a tight correlation between groundfish harvests, and the forage available to seabirds. Northern fulmars "forage over vast areas of ocean on prey that are taken in very small amounts by the groundfish fisheries and which do not appear to be affected on an ecosystem level by the groundfish harvest." (NMFS 2004b, 4.9-234). Short-tailed albatross, likewise, forage widely over the ocean, and on species taken in small amounts by the groundfish fisheries. (NMFS 2004b, page 4.9-225) There is little overlap between the groundfish fisheries and the foraging areas of the Spectacled eiders and the Steller's eiders. (NMFS 2004b, page 4.9-247). Albatrosses and shearwaters "forage over vast areas of ocean on prey that are taken only in negligible amounts by the groundfish fisheries and which do not appear to be affected on an ecosystem level…" (NMFS 2004b, page 4.9-229. Among the piscivorous seabirds, the species and size classes of fish eaten by red-legged kittiwakes are taken in "negligible" quantities in the groundfish fisheries and there is little overlap between marbled and Kittlitz's murrelets foraging areas and the groundfish fisheries. (NMFS 2004b, page 4.9-237) While there may be some overlaps between groundfish fishing and foraging areas for alcids, gulls and cormorants, during the breeding season, these species have the ability to forage far from their colonies, which minimizes the potential for localized depletion. Moreover, they tend to forage on species and size classes that are not targeted by the groundfish fisheries. (NMFS 2004b, page 4.9-241) Other seabirds, including storm-petrels and auklets, target species and size classes that are not the subject of directed fisheries. These could be affected by ecological influences (changes in predator-prey balance due to groundfish harvests), but "…fluctuations in this food source are probably more closely related to fluctuations in environmental conditions than predator/prey relationships." (NMFS 2004b, page 4.9-245)

The BSAI and GOA FMPs define a separate category of non-target forage fish species. As noted in the discussion of forage fish in Section 4.4 of this EA, bycatch of these forage fish species consists almost entirely of smelt, taken as a bycatch in directed trawl fisheries for Pollock. Forage fish bycatch appears to be relatively small compared to biomass. Regulations at 50 CFR 679.20(i) prohibit directed fishing for, and the sale of, forage fish species, except for maximum retainable bycatch (MRB) amounts, which may be made into fish meal and sold. Ecosystem indicators in the annual SAFE document suggest that the groundfish fisheries are not fishing down the food chain – that is, fishing out populations of larger predator species and moving down the chain to harvest smaller species that tend to serve as ecosystem prey and forage. (NMFS 2005e, page __ - Eco system SAFE) This issue is discussed at greater length in Section 4.9 of this EA, which deals with ecosystem relationships.

Discards of offal and processing wastes, and fish that escape from fishing gear, may provide an additional source of food for seabirds. Evidence from elsewhere suggests that offal discards from fishing operations can have population level impacts on bird species. (Furness 1999) This impact may be offset by potential mortality occurring when seabirds, attracted by the food source, fly into fishing vessels, or become attracted to and trapped by longline or trawl fishing gear. Seabird behavioral changes associated with access to offal as a food source are a cause for concern, even if offal availability does increase populations. Moreover, changes in offal availability may have complex, and potentially undesirable, ecosystem impacts. Furness discusses the possibility that reductions in offal availability, "leading to large scavenging seabirds switching diet, may have a severe impact on other seabird populations" if the birds switching diets begin to predate on other seabird populations (Furness, 1999, page 485). Mortality to seabirds attracted by offal and taken by fishing gear or vessel strikes was discussed earlier in this section in the discussion of seabird incidental take.

<u>Alternatives 2, 3 and 4:</u> TAC levels under Alternatives 2, 3, and 4 are similar to, or smaller than, those in the 2005 baseline. These alternatives retain the same restrictions on methods, locations and amounts of fishing as the baseline fishery.[22] The impacts on the prey available for seabirds under these alternatives are likely to be similar to those in 2005. As noted above, seabirds may not be heavily dependent on the species and size classes of fish harvested by the directed groundfish fisheries. Forage fish harvests are restricted by regulation, and are believed to be small with respect to biomass. There does not appear to be evidence that fishing operations are fishing down the food chain. Discards of offal and processing wastes may provide an additional food source for seabirds, but the benefits would be offset by potential mortality. For these reasons, seabird survival and reproductive success relative to food abundance and availability, are not likely to be different from the baseline and, therefore, the impacts on seabirds are rated adverse, but not significant.

[22] As noted earlier, while Alternative 3 has slightly higher TACs in the GOA, these are due to increases in flatfish TAC, and marketing and halibut PSC limits make it unlikely they would be fully harvested.

Alternative 1: Under Alternative 1, the sum of BSAI TACs would be higher than the baseline in 2006 and about the same as the baseline in 2007. GOA TACs will be larger than the baseline in both years. As noted in Section 2.5, it isn't clear that total GOA catches will increase proportionately to TACs under Alternative 1, because a large part of any flatfish TAC increase is likely to go uncaught. However, Pollock and Pacific cod TACs would both be larger under Alternative 1, and actual catches could increase, if not increase proportionately. Alternative 1 could be expected to have larger adverse impacts than the 2005 baseline. However, for the reasons given under Alternatives 2 to 4, these have been rated adverse, but not significant.

Alternative 5: By eliminating fishing effort there would be no incidental take of forage species. Ecological impacts of groundfish harvests on seabird forage would also be eliminated, but it is difficult to say if this would increase or decrease available forage. Offal discards would be eliminated as a food source for seabirds attracted to fishing operations, particularly northern fulmars, albatrosses, shearwaters, and gulls. While the specific impacts are unknown, they are believed to be likely to involve a reduction or elimination of adverse impacts for all seabirds compared to the 2005 baseline. This alternative has been rated as having no adverse or beneficial impact on seabird populations.

Benthic habitat

Groundfish specification impacts on benthic habitat of seabirds during 2006 and 2007 appears to have adverse, but not significantly adverse, direct and indirect impacts on seabirds under Alternatives 1 to 4. It does not appear to have adverse impacts under Alternative 5, under which there would be no fishing.

The fishery impacts on benthic habitat are described in the Essential Fish Habitat EIS (NMFS 2005c). Seabird utilization of benthic habitat is described in Section 3.7 of the PSEIS, and the impacts of groundfish fishing on seabirds foraging on benthic habitat are described in Section 4.9.7 of the PSEIS (NMFS 2004b).

Several seabird species exploit food resources on the seabed. Spectacled eiders are bottom feeders, eating mollusks and crustaceans down to 70 m. Steller's eiders feed in shallow inshore waters, eating clams, plychaete worms, and amphipods. Marbled and Kittlitz's Murrelets depend on species that themselves depend on benthic habitat for part of their life cycles. (NMFS 2004b - PSESI 3.7-50, 52; 4.9-237) Cormorants and alcids have diverse diets that include small schooling fishes (capelin and sand lance) and demersal fish species and crustaceans. These birds are capable of diving from 40 m to over 100 m deep and are thus able to reach the ocean floor in many areas. Some species, such as cormorants and guillemots, usually forage in coastal waters during the breeding season, but other species forage well away from land. (NMFS 2004b, page __, PSEIS)

Bottom trawl gear has the greatest potential to indirectly affect these diving seabirds via physical changes to benthic habitat, but pelagic trawls (to various extents), pot gear, and longline gear also contact the ocean floor. Gear that contacts the seabed can reduce habitat complexity and productivity. (NMFS 2004b, page 4.9-241 to 4.9-242, 248)

There appears to be little overlap between groundfish fishing activities and the range of some of these species. Observer data suggests that there is no overlap between groundfish operations and Spectacled eider habitat, and that Steller's eider feeding areas tend to be in shallow waters inshore of the groundfish fisheries. Based on an analysis of the Observer Program data, there is currently no overlap occurred between spectacled eider critical habitat and the groundfish fishery under the baseline conditions. (NMFS 2004b, page 4.9-248) Since Steller's eiders forage almost exclusively in shallow waters inshore of the groundfish fisheries, their preferred winter habitats are not subject to groundfish fishing effort. During the breeding season, the overlap of bottom trawl fisheries and Steller's eider critical habitat is also very limited, involving only a few vessels in a limited area of Kuskokwim Bay. The impacts of this small bottom trawl fishery on Steller's eider critical habitat have not been investigated, but fishing effort appears to be limited, and a large area of critical habitat that is not fished. The small amount of fishing in this area is limited by logistical considerations and lack of interest by the fleet. During Section 7 consultations with NOAA, USFWS concluded that the fisheries were not likely to adversely affect Steller's eider critical habitat or their food supply through bottom-contact fishing gear (USFWS 2003a; NMFS 2004a, page 4.9-248).

Similarly, the foraging grounds for Marbled and Kittlitz's Murrelets also appears to lie inshore of groundfish fishing operations (NMFS 2004b, page 4.9-237 PSEIS). Some species in the alcid, gull, and cormorant grouping, do fish well away from the shore. However, none of the species in the cormorant or alcid groups appear to have experienced consistent or widespread population declines (Dragoo, Byrd and Irons, 2003) so there is no indication that the carrying capacity of the environment has been decreased through changes to benthic habitat (or any other mechanism) (NMFS 2004a).

Alternatives 2, 3 and 4: TAC levels under Alternatives 2, 3, and 4 are similar to, or smaller than, those in the 2005 baseline. These alternatives allow for the same methods, locations and amounts of fishing as the baseline fishery. The survival and reproductive success of seabirds that may be dependent on the benthic habitat is likely to be similar to that under the 2005 baseline. Because the impacts on benthic habitat under these alternatives are likely to be the similar to those in the baseline fishery, and because, as noted above, for many of these species there appears to be relatively little overlap between groundfish fishing and benthic foraging, the impacts on seabird survival and reproductive success at the population and colony level (for ESA listed species) have been rated adverse, but not adversely significant.

Alternative 1: Under Alternative 1, there are large increases in many TACs However, much of this is pollock TAC harvested with pelagic gear. Another significant part of the increase consists of flatfish species taken with bottom trawl gear. However, the additional harvest of much of this is likely to be constrained by market limitations (for arrowtooth flounder) and by halibut PSC bycatch. Moreover, as noted above, for many of these species there appears to be little overlap between the benthic habitat exploited, and the areas in which bottom trawling takes place. Therefore, despite the increase in TACs, the impact of this alternative has been rated adverse, but not significantly adverse.

Alternative 5: Under Alternative 5, all TACs would be set equal to zero. Because the scope of the benthic habitat contribution to the food web is not well understood, it is not possible to predict the impact on the seabird survival and reproductive success by eliminating fishing. However, this alternative eliminates all fishing, and therefore all impact on benthic habitat exploited by seabirds. This alternative has been rated not adverse.

4.7.2 Cumulative Impacts

Ecosystem approaches to management: Increased attention to ecosystem approaches to management is likely to lead to more consideration for the impact of the groundfish fisheries on seabirds, and more efforts to ensure that the ecosystem structure that seabirds depend upon is maintained, including prey availability. New observer data recording techniques are likely to lead to better estimates of seabird trawl bycatch takes. Research into trawl cable and "third wire" interactions is likely to lead to an improved understanding of the mechanisms by which seabirds are taken when they are caught by the cables. This understanding may lead to trawling methods that take fewer seabirds through this mechanism.

Fisheries rationalization: Rationalization may lead to fewer operations on the water. Moreover, if appropriate monitoring and enforcement provisions are incorporated into the programs, they can lead to more effective control over fisheries bycatch.

Traditional management tools: Future actions include ongoing annual groundfish fisheries in 2008 to 2015. These would cause additional incidental takes of seabirds, additional harvest of prey species, and additional impacts on benthic habitat. All of these would have adverse impacts on seabird populations.

Actions by other Federal, State, and International Agencies: The US Fish & Wildlife Service will continue its management of coastal seabirds. These measures include research into the natural history and population status of seabird populations, efforts to protect bird populations (for example, through invasive species management in the Alaska Maritime National Wildlife Refuge), and listing of bird threatened or endangered bird populations under the Endangered Species Act, and consultations on actions that may affect listed species.

Private actions: The most important private actions are the fishing actions by private fishing operations, carried out under the authority of the annual TAC specifications. So some extent the impact of these actions is considered under traditional management tools. In recent years, longline effort in the EBS appears to have trended upwards. As noted in Figure 4.7-1, fishing effort measured as numbers of hooks has consistently trended upwards since 1997. Until 2002, catch per unit of effort decreases appear to have more than offset the effort increases, since the bycatch rate was falling. The bycatch rate stopped decreasing in 2003, and rose slightly that year. If this trend persists through the forecast period, it may offset some part of any future potential gains from reductions in bird bycatch per unit of effort in the longline fishery.

Conclusions: Many of the actions under consideration would reduce the adverse impacts of groundfish fishing on seabird populations. Increased attention to ecosystem concerns, better estimates of trawl bycatch takes, research into the mechanisms between seabirds and trawl cables, and rationalization that may reduce vessel numbers and reduce competitive pressures that make it hard for operations to address bycatch issues, and FWS investigations into seabird population sizes, characteristics and behaviors, should all contribute to reductions in adverse impacts of groundfish fisheries on seabirds. Some of these measures, such as improved understanding of trawl cable interactions, may be available in time to mitigate the direct and indirect impacts of this action in 2006 and 2007. The impacts of others may only be felt during the cumulative impacts period, 2008 to 2015. They might thus mitigate the potential impacts of other actions considered in the cumulative effects analysis.

Groundfish fisheries from 2008 to 2015 could create additional adverse impacts on seabirds through their impacts on incidental take, the availability of prey species, and their impacts on benthic habitat. As noted above, while the groundfish fisheries are believed to have adverse impacts on seabirds through these mechanisms, in general takes are believed to be small compared to the populations of affected seabirds, groundfish fishing impacts on forage availability is believed to relatively small, especially given the variety of species consumed by seabirds, and there appears to be relatively little overlap between groundfish fishing operations, and the benthic habitat used by bottom feeding seabirds. As noted in the preceding paragraph, other reasonably foreseeable actions may mitigate these impacts further. Note that a continuation in the trend of increasing fishing effort by longline operations has the potential to increase longline impacts over time. However, for reasons not fully understood, the increasing effort in the past has been associated with falling longline seabird take. The incremental impact of 2006-2007 Alternatives 1 to 4, when added to these present and reasonably foreseeable future actions, and considering the past actions incorporated into the 2005 baseline, is adverse, but is not expected to be significant. The incremental impact of Alternative 5 is rated not adverse.

4.8 Effects on Benthic and Essential Fish Habitat

Benthic habitat is the bottom living and non-living habitat between the shoreline and the 200 mile outer limit of the US EEZ. As noted in Section 3.2, this is the action area considered in this EA. In this analysis, Essential Fish Habitat (EFH), as defined in the Magnuson-Stevens Act, is used as a proxy for benthic habitat. This has been done, since virtually all of the seafloor off of Alaska has been designated as EFH, and because the 2005 EFH EIS , provides a recent analysis of the impact of fishing activity on EFH. Additional discussions of the impact of fishing on habitat may be found in this EA in Section 4.6 on marine mammals, in Section 4.7 on seabirds, and in the discussion of functional and structural diversity in Section 4.9 on ecosystem relationships.

The effects of fishing on essential fish habitat (EFH) are analyzed for alternative levels of total allowable catch, using the best available scientific information. A complete evaluation of effects would require detailed information on the distribution and abundance of habitat types, the life history of living habitat, habitat recovery rates, and natural disturbance regimes. Although more habitat data become available from various research projects each fishing year, much is still unknown about EFH in the EEZ. Specific effects of EFH for alternate TAC levels, and the magnitude of the differences between them, are hard to predict with current data.

In 2005 NMFS and the Council completed the Environmental Impact Statement for Essential Fish Habitat Identification and Conservation in Alaska (EFH EIS, NMFS 2005c). The EFH EIS provided a thorough analysis of alternatives and environmental consequences for amending the Council’s FMPs to include EFH information pursuant to Section 303(a)(7) of the Magnuson-Stevens Act and 50 CFR 600.815(a). Specifically, the EFH EIS examined three actions: (1) describing and identifying EFH for Council managed fisheries, (2) adopting an approach to identify HAPCs within EFH, and (3) minimizing to the extent practicable the adverse effects of fishing on EFH.

The area affected by the proposed action has been identified as EFH for all of the FMP managed species in the BSAI and GOA. In April 2005, to minimize the adverse effects of fishing on EFH, the Council recommended, and NMFS is developing, FMP and regulatory amendments to implemented EFH conservation measures and Habitat Areas of Particular Concern (HAPC). These amendments are expected to be effective in early 2006.

Table 4.1-9 provides the significance criterion for the effects of the alternatives on EFH. The criterion for significantly adverse effects is derived from the requirement at 50 CFR 600.815(a)(2)(ii) that NMFS must determine whether fishing adversely affects EFH in a manner that is more that minimal and not temporary in nature. This standard determines whether Councils are required to act to prevent, mitigate, or minimize any adverse effects from fishing, to the extent practicable.

Summaries and assessments of habitat information for BSAI and GOA groundfish, and all other managed species, are provided in Appendix F of the EFH EIS (NMFS 2005c). Appendix B of the EFH EIS contains an evaluation of the potential adverse effects of fishing activities on EFH. The EFH EIS determined an overall fishery impact for each fishery based on the relative impacts of the gear used (which is related to physical and ecological effects), the type of habitat fished (which is related to recovery time), and the proportion of that bottom type utilized by the fishery. These evaluations indicate that the groundfish fisheries do not affect non-benthic EFH, so the focus of this assessment will be on the EFH for benthic species. Managed species with EFH defined as benthic habitat include crab, scallops, and groundfish. The groundfish fisheries do not affect salmon EFH because the groundfish fisheries do not affect non-benthic habitat.

4.8.1 Direct and Indirect Effects

Fishing operations change the abundance or availability of certain habitat features (e.g., prey availability or the presence of living or non-living habitat structure) used by managed fish species to accomplish spawning, breeding, feeding, and growth to maturity. These changes can reduce or alter the abundance, distribution, or productivity of that species, which in turn can affect the species' ability to "support a sustainable fishery and the managed species' contribution to a healthy ecosystem" (50 CFR 600.10). The outcome of this chain of effects depends on characteristics of the fishing activities, the habitat, fish use of the habitat, and fish population dynamics. The duration and degree of fishing's effects on habitat features depend on the intensity of fishing, the distribution of fishing with different gears across habitats, and the sensitivity and recovery rates of habitat features.

Bottom trawls, pelagic trawls, dredges, longlines, pots, and dinglebars affect EFH. These gear types damage or capture benthic species and may cause habitat degradation, as described in Appendix B to the EFH EIS (NMFS 2005c).

Total Allowable Catch Specifications Alternatives 2, 3, and 4

Alternatives 2, 3, and 4 would implement harvest levels that are near to those evaluated in the EFH EIS and would likely have impacts on EFH that are the same or less than those impacts. The alternatives would not change the spatial distribution of the groundfish fisheries. However, the implementation of a wide variety of existing closed areas and gear restrictions would continue to restrict the spatial distribution of the groundfish fisheries and potential effects on EFH.

The analyses in Section 4.3 and Appendix B of the EFH EIS indicate that groundfish fishing has long-term effects on benthic habitat features off Alaska and acknowledges that considerable scientific uncertainty remains regarding the consequences of such habitat changes for the sustained productivity of managed species (NMFS 2005c). Nevertheless, the EFH EIS concludes that the effects on EFH are minimal because the analysis finds no indication that continued fishing activities at the current rate and intensity would alter the capacity of EFH to support healthy populations of managed species over the long term. The analysis concludes that no Council-managed fishing activities have more than minimal and temporary adverse effects on EFH, which is the regulatory standard requiring action to minimize adverse effects under the Magnuson-Stevens Act. Even though the available information does not identify adverse effects of fishing that are more than minimal and temporary in nature, that finding does not necessarily mean that no such effects exist.

Due to this uncertainty, the Council recommended, and the Secretary approved, EFH and HAPC conservation measures to protect areas of ecological importance to the long-term sustainability of managed species in the BSAI and GOA from adverse effects of fishing (NMFS 2005c). The Council determined that these precautionary measures were warranted because the EFH EIS analysis has many limitations, and the effects of fishing on EFH for some managed species are unknown (NMFS 2005c).

Thus, NMFS concludes that all alternatives under consideration may have an adverse impact on EFH for managed species, but that the potential adverse impact on EFH is not significant. That means that adverse effects may be occurring but that they do not rise to the level requiring additional minimization, that level being established by 50 CFR 600.815(a)(2) as adverse effects that are more that minimal and not temporary in nature. This conclusion is based on the analysis presented in the EFH EIS and the mitigation measures enacted under Amendment 65 to the FMP for the Groundfish Fishery of the BSAI Area and Amendment 65 to the FMP for the Groundfish Fishery of the GOA Area. Regardless, EFH and HAPC protection measures are expected to be implemented with the 2006 and 2007 groundfish fisheries, further reducing potential adverse effects.

Total Allowable Catch Specifications Alternative 1

Alternative 1 would allow for larger amounts of harvest overall, may result in levels of fishing effort above those seen under the current management regime, and may cause mortality of benthic organisms beyond those currently experienced. For example, 2006 Alternative 1 BSAI TACs exceed Alternative 2 TACs by about 1.7 million mt. This increase in harvest may result in additional removal of organisms from the benthic community that may result in changes to the community structure, depending on the type of organisms removed and the potential rate of recovery. Information on how the additional harvest may change the community structure is not available at this time. The geographic management of the groundfish fishery would not change under Alternative 1.

About sixty percent of the Alternative 1 TAC is pollock that would be taken with mid-water trawls. This gear has relatively small impacts on benthic habitat, although the EFH EIS notes that “pelagic trawls may be fished in contact with the seafloor, and there are times and places where there may be strong incentives to do so, for example, the EBS shelf during the summer.” (NMFS 2005c). Trawl performance standards for the directed pollock fishery at 50 CFR 679.7(a)(14) reduces the likelihood of using the pelagic trawl on the bottom.

Much of the other Alternative 1 metric tonnage would consist of species taken with longline and non-pelagic trawl gear. These species include Pacific cod (214,300 mt), yellowtail sole (117,700 mt), rock sole (121,700 mt), and others. Longline gear and non-pelagic trawls work on the bottom and can have an adverse impact on benthic habitat (see the descriptions of effects of gear on benthic habitats in Section 3.4 of the EFH EIS).

It may not be possible to market the increased quantities of many of these species (for example, increased arrowtooth flounder TACs). In other instances, incidental catch constraints for PSC species, like halibut, may limit the industry’s ability to catch the increased TACs. Additionally, the existing EFH conservation measures, HAPC sites, and other area closures and gear restrictions, established in the FMPs, protect areas of ecological importance to the long-term sustainability of managed species from fishing impacts, regardless of the TAC levels.[23]

Because of the increased TACs in many instances, the impacts of Alternative 1 on EFH are considered more adverse than for Alternative 2, 3, and 4. However, the impacts of Alternative 1 are considered adverse, but not significantly adverse. Increased TACs may not lead to proportionate increases in fishing activity or harvests, or benthic habitat impact. As pointed out in Section 2.5, increased TACs of arrowtooth flounder may not be harvestable because of limited markets; increased activity by bottom trawlers may be restricted, or even prevented, by halibut PSC restrictions.

Total Allowable Catch Specifications Alternative 5

Alternative 5 sets the TACs to zero. No groundfish fisheries would have an allocation, and therefore no fishing would occur. A no fishing regime would result in no impact on EFH because no additional mortality on living benthic habitat would occur. Abundance increases for short-lived biota with fast recovery rates may occur relatively quickly if no fishing occurred during the 2006 and 2007 fishing years. For other species of living substrates such as long-lived corals and perhaps some sponges that have been permanently eradicated from some areas, increases over baseline levels during 2006 and 2007 may not occur or would occur very slowly. Even though the ability of the biota to recover from the impacts of the current fishing practices vary, the effects of Alternative 5 on EFH would be less than the current management and therefore eliminate the adverse impacts of groundfish fishing on EFH in 2006 and 2007.

The elimination of fishing would allow for widespread protection of the geographic diversity of benthic communities. Some changes in community structure may be seen in 2006 and 2007 with no fishing, but detectable, meaningful changes in community structure are expected to take longer than two years to accumulate. Shorter lived species that are capable of re-colonizing damaged areas may increase the structure in some benthic communities.

4.8.2 Cumulative Effects

The following reasonable foreseeable future actions may have a continuing, additive and meaningful relationship to the direct and indirect effects of the alternatives on EFH. These types of actions are described in section 3.2. As discussed in Section 4.1, past actions are incorporated into the 2005 baseline used in the direct and indirect impacts analysis. This baseline includes all past management measures adopted by the Council through 2005, including area closures, effort reduction, and gear modification measures.

<u>Ecosystem approaches to management</u>: Habitat is one component of the ecosystem in which the groundfish fisheries are prosecuted. Future fisheries management measures will be developed with consideration of the entire ecosystem, including habitat. Ongoing research into habitat will increase our understanding of the locations of different types of habitat, the importance of habitat in the different life stages of fish species, the impact of different types of fishing gear on different types of living and nonliving habitat, and the recovery rates for different types of habitat. Ongoing research is summarized in the Ecosystems Considerations SAFE. Moreover, increased

[23] Note that, for the purposes of analysis, it is assumed that the BSAI OY will of two million mt will not be binding. While this is a statutory constraint, an alternative need not be available under current statutes to be considered in a NEPA analysis.

protections for habitat will be implemented to mitigate fishing impacts on benthic habitat. The identification of EFH and implementation of EFH conservation measures and HAPC, along with any additional future habitat protection measures, are likely to result in the decrease in mortality and damage to marine habitat, the increase in benthic community structure, and changes in the distribution of fishing effort (NMFS 2005c). To the extent that the implementation of an ecosystem approach to management will likely result in reduced or modified fishing, the adverse direct and indirect impacts of the proposed action will be reduced.

Fisheries Rationalization*:* Many of the resulting changes to the prosecution of the fisheries under rationalization would potentially reduce impacts of the fisheries on EFH. Future rationalization of the groundfish fisheries is expected to reduce fishing effort and improve manageability of the fisheries through better harvest and bycatch controls. A rationalization program would reduce the number of vessels that participate in the groundfish fisheries. A rationalization program would also potentially reduce the effects of the fisheries on EFH by providing fishermen the time to improve fishing practices and avoid sensitive habitat areas. With a guaranteed share of the harvest, fishermen would have the time to be selective and choose where to fish to avoid fishing on grounds with crabs or other benthic species. Increases in monitoring and observer coverage from implementing a rationalization program would increase our understanding of the impacts of these fisheries on EFH by providing better bycatch information and fishery locations. To the extent that the implementation of fisheries rationalization will likely result in reduced effort or modified fishing, the adverse direct and indirect impacts of the proposed action may be reduced.

Traditional management tools: Since portions of habitat are impacted each year by fishing activities and since some of those habitats may require exceptionally long periods to recover from fishing impact (i.e., slow growing, long lived corals) (NMFS 2004a), the cumulative impact of the 2006 and 2007 harvest specifications in combination with future harvest specifications may have lasting effects on habitat. As the slow growing, long-lived components of the habitat are impacted by cumulative years of fishing, there is likely to be cumulative mortality and damage to living habitat and changes to the benthic community structure. Species that are able to recover faster from fishing impacts may displace the longer-lived, slower growing species, changing the structure and diversity of the benthic community. Improved monitoring and enforcement would improve the effectiveness of existing and future EFH conservation measures and HAPC by ensuring the fleet complies with the protection measures, and, thus, reducing the adverse direct and indirect impacts of the future harvest specifications.

The EFH EIS noted that "…habitat loss due to fishing off Alaska is relatively small overall, with most of the available habitats unaffected by fishing…Based on the best available scientific information, the EIS analysis concludes that despite persistent disturbance to certain habitats, the effects on EFH are minimal because the analysis finds no indication that continued fishing activities at the current rate and intensity would alter the capacity of EFH to support healthy populations of managed species over the long term." (NMFS 2005c, ES-10). Since past fishing activity has not resulted in impacts that are more that minimal and not temporary, and future fishing activity is expected to be constrained by reasonably foreseeable future actions, the future effects of a continued fishery are predicted to continue to be minimal and temporary.

Other Federal, state, and international agency actions: In the EIS prepared for upcoming sales in the OCS Leasing Program, the Mineral Management Service (MMS) has assessed the cumulative effects of such activities on fisheries and finds only small incremental increases in effects of development unlikely to significantly impact fisheries and essential fish habitat (MMS 2003). Because the levels of harvest are similar to, or less than, current management levels, and the locations of fishing are not changed under the alternatives, the cumulative impacts on EFH are considered similar to those analyzed in the EIS.

Expansion of State groundfish fisheries would impact EFH in state waters. The effects of those impacts combined with the impacts of the proposed action and its alternatives would be offset by the probable reduction in fishing in federal waters. The change would occur through future harvest specification processes. Thus, the cumulative effects of the 2006 and 2007 harvest specifications in combination with the expansion of State groundfish fisheries would be similar to the direct effects of the proposed action on EFH.

Private actions: Other factors that may impact marine benthic habitat include ongoing non-fishing commercial, recreational, and military vessel traffic in Alaskan waters, and population growth, that may impact the coastal zone. Appendix G of the EFH EIS identifies 24 categories of upland, riverine, estuarine, and coastal/marine activities that may have adverse effects on EFH (NMFS 2005c). Little is known about the impacts of the listed activities on EFH in the GOA and BSAI. However, Alaska's coasts are currently relatively lightly developed, compared to coastal regions elsewhere. Despite the likelihood of localized impacts, the overall impact of these activities on EFH during the period under consideration is expected to be modest.

Conclusions: The cumulative effects analysis proceeds by modifying the 2005 baseline used for the direct and indirect effects analysis to account for the reasonably foreseeable future actions described above. (As noted, past actions are considered to be reflected in the 2005 baseline). The 2006-2007 action is then compared to this revised baseline to see if the direct-indirect significance conclusions would change in light of the reasonably foreseeable future actions. As noted above, the direct-indirect impacts of this action appear to be adverse, but not significant.

The continuing fishing activity in the years 2008 to 2015 is potentially the most important source of additional annual adverse impacts on marine benthic habitat. The size of these impacts would depend on the size of the fisheries, the protection measures in place, and the recovery rates of the benthic habitat. However, a number of factors will tend to reduce the impacts of fishing activity on benthic habitat in the future. These include the trend towards ecosystems management and fisheries rationalization. Ecosystem approaches to management will increase understanding of habitat and the impacts of fisheries on them, protection of EFH and HAPC, and institutionalization of ecosystems considerations into fisheries governance. Fisheries rationalization may lead to reduced habitat impacts to the extent that fewer operations remain in a fishery, and the remaining operations are better able to comply with habitat protection and bycatch reduction measures. The effects of actions of other Federal, State and International Agencies and private parties are likely to be less important when compared to the direct interaction of commercial fishing gear with the benthic habitat.

Based on this analysis, the incremental effects of the 2006-2007 fishery when added to the past actions reflected in the 2005 baseline, and the reasonably foreseeable future actions during the analytical time period, have been rated adverse, but not significant.

4.9 Effects on the Ecosystem

The indicators used to evaluate the impacts of the BSAI and GOA groundfish fisheries on the ecosystem are listed in Table 4.1-10. The indicators provide information about three key ecosystem attributes: (1) predator/prey relationships, (2) energy flow and removal, and (3) species, functional, and genetic diversity. The impact on each attribute is evaluated with respect to two or more indicators.

Other elements of this EA also deal with ecosystem issues, evaluating the impacts of the specifications alternatives on a wide range of ecosystem components (target and other fish species categories, seabirds, marine mammals, and habitat). This section looks at ecosystem issues from a somewhat different direction. It is concerned with systemic ecosystem impacts, rather than the impacts on specific resource components.

Ecosystem characteristics of the BSAI and GOA have been described annually since 1995 in the "Ecosystem Considerations" section of the annual "Stock Assessment and Fishery Evaluation" (SAFE) reports. This is treated as Appendix C to this EA (NPFMC 2005a, p 102 – BSAI FMP). An overview of North Pacific ecosystem issues was provided in Section 3.10 of the PSEIS, and an evaluation of the impacts of the preferred FMP alternative bookends was provided in Section 4.9.10 of the PSEIS. (NMFS 2004b).

4.9.1 Direct and indirect impacts

Predator-prey relationships

Predator-prey relationships are evaluated with respect to four indicators: (1) pelagic forage availability, (2) spatial and temporal concentration of fishery impact on forage, (3) removal of top level predators, and (4) introduction of non-native species.

<u>Pelagic forage availability</u> As noted in Table 4.1.10, the significance of impacts on pelagic forage availability is assessed with respect to whether or not fishery induced changes are outside the natural level of abundance or variability for a prey species relative to predator demands. Significance is assessed for biomass of GOA and BSAI walleye pollock, Aleutian Islands Atka mackerel, FMP forage species, squid and herring. (Section 4.1, Table 4.1-10)

The PSEIS reports that, under the less conservation oriented bookend of the preferred alternative,

> …the estimated pelagic forage biomass for the age-modeled populations declines from the baseline in the BSAI and increases over the baseline in the GOA. Twenty-year biomass projections show similar trends. Average biomass, however, remains within the bounds of estimated biomass that occurred historically before a target fishery emerged. Bycatch of other forage species increases in the BSAI and declines in the GOA. Estimates of forage biomass from food web models of the EBS indicate that this level of bycatch is probably a small proportion of the total forage biomass…although because population-level assessments are lacking for some members of the forage species group, corresponding biomass estimates for these species are not available…average biomass projections for the age-modeled forage species remain within the estimated historical boundaries, and bycatch-based estimates for other forage species are small in relation to total forage biomass…

Similar results are found for the more conservation-oriented bookend. …(NMFS 2004b, page 4.9-352)

EBS pollock age-structured population model estimates of total biomass from 1983 to 2004, suggest that age 3+ biomass has fluctuated between about 5.6 million mt and 13.6 million mt. Estimated female spawning biomass fluctuated between 2.1 million mt and 4.0 million mt over the same period. The age structured models suggest that, under Alternatives 1 and 2, female spawning biomass will change relatively little over the projection time horizon. Under both alternatives, biomass is about 2.8 million mt in 2015. Biomass tends to rise under the other Alternatives. Under Alternative 3, biomass is 3.8 million in 2015, under Alternative 4 it is 3.4 million, and under Alternative 5 it is about 6.3 million. (NMFS 2004b, Tables 1.16 and 1.18 on pages 74 and 76 – EBS pol SAFE)

AI pollock age-structured population model estimates of age 2+ total biomass from 1977 to 2004, suggest that biomass has fluctuated between about 123,000 mt and 628,000 mt. The model estimates indicate that biomass was considerably lower after 1996 than it was before. Biomass appears to have reached its lowest level in 1999, and to have been increasing since then. Estimated female spawning biomass is not available from the SAFE for this time period. The age structured models suggest that, under Alternatives 1 and 2, female spawning biomass is projected to remain at approximately current levels through 2015. Increases are expected under the other alternatives. (NMFS 2004b, Tables 1.15 and 25 on pages 81 and 161 - AI pol SAFE)

GOA pollock age-structured population model estimates of total age 2+ biomass from 1977 to 2004, suggest that biomass has fluctuated between about 625,000 mt and 4,171,000 mt. Estimated female spawning biomass fluctuated between 143,000 mt and 712,000 mt over the same period. The age structured models suggest that, under Alternatives 1 and 2, female spawning biomass will gradually rise from current levels, reaching about 238,000 mt by 2015 under Alternative 1, and 248,000 mt under Alternative 2. Biomass also rises under both Alternatives 3 and 4. Under Alternative 3, biomass is 325,000 in 2015, and under Alternative 4 it is 288,000. Biomass generally rises under Alternative 5, reaching about 493,000 mt, in 2015. (NMFS 2004b, Tables 1.15 and 1.18 on pages 81 and 84 – GOA pol SAFE)

AI Atka mackerel age-structured population model estimates of total biomass since 1977, suggest that biomass has fluctuated between about 291,000 mt and 800,000 mt. Estimated female spawning biomass fluctuated between 59,000 mt and 200,000 mt over the same period. The age structured models suggest that, under Alternatives 1 and 2, female spawning biomass will drop somewhat in the shortrun under the preferred alternative, reaching a minimum of 85,000 mt in 2007, before rising to about 102,000 mt 2015. Biomass drops by less and rises by more under Alternatives 3 and 4. Under Alternative 3, biomass is 140,000 in 2015, and under Alternative 4 it is 133,000. Biomass generally rises under Alternative 5, reaching about 237,000 mt, in 2015. (NMFS 2004b, Tables 15.12 and 15.15 on pages 897 and 900 – Atka SAFE)
As noted in Section 4.4 of this EA, forage fish harvests are mostly smelt, taken in Pollock trawl fisheries. Alternatives 2, 3, and 4 impacts on forage fish are rated adverse, but not significantly adverse, and Alternative 5 is rated not adverse.

Herring impacts are described in Section 4.5 of this EA, which discusses impacts on PSC species. Alternatives 1 to 4 have been rated as adverse, but not significantly adverse with respect to impacts on herring populations. Alternative 5 has been rated not adverse.

Squid are primarily taken as a bycatch in directed fisheries for other species, primarily pollock. ABC in the BSAI is set using Tier 6 criteria. Catches in recent years have been low compared to historical catches and stocks are believed to be "comparatively lightly exploited." (Appendix A, page 949-955) In the GOA, squid are included in the other species category. GOA squid catches have been low historically, with an estimated average catch of about 58 metric tons per year from

1997 to 2002 (Gaiches, pers. Comm.. 2005). Estimates of forage biomass from food web models of the EBS indicate that levels of bycatch at recent harvest levels (represented by the baseline in the PSEIS) have probably been a small proportion of the total forage biomass, although because population-level assessments are lacking for some members of the forage species group, corresponding biomass estimates for these species are not available. (NMFS 2004b, page 4.9-352)

Because average biomass projections for the age-modeled forage species remain within the estimated historical boundaries, and bycatch-based estimates for other forage species appear to be small in relation to total forage biomass (NMFS 2004b, page 4.9-352), specifications Alternatives 1, 2, 3, and 4 have been rated "adverse" but not "significantly adverse." Alternative 5 sets all species TACs equal to zero. This alternative has been rated "not adverse."

Spatial and temporal The concentration criterion and its indicator are described in Table 4.1-10. The spatial and temporal concentration of fishery impacts on forage species is assessed with respect to whether or not fishery concentration levels are high enough to impair the long term viability of ecologically important, non-resource species such as marine mammals and birds. The indicator is the degree of spatial/temporal concentration of the groundfish fisheries on pollock, Atka mackerel, herring, squid, and forage species. This is evaluated qualitatively by considering the potential for the alternative to concentrate fishing on forage species in regions used by predators tied to land, such as pinnipeds and breeding seabirds. (NMFS 2004b, page 4.9-353)

All alternatives under consideration would continue the existing closures around Steller sea lion rookeries, trawl and fixed gear closures in nearshore and critical habitat areas, the ban on directed fishing for forage fish, the seabird protection measures required since February 2004 in hook-and-line fisheries, and the spatial/temporal allocation of TAC for some of the BSAI and GOA Pollock and Atka mackerel fisheries. The ecosystem appendix to this EA (Appendix C) provides a map of groundfish closures in Alaska's Exclusive Economic Zone and a table summarizing groundfish trawl closures implemented since 1995.

BSAI pollock fisheries have shown increasing catch in northern fur seal foraging habitat, but more research is required to evaluate whether the amounts of pollock removed are having a population-level effect on fur seals. The relationship between the Pollock fishery and the fur seals is described at greater length in Section 4.6 of this EA (on marine mammal impacts) and in the recently completed EIS on the Pribilof Islands fur seal subsistence harvests. (NMFS 2005d - fur seal EIS)

Alternatives 2, 3, and 4 have been rated adverse but not significantly adverse because they involve harvests similar to or less than 2005 harvests, and no change in spatial or temporal controls. Moreover, the alternatives were evaluated elsewhere in this EA with respect to their impacts on marine mammals (Section 4.6) and seabirds (Section 4.7) and were rated as adverse, but not significantly adverse. Alternative 1 has been rated unknown, because of the large increase in BSAI pollock harvests it implies, and because of the noted potential for increased pollock catches in northern fur seal habitat. Alternative 5 has been rated not adverse, because, in the absence of fishing, there is no need for spatial and temporal fishing controls the ecosystem.

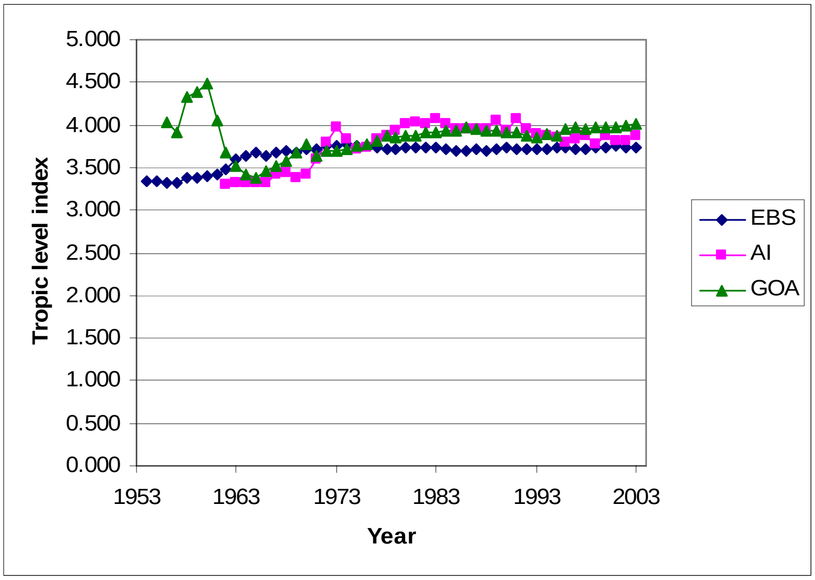
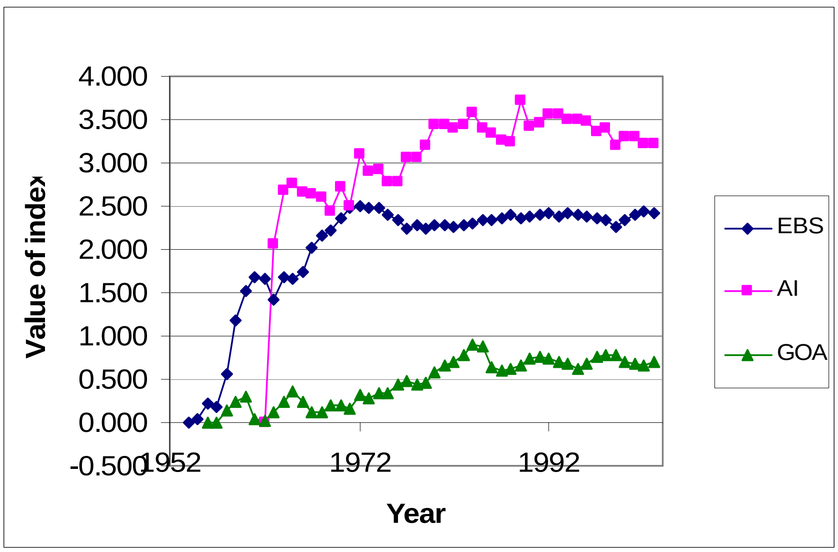
Removal of top predators The significance criterion for removal of top level predators is whether or not catch levels are high enough to cause the biomass of one or more top level predator species to fall below minimum biologically acceptable limits. Removal of top predators, either through directed fishing or bycatch, is assessed by (1) an examination of the trophic level of the catch or bycatch, (2) the bycatch levels of sensitive top level predators, and (3) the population status of top predator species relative to acceptable limits. (See Section 4.1, Table 4.1-10).

The PSEIS points out that trophic level of the catch in both the BSAI and GOA have been stable. (NMFS 2004b, 4.9-353). In 1999, Livingston et al. “found no evidence that groundfish fisheries had caused declines in trophic guild diversity for the groups studied.” Observed changes in trophic guild diversity appeared to be “related primarily to recruitment rather than to fishing.” (NMFS 2004b, page 3.10-26) More recently, as noted in this year’s Ecosystems Consideration section of the SAFE, which may be found in Appendix C, “Stability in the trophic level of the total fish and invertebrate catches in the eastern Bering Sea, Aleutian Islands, and Gulf of Alaska…are another indication that the “fishing-down” effect is not occurring in these regions. Although there has been a general increase in the amount of catch since the late 1960’s in all areas, the trophic level of the catch has been high and stable over the last 25 years.”

The Appendix also reports on a “Fishery in Balance Index” or FIB, which declines “when catches do not increase as expected when moving down the food web, relative to an initial baseline year.” In the Alaska region, the index suggests that “…catches and trophic level of the catch in the EBS, AI, and GOA have been relatively constant and suggest an ecological balance in the catch patterns.” (Appendix C, page 267) Figures 4.9-1 and 4.9-2 show trends in key indices of the trophic level of catches in the GOA, EBS, and AI, over the period from the early 1950s to 2002.

This indicator is unknown for Alternative 1, which is associated with large increases in TACs. The indicator is rated not adverse for the other alternatives, under which TACs remain at recent levels, or are reduced, on the basis of the stability of the trophic level over the last 10 years.

Figure 4.9-1 Indices of Trophic level of catches in the GOA, EBS, and AI

<table>
<tr>
<td>
</td>
<td>Trophic level of catch: Species in different trophic levels are assigned a numerical index between 1 and 5. Trophic levels are assigned based on diet composition data for the species. The index is a weighted average of the species trophic levels, with the weights given by the volumes of the species in landings.</td>
</tr>
<tr>
<td>
</td>
<td>Pauly's Fishery in Balance index (FIB) of trophic level of catch. Fishing down the food web might be a deliberate policy, since fishing species at a lower trophic level might be a strategy for reducing lost system energy. The FIB takes account of this, and only declines if reductions in trophic level are not offset by appropriate increases in productivity. Increases reflect increases in catch and trophic level and new stocks exploited. Pauley, et al.</td>
</tr>
<tr>
<td colspan="2">Source: Accessed at AFSC website http://intra.afsc.noaa.gov/reem/ecoweb/EcoChaptDataFrame.cfm on July 31, 2005.</td>
</tr>
</table>

Lower trophic levels are more biologically productive. Catch should increase, as a fishery exploits lower trophic levels. The FIB index is designed to reflect the balance of the trophic level of harvest, and the size of the harvest. If trophic levels are declining, the index will decline, unless fishery harvest increases enough to offset the declining trophic level. Large enough productivity increases could even lead to an increase in the value of the index for a declining average trophic level of catch. In general, and particularly in recent years, average annual trophic levels for retained catch in Alaska groundfish fisheries have not varied very much. Increased catch of GOA Pacific ocean perch, a lower trophic-level-fish, in the 1960s resulted in a slight decrease in the overall trophic level of the catch during that time period. Increasing catches and roughly stable trophic levels, led to increasing levels of the FIB over the period from the mid-1950s to the 1970s in the EBS, and the 1980s in the AI and GOA. In the GOA, increased total catches and decreased POP catches in the 1970s also contributed to this trend in the FIB index. Since the early 1990s, FIB levels have been fairly stable in the EBS and AI, and have shown more variation in the GOA. The Ecological Considerations SAFE interprets the results as suggesting "an ecological balance in catch patterns.

The equation for the FIB index is:

FIB= $$\log\left(Y_i \times \left(\frac{1}{TE}\right)^{TrL_i}\right) - \log\left(Y_0 \times \left(\frac{1}{TE}\right)^{Trl_0}\right)$$

Y=landings
TE=trophic efficiency=fraction of production passing from one trophic level to the next=0.1
TrL=trophic level of catch

The equation is the difference in one year (subscript i) compared to the baseline year (subscript 0).

Section 4.6 of the EA examined the impacts of groundfish fishery on incidental takes, prey competition, and disturbance of marine mammals and found the impact of Alternatives 1 to 4 to be adverse, but not significant, and the impact of Alternative 5 to be not adverse. Section 4.7 examined the impacts on incidental takes of seabirds, prey competition, and impacts on benthic habitat, and found impact of Alternatives 1 to 4 to be adverse, but not significant, and the impact of Alternative 5 to be not adverse.

The effect of shark bycatch on shark populations is a concern because these are late maturing, low fecundity, low natural mortality species. A special analysis of sharks was included in the 2004 SAFE reports and reported that “Preliminary comparisons of incidental catch estimates with available biomass estimates suggest that current levels of incidental catches are low relative to available biomass for spiny dogfish and Pacific sleeper sharks in the GOA and for Pacific sleeper sharks in the BSAI.” Other shark species (salmon shark, spiny dogfish in the BSAI, and other species) were reportedly rarely captured (NMFS 2004b, page 1010).

Alternative 1 is associated with higher TACS (but, as noted elsewhere, not necessarily larger catches for many species) than the 2005 baseline. This is believed to have a more adverse impact than the baseline, but of unknown significance. Alternatives 2 through 4 have similar impacts to those under the baseline. They have adverse impacts on the species, but these are not rated as significant. There is no harvest under Alternative 5, and therefore no adverse impacts.

Introduction of non-native species The introduction of non-native species through ballast water exchange and hull-fouling organism release from fishing vessels could potentially disrupt the Alaskan marine food web structure. There have been 24 non-indigenous plant and animal species documented in Alaskan marine waters, primarily in shallow-water nearshore and estuarine ecosystems, with 15 of those species recorded in Prince William Sound. It is possible that most of these introductions were from tankers or other large commercial vessels that have large volumes of ballast exchange. However, exchange via fishery vessels that take on ballast from areas where invasive species have already been established and that then transit through Alaskan inshore waters has been identified as a threat in a recently developed State of Alaska Aquatic Nuisance

Species Management Plan. (NMFS 2004b, 4.9-354) Another invasive species concern is the potential introduction of rats by fishing vessels onto islands with colonies of seabirds that may be vulnerable to rat predation.

Total groundfish catch levels are used as an indicator of potential changes in the risk of invasive species introductions by groundfish fishery vessels. Catch levels in the BSAI and GOA increase substantially beyond the 2005 baseline under Alternative 1. Catch levels are similar to or less than 2005 baseline under Alternatives 2, 3, and 4. Catch levels are set to zero under Alternative 5. Consequently, Alternative 1 has been rated as more adverse than the baseline, but with unknown significance, while Alternatives 2, 3, and 4, have been rated adverse, but not significantly adverse when compared to the baseline. Alternative 5 has been rated not adverse. (NMFS 2004b, 4.9-354 to 4.9-355)

Energy flow and removal

The impacts on the movement of energy through the ecosystem are evaluated with respect to two indicators: (1) removal of energy from the system through fishing operations, and (2) the redirection of energy flow into new pathways by fishing operations.

Energy removal Fishing may alter the amount of energy in an ecosystem by removing energy through the retained harvest of fish. The indicator for energy removal is trends in total retained catch levels. (See Section 4.1, Table 4.1-10). The PSEIS notes that "The annual total catch biomass in the EBS is estimated at about one percent of the total system biomass, excluding dead organic material. There is no indication that the annual removal of this small biomass percentage alters the amount and flow of energy sufficiently to affect ecosystem stability." (NMFS 2004b, page 3.10-24).

Total retained catch mortality in 2006 and 2007 is expected to be very similar to, or less than, that in 2005 under Alternatives 2, 3, and 4. Therefore, these alternatives are expected to have an impact similar to that in 2005. The impact is adverse, but is not expected to be significantly adverse. Alternative 1 will increase expected total retained catch mortality (although actual mortality is likely to be less than potentially allowed by the TACs, because of the difficulty of finding markets in some cases, and because of halibut PSC constraints in others). Given the limited potential for impacts on the ecosystem, this impact has been rated adverse, but not significantly adverse. Alternative 5 sets all TACs equal to zero. This would eliminate the adverse impacts experienced under the other alternatives.

Energy re-direction Fishing may alter the direction of energy flow in an ecosystem. Energy re-direction, in the form of discards, fishery offal production, or unobserved gear-related mortality, can change the natural pathways of energy flow in the ecosystem. The recipients, locations, and forms of this returned biomass may differ from those in an unfished system. Three factors: (1) trends in discard and offal production, (2) scavenger population trends, and (3) bottom gear effort, were identified as formal indicators of energy redirection in Section 4.1, Table 4.1-10). Animals damaged when passing through the meshes of trawls may later die and be consumed by scavengers. Bottom trawls can expose benthic organisms and make them more vulnerable to predation. Discards and offal production can cause local enrichment and changes in species composition or water quality if discards or offal returns are concentrated in confined areas such as estuaries, bays, and lagoons. (NMFS 2004b, 4.9-355)

Ecosystem Appendix C shows that biomass discards in BSAI and GOA groundfish fisheries dropped substantially in 1998, with the introduction of regulations prohibiting the discards of pollock and Pacific cod. The BSAI biomass discard rate in 2004, was about 6%, while the GOA rate was under 10%. (Appendix C, page 257). The PSEIS notes that:

> Queirolo, *et al.* (1995), working before present stricter retention requirements for pollock and cod were mandated, estimated that the total production of discarded fish and processing wastes in the BSAI and GOA ecosystems were about one percent of the unused detritus already going to the bottom. With the new retention requirements now in effect, this estimate would be substantially smaller. These authors found no changes in scavenger populations relating to changes in discard or offal production, and found the annual consumptive capacity of scavenging birds, groundfish, and crabs in the EBS to be over 10 times larger than the total production of discards and offal in the BSAI and GOA. Pathways of energy flow within the BSAI and GOA ecosystems, therefore, are apparently not redirected in any significant way by discarded fish bycatch and processing wastes that are returned to the sea. (NMFS 2004b, page 3.10-25)

Bottom gear effort may affect benthic habitat, and its capacity to support marine fish and invertebrates that use the habitat for protection from predators. Because of this the use of bottom gear may be an indicator of the potential for this source of energy redirection. The PSEIS notes that "Present-day trends in bottom gear effort show there has been a decline in this effort over the last ten or more years." (NMFS 2004b, page 3.10-25).

Given the limited significance of the offal production and scavenging in the ecosystem, the reduction in bottom trawling effort in recent years, and the similarity between the baseline 2005 TACs, and those proposed under this action, the impacts of all alternatives have been rated adverse, but not significantly adverse for Alternatives 2 to 4. Alternative 1 may lead to significantly increased use of bottom trawl gear, however, as noted earlier, bottom trawl efforts may be constrained by limited markets for some species, and PSC constraints for others. Alternative 1 has been given a rating of adverse, but of unknown significance. Alternative 5 sets all TACs equal to zero. This would eliminate the adverse impacts expected under the other alternatives.

Diversity

Diversity is evaluated with respect to (1) species diversity, (2) functional diversity (or the diversity of components playing different roles in the ecosystem) and (3) genetic diversity.

<u>*Species diversity*</u> Species diversity, defined as the number of different species in an ecosystem, can be altered if fishing results in removal of one or more species from the system . An impact on species diversity is significant if catch removals are high enough to cause the biomass of one or more species (target or nontarget) to fall below or to be kept from recovering from levels below minimum biologically acceptable limits.

Two different indices were used to measure trends in species diversity. The index of species richness is the "average number of fish taxa per haul" in bottom trawl surveys. Estimated values for this index are shown below. Note that this index may be strongly affected by changes in the location of species: if some species are highly concentrated at the time the surveys are completed, the index would tend to have a lower value. The richness index is shown in Figure 4.9-3 below.

The formula for the Shannon-Weiner index is:

$$H = \sum_i p_i * \ln(p_i)$$

Where p is the proportion of the individuals in the trawl sample of a given species. The Shannon-Weiner index measures the number of species and the relative equality of the counts of the different species in the sample. This index takes a maximum value when equal numbers of species are present (the maximum value is equal to the log of the number of species present). (McCarthy n.d.) The values for the Shannon-Weiner index are shown in Figure 4.9-4, below.

Mueter describes the values for the richness and diversity indices in the GOA as increasing from 1990 to 1999, peaking in 1999, and sharply decreasing after 1999. In the BSAI, they "have undergone significant variations from 1982 to 2004…Species diversity increased from 1983 through the early 1990s, was relatively high and variable throughout the 1990s, decreased significantly after 2001, and increased again to its long term average in 2004". He notes that shifts in the locations of species included in the richness index appear to be the key determinants of changes in the richness index (NPFMC 2005e, page 238).

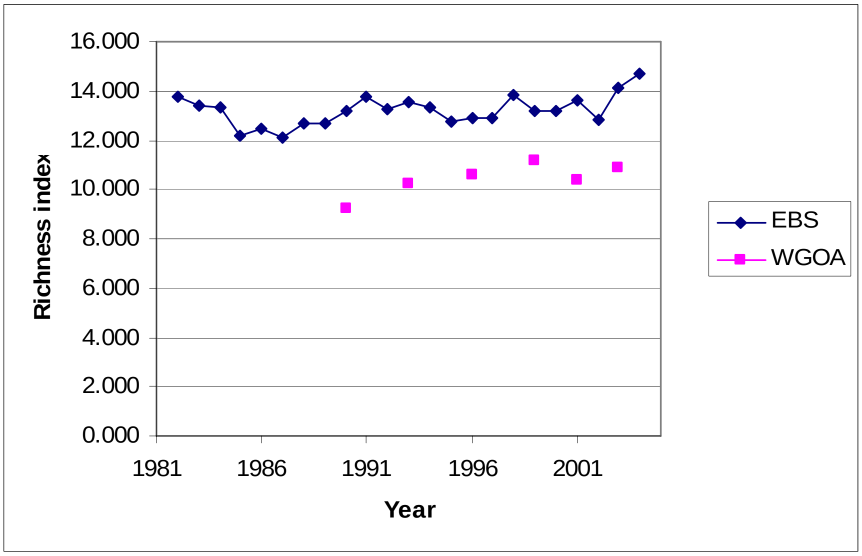
Trends in the Shannon-Weiner index differ in the GOA and BSAI. While both indices track together in the GOA, they move in different directions in the BSAI.

> …low species diversity in the EBS in 2003 occurred in spite of high average richness, primarily because of the high dominance of walleye Pollock, which increased from an average of 18% of the catch per haul in 1995-98 to 30% in 2003, but decreased again to an average of 21% in 2004.

Without additional information, these indices may be of limited usefulness in evaluating diversity status. The SAFE notes that:

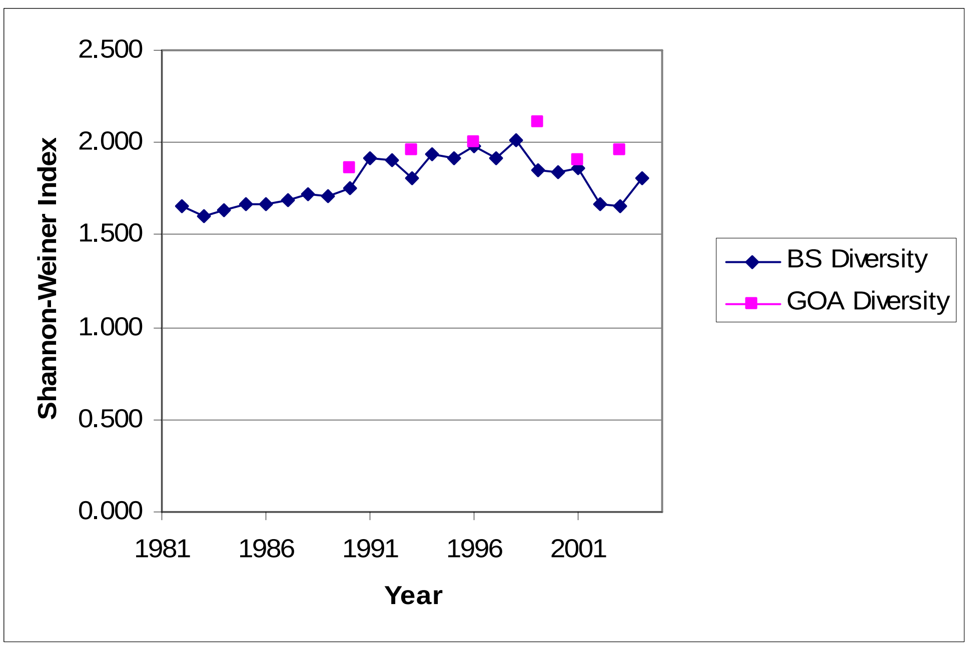
> The effect of fishing on species richness and diversity are poorly understood at present. Because fishing primarily reduces the relative abundance of some of the dominant species in the system, species diversity is expected to increase relative to the unfished state. However, changes in local species richness and diversity are strongly confounded with natural variability in spatial distribution and relative abundance.

Figure 4.9-2 The richness index of species diversity in the WGOA and EBS



Source: Data prepared by F. Mueter and accessed at
http://intra.afsc.noaa.gov/reem/ecoweb/EcoChaptDataFrame.cfm August 3, 2005

Figure 4.9-3 Shannon-Weiner index of species diversity in the WGOA and EB



Source: Data prepared by F. Mueter and accessed at
http://intra.afsc.noaa.gov/reem/ecoweb/EcoChaptDataFrame.cfm August 3, 2005

Table 4.1-10 indicates that the indicators for species diversity are: (1) population levels of target and non-target species relative to MSST or ESA listing thresholds, linked to fishing removals, (2) bycatch amounts of sensitive (low potential population turnover rates) species that lack population estimates, (3) number of ESA listed marine species, and (4) area closures.

Population levels of target, non-specified, PSC, and forage species were addressed in Sections 4.2, 4.3, 4.4, and 4.5 of this EA. Alternatives 1 to 4 were rated adverse, but not significantly adverse for all groups of species. Alternative 5 was rated not adverse for all groups of species.

Although no fishing-related species removals have been documented under fisheries management policies in effect during the last 30 years, elasmobranches (sharks, skates, and rays) are particularly susceptible to removal, and benthic invertebrate species diversity could be affected by bottom trawling. (NMFS 2004b, page 3.10-26) More comprehensive survey data and life history parameter determinations for skates, sharks, grenadiers, and other species groups may help to determine population status and establish additional protection measures that could minimize adverse impacts from fishing. (NMFS 2004b, page 4.9-356). Alternative 1, under which there are large increases in TACs, has been rated adverse, but of unknown significance, for this impact. Alternatives 2, 3, and 4, under which TACs remain close to what they were in 2005, or decline somewhat, has been rated adverse, but not significantly adverse. Alternative 5, under which TACs are set to zero, has been rated not adverse.

Table 3.3-1 in Section 3.3 identifies the ESA listed and candidate species that range into the BSAI or GOA groundfish management areas. As determined in previous ESA consultation BiOps (NMFS 2000, 2001a, and USFWS 2003), the alternatives under consideration in this EA are not expected to change the number of ESA marine species, or the status of existing ESA listed species. Species currently listed as candidates for ESA listing (northern sea otter and Kittlitz murrelet) have little overlap with groundfish fisheries (NMFS 2004b, NMFS 2004c, and 69 FR 24876, May 4, 2004). Harvest levels under Alternatives 1-4 are unlikely to increase the potential for these species to be listed. Alternative 5 also is not likely to result in the removal of any threatened or endangered species from the ESA listed because of the short duration of the action and the time period needed to recover a species. Alternatives 1 to 5 have been rated not adverse respect to this impact.

Under all the alternatives, currently closed areas (50 CFR 679.22) would be maintained, and current no-trawl zones and fixed-gear restrictions would stay in place. Alternatives 1 to 5 have been rated not adverse with respect to this impact.

In summary, Alternative 1 is rated adverse, but of unknown significance, Alternatives 2, 3 and 4 are rated adverse but not significantly adverse, and Alternative 5 is rated not adverse.

Functional (trophic and structural habitat) diversity Functional diversity can be altered with respect to trophic or food-web characteristics if removal or depletion of a component of the food web (trophic guild member) occurs. Changes to distribution of biomass within a trophic guild may also result. From a structural habitat standpoint, functional diversity can be altered or damaged if bottom contact fishing methods such as bottom trawling, longlining, pot fishing, or bottom contact with pelagic trawls, remove or deplete organisms that provide structural habitat for other species (e.g., corals, sea anemones, sponges). (NMFS 2004b, 4.9-355 to 4.9-356)

Significance thresholds were described in Table 4.1-10. They are characterized by catch removals resulting in a change in functional diversity outside the range of natural variability observed for the system. Three indicators are used with respect to functional diversity: (1) guild diversity or size diversity changes linked to fishing removals, (2) bottom contact gear effort, and (3) HAPC biota bycatch.

The impacts of fishing on trophic levels were evaluated earlier in this Section. Figures 4.9-1 and 4.9-2 summarized time trends in two indices of trophic level of the catch, calculated for the period from the 1950s to 2003. This discussion will not be repeated here. The conclusions associated with that earlier discussion are adopted for this indicator: Alternative 1 has an adverse impact, but of unknown significance. Alternatives 2 through 4 have adverse, but not significantly adverse impacts. Alternative 5 has been rated not adverse.

As noted in Appendix C, bottom trawl effort has dropped considerably in recent years (NMFS, 2005e, page 264). While Alternative 1 creates much larger TACs for some species taken with bottom trawl gear, constraints associated with the marketability of some of these species, and halibut PSC constraints, are likely to prevent the bottom trawl fleet from fully harvesting these TACs. Actual effort increases may be much smaller than suggested by the proportionate change in TACs. Alternative 1 has been rated adverse, but of unknown significance. Alternatives 2, 3, and 4 are expected to be associated with bottom trawl effort similar to that seen in recent years. These alternatives therefore have an adverse impact, but are not expected to have an impact significantly different from that in 2005. Alternative 5 would be associated with no bottom trawling effort, and will not have an adverse impact on habitat. Note that, while bottom trawl effort levels are lower than they were in past years, longline gear effort has been increasing in recent years. (NMFS 2005e, page 262). A figure illustrating the time trend in longline effort can be found in Section 4.7 on seabird impacts.

HAPC biota include seapens, seawhips, sponges, anemones, corals, and tunicates. (NMFS 2005e, page 258 – Eco SAFE). The Ecosystems Considerations SAFE notes that over the period 1997 to 2002, "HAPC biota catch estimates range from 922 to 2548 t (primarily tunicates) in the BSAI, and from 27 to 46 t (primarily anemones) in the GOA." (NMFS 2005e, page 258) Alternatives 2 to 4 involve fishing at levels that are similar to those in 2005. These alternatives are expected to have adverse impacts on habitat through bycatch of HAPC biota, but they are not expected to have larger impacts than those experienced in 2005. These alternatives have been rated adverse, but not significantly adverse. Alternative 1 has been rated adverse, but of unknown significance, and Alternative 5 has been rated not adverse, for the reasons discussed above under the other indicators.

Genetic diversity Genetic diversity raises two important issues. First, a stock of fish defined for management purposes is often actually made up of several substocks, each with somewhat different reproduction, growth, mortality, and carrying capacity parameters. For management purposes, stock definition often represents a compromise between administrative tractability and the distinctiveness of substocks. A TAC, and by implication a given fishing mortality rate, established for a stock, made up of several substocks, may have differential impacts on the various substocks. Some of these substocks may be overfished relative to others, reducing the genetic diversity of the overall population. (Walters and Martell 2004, pages 83-84).

Second, selective fishing, for sex or for size, may affect the genetic make-up of a given stock through time. The impacts can be unexpected. There is evidence that selective fishing for larger fish in a population that tends to reach sexual maturity at a given age may select for slower growing fish, while similarly selective fishing on a population that tends to reach sexual maturity at a given weight may select for faster growing fish. (Walters and Martell 2004, pages 83-84). Clear-cut cases of changes in fish characteristics due to genetic changes are not easy to find, because many other factors can affect fish characteristics as well. These might include density-dependent effects and environmental factors such as water temperature. (Walters and Martell, 2004,page 85; Law and Stokes 2004, page 241).

The criterion for this impact, from Table 4.1-10, is an impact on genetic diversity from catch removals large enough to cause a loss or change in one or more genetic components of a stock that would cause the stock biomass to fall below minimum biologically acceptable limits. Indicators for this effect are: (1) degree of fishing on spawning aggregations or larger fish, and (2) older age group abundances of target groundfish stocks. Changes in these indicators are assessed qualitatively by inferences from changes in catch levels and in regulations protecting spawning aggregations and separate biomass concentrations.

If a fishery concentrates on certain spawning aggregations or on older (larger) age classes of a target species that tend to have greater genetic diversity (dating from an earlier period when fishing was less intensive), then genetic diversity will tend to decline in fishing versus unfished systems. Since genetic diversity has not been systematically surveyed, there is no baseline against which changes in genetic diversity may be measured. There are examples (i.e., North Sea cod) of fisheries in which heavy fishing, and selection for body length, over long periods of time have been found to have little impact on genetic diversity. There has been heavy exploitation of certain spawning aggregations in the past (e.g., Bogoslof pollock), but current spatial-temporal management of the groundfish fishery has tended to reduce fishing pressure on spawning aggregations. Groundfish stocks are often protected by sub-division of ABCs and TACs among management areas within the BSAI and GOA management areas. It is unknown if commercial fishing has altered the genetic diversity of stocks with distinct genetic components at finer spatial scales than the present groundfish management regions. (NMFS 2004b, page 3.10-27).

Alternatives 2, 3, and 4 would establish harvest levels similar to 2005, but would not alter spatial and temporal management controls that provide existing protection for spawning stocks and for overexploitation of subdivisions of broader regional stocks. These alternatives provide for catch levels very similar to current levels, or somewhat smaller. They have been rated as having an adverse impact, but not a significantly adverse impact. Alternative 1 has higher TACs than the 2005 baseline However, as noted earlier, these may not be fully harvested because of market or halibut PSC constraints. Moreover all harvests will be subject to the Council’s OFLs, which prevent fishing beyond levels considered sustainable. This alternative may have a greater adverse impact on genetic diversity than the baseline, but it has not been rated as significant. Under Alternative 5 there would be no harvest. This alternative does not have an adverse impact on genetic diversity.

4.9.2 Cumulative Effects

The following reasonably foreseeable future actions may have a continuing, additive and meaningful relationship to the direct and indirect effects of the alternatives on the ecosystem. These types of actions are described in Section 3.2. As discussed in Section 4.1, past actions are incorporated into the 2005 baseline used in the direct and indirect impacts analysis. This baseline includes all past management measures adopted by the Council through 2005, including area closures, effort reduction, and gear modification measures. The cumulative effects analysis proceeds by revising the direct and indirect effects baseline (which includes the results of past actions) to reflect the reasonably foreseeable future actions.

<u>Ecosystem approaches to management</u>: Ongoing research into ecosystem impacts will improve our understanding of the impacts of fishing activity on the interrelationships between fished target stocks, of the impacts of fishing bycatch on other resources components such as seabirds, marine mammals and habitat, and on more systemic measures of a functioning ecosystem (such as species richness (the number of species) and diversity (relative numbers of animals of different

species). Other research, such as current research into trawl cable-seabird interactions, may lead to new ways of operating that may reduce fishery impacts.

Several efforts to manage the impacts of fishing activity on other resource components should reach fruition within the period of the current action, or the period covered by the cumulative effects analysis. New rules to provide better control over other species harvests in the GOA should be effective by the time the 2006-07 specifications become effective. Critical habitat will be designated for right whales during the next year. The promulgation of an incidental take statement (ITS) for humpback whales, the ESA consultation and ITS for sea otters, and the determination of critical habitat for right whales, should result in increased levels of protection for these species. Proposed BSAI FMP Amendment 84 is expected to modify bycatch reduction measures for Chinook and chum salmon in the BSAI, to reduce incidental catches of these species.

In 2005, NMFS and the Council completed the EIS for Essential Fish Habitat Identification and Conservation in Alaska (EFH EIS, NMFS 2005). The EFH EIS provided a thorough analysis of alternatives and environmental consequences for amending the Council's FMPs to include EFH information pursuant to Section 303(a)(7) of the Magnuson-Stevens Act and 50 CFR 600.815(a). In February 2005 the Council took action to revise its existing descriptions of EFH, adopted a new approach to identifying HAPC, closed 95% of the Aleutian Islands to bottom trawling, closed six "coral garden" areas within the Aleutians to all bottom contact gear, prohibited bottom trawling in ten designated areas in the GOA, designated 16 seamounts as HAPC and prohibited the use of bottom contact gear within them, and prohibited the use of bottom contact gear in several small HAPC-designated areas off of Southeast Alaska in order to protect Primnoa corals. Additional information is available in the Council's 2005 February newsletter at http://www.fakr.noaa.gov/npfmc/newsletters/newsletters.htm. NMFS Alaska Region is preparing the proposed and final rules necessary to implement the Council's recommendations. NMFS expects to these provisions to be effective at the start of the 2006 fisheries.

The actions contemplated under this heading should tend to reduce the adverse ecological impacts of future fishing TACs. The steps to reduce the impacts of the fishery on other ecosystem components may be particularly important for the protection of top-level predators such as seabirds, marine mammals and sharks, and for the protection of species and functional diversity in the ecosystem. Ongoing research into and modeling of ecosystem components may have a more indirect impact on a broader range the of ecosystem impacts as this research is brought to bear on TAC setting.

<u>Rationalization</u>: Future rationalization programs are likely to reduce the number of fishing vessels active in Alaskan waters, and to reduce effort associated with competitive races for the fish. Current efforts include the rock fish demonstration project in the GOA, the more broad-based GOA rationalization effort, and the movement towards cooperatives for non-AFA trawlers in the BSAI under Amendment 80. As competition for fish resources is reduced, the opportunity costs of addressing bycatch related impacts on other marine resources, including seabirds, marine mammals, and habitat, should also be reduced. As noted in Section 3.2, however, rationalization can also be associated with high-grading, illegal discarding, and under-reporting of harvests. These may be new problems, requiring that rationalization programs be associated with a proportionate commitment to monitoring and enforcement.

<u>Traditional fisheries management</u>: Future groundfish fisheries in 2008-2015 should have impacts on the ecosystem each year that are similar to those described under the direct and indirect impacts discussion in this section. Enforcement responsibilities are also expected to increase over

the forecast period. Technical and program changes, such as the extension in the use of VMS and electronic reporting, should improve enforcement and monitoring capabilities.

Future fisheries will impose burdens on the ecosystem similar in type to those described in the direct and indirect impacts section for 2006-2007. However, improvements in ecosystem-based management, particularly with respect to impacts on habitat, seabirds, and marine mammals, as discussed earlier, should mean that, in many cases, the annual impacts of fishing in 2008-2015 on other ecosystem components are potentially less than those described under the direct and indirect impacts for the 2006-2007 action. The increased enforcement responsibilities would be a concern in the absence of new funding, however these concerns would be mitigated by the technical and program changes described.

Other Federal, state, and international agencies: Other agencies will continue to carry out their management, research, and permitting functions, as they have in the past. These include the ongoing management, research, permitting, and consultation activities carried out by the Fish and Wildlife Service, and the ongoing discharge permitting activities by the EPA. Because of its Homeland Security responsibilities, the US Coast Guard is expected to continue with its current level of reduced allocation of resources to fisheries enforcement. The Minerals Management Service projects numerous oil discoveries off of Alaska during the cumulative effects period. In the near future, it expects to offer tracts off of Cook Inlet for sale.

Private actions: Commercial groundfish fishing in the years 2008 to 2015 is an important class of private actions that may affect the cumulative impact of the 2006-2007 fishing action. These actions were effectively treated above, under the discussion of future TAC setting.

The BSAI and GOA Pollock fisheries have recently received MSC certification. The MSC principle 2, on which the industry is evaluated, requires that "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." (Scientific Certification Systems (SCS), 2004, page 22). Because the program requires ongoing monitoring and re-evaluation for certification every five years (SCS, 2004, page 242), and because the program may convey a marketing advantage, MSC certification may change the industry incentives to emphasize environmental impacts to a greater extent. This certification currently may only affect the incentives for the pollock industry segment since other groundfish sectors have not yet been certified.

Ongoing economic development within Alaska, may impact coastal zones, and groundfish species which depend on those zones, through increases in runoff, discharge of pollutants, development of coastal areas, or through increases in coastal transportation and recreational traffic. Development in Alaska remains relatively light, compared to development along other U.S. coastlines. Freight, military, and passenger traffic by large vessels through Alaskan waters may also have potential impacts. Sea traffic could affect ecosystems through oil spills or the introduction of invasive species through hull fouling or ballast water exchanges. As noted above, the MMS predicts oil development activity off of Alaska during the prediction period.

Conclusions: The cumulative effects analysis proceeds by modifying the 2005 baseline used for the direct and indirect effects analysis to account for the reasonably foreseeable future actions described above. (As noted, past actions are considered to be reflected in the 2005 baseline). The 2006-2007 action is then compared to this revised baseline to see if the direct-indirect significance conclusions would change in light of the reasonably foreseeable future actions. As noted above, the direct-indirect impacts of this action appear to be adverse, but not significantly adverse.

Continued fishing in the period 2008 to 2015 will impose continuing impacts on predator-prey relationships, energy movements through the ecosystem, and species, functional, and genetic diversity similar in type to the annual impacts described in the direct and indirect impacts analysis for the 2006-2007 action. To some extent, particularly with respect to impacts on seabird, marine mammal, and habitat resources, actions considered above may moderate 2008-2015 actions compared to those in 2006-2007. In the absence of these measures, annual fishing operations would not be expected to have impacts worse than the annual impacts contemplated for 2006-2007. Ongoing economic development in Alaska, and in its coastal waters, and ongoing traffic near Alaska between Asia and North American, will also impose stresses on coastal ecosystems. Development along Alaska's coastline remains relatively light compared to developments along other U.S. coastal areas.

Cumulative actions that would reduce the impact of the fisheries, in addition to those discussed under ecosystem approaches to management, include rationalization efforts that may reduce the impact of fishing operations, technical and program changes that should improve monitoring of fishing operations, and enforcement of management measures, and the introduction of MSC certification in the Pollock fisheries.

Based on this analysis, the cumulative effects of the 2006-2007 fishery, when added to the past actions reflected in the 2005 baseline, and the reasonably foreseeable future actions during the analytical time period, have been rated adverse, but not significantly adverse.

4.10 Economic and Social Impacts

Section 4.10 describes the economic and social consequences of the alternatives.

Economic and social impacts differ in fundamental ways from other resource components examined in this EA. They deal with impacts on persons and on communities, while other impacts deal with the natural environment. Significance findings for social and economic impacts would not affect a finding of no significant impact (FONSI); see 40 *CFR* 1508.14. Economic and social impacts are described in Section 4.10. In light of 40 *CFR* 1508.14, significance determinations are not made for these impacts.

In past specifications analyses, the state groundfish fisheries were treated as a separate resource component. State harvests come from the target groundfish stocks, and environmental impacts on these are evaluated in Section 4.2. The environmental impacts of the specifications action on state groundfish fisheries are thus appropriately handled in that section. Distributional impacts associated with these impacts are appropriately described under economic impacts. The social and economic impacts sections have been modified to address impacts on state groundfish fisheries.

Section 3.9 of the PSEIS describes the social and economic context for the North Pacific groundfish fisheries. Section 4.9.9 of the PSEIS describes the social and economic impacts of the preferred alternative and its bookends. The annual Economic SAFE document provides historical economic background for these fisheries.

Impacts

This section describes the following economic impacts:

First Wholesale Groundfish Gross Revenues
Operating Cost Impacts
Net Returns to Industry
Safety and Health Impacts
Impacts on Related Fisheries
Consumer Effects
Management and Enforcement
Excess Capacity
Bycatch and Discard Considerations
Subsistence fishing
Sport fishing
Changes in the value of other ecosystem services
Community impacts

4.10.1 Direct and indirect impacts

First Wholesale Groundfish Gross Revenues

Gross revenue, under each alternative, has been estimated separately for the fisheries harvesting (a) the BSAI TAC and unspecified reserves, (b) the BSAI CDQ reserve, and (c) the GOA TACs. Revenue is projected for each alternative separately for 2006 and 2007, and estimated for the TACs adopted by the Council in the years 2003, 2004, and 2005. The gross revenues impacts of the alternatives are defined with respect to the change between the alternative and the year 2005 estimates. The 2003 through 2005 estimates were generated through the same estimation process used to produce the projections for the alternatives - in other words, the 2003 through 2005 gross revenues estimates were produced, treating the ABCs and TACs for those years in the same manner as the ABCs and TACs for the alternatives. All the alternatives, and the 2005 baseline gross revenues, were estimated using average 2003 prices.

The method used to prepare these first wholesale gross revenue estimates is described in detail in Appendix F.[24] The model makes a large number of simplifying assumptions.[25] These results must be treated as a rough approximation, with a large margin of error. Note that 2003 through 2005 revenue estimates are not historical revenue estimates, but estimates developed from the model, based on the TAC levels in those years, using the same assumptions that were used for the

[24] NMFS AKR is in the process of developing the gross revenues model to differentiate between revenues flowing to the CP sector, and revenues flowing to the CV and shoreside processing sectors. When this work is completed, it may be combined with regional impact models to provide a more complete picture of the interaction of the fisheries and onshore communities. This will address the needs of an ecosystem approach to management for a more complete view of the fishery-human community interactions. Appendices F and G provide a status report on the state of this project.

[25] An important assumption is that the first wholesale and ex-vessel prices received for fish products do not vary as the level of output varies. Economists refer to this as perfectly elastic demand. To the extent that prices vary inversely with output levels, and that demand is less elastic, changes in gross revenues associated with the alternatives would be reduced. A discussion of consumer impacts, later in this section, discusses available information on demand elasticity for these species.

2005 and 2006 estimates. The model results are used here, and in the small entity analysis in Chapter 6, as an index of the relative impacts of the alternatives on revenues.

Overall results are summarized for Alternative 2 separately for the BSAI, the BSAI CDQ program, and the GOA, in Tables 4.10-1 to 4.10-3. Alternatives 1 to 5 are compared in Table 4.10-4. Table 4.10-5 provides a comparison of overall model results with first wholesale gross revenue estimates for 2003 summarized from the 2004 Economic SAFE. In general, the species specific gross revenue estimates from the model appear to be close to those from the SAFE. The model estimates for flatfish are much smaller, however than SAFE estimates.

Table 4.10-1 Estimated and Projected BSAI Combined Revenue, 2003-2007.

BSAI	Estimated Earned Revenue			Projected Revenue	
Combined	2003	2004	2005	2006 Alt. 2	2007 Alt. 2
Pollock	851,029,211	851,166,032	853,708,613	858,985,323	754,640,257
Sablefish	13,183,970	13,558,813	11,118,278	10,525,043	11,862,721
Pacific cod	211,305,137	219,451,841	209,777,630	198,575,912	179,594,470
Arrowtooth	501,188	501,188	501,188	501,188	1,601,135
Flathead sole	5,864,289	5,571,074	5,717,681	5,864,289	14,886,513
Rock sole	8,740,207	8,144,284	8,243,605	8,342,925	23,098,889
Turbot	3,868,689	3,385,103	3,385,103	3,385,103	10,176,234
Yellowfin	29,367,814	30,183,099	31,799,995	31,559,442	39,773,305
Flats (other)	659,973	659,973	583,822	659,973	4,086,765
Rockfish	7,476,623	6,399,060	6,423,476	6,423,476	8,433,150
Atka	20,961,509	22,009,585	22,009,585	22,009,585	31,735,270
Other	2,979,476	2,475,436	2,631,454	2,648,838	5,225,374
Column total	1,155,938,086	1,163,505,488	1,155,900,429	1,149,481,096	1,085,114,084

Table 4.10-2 Estimated and Projected BSAI CDQ Combined Revenue, 2003-2007.

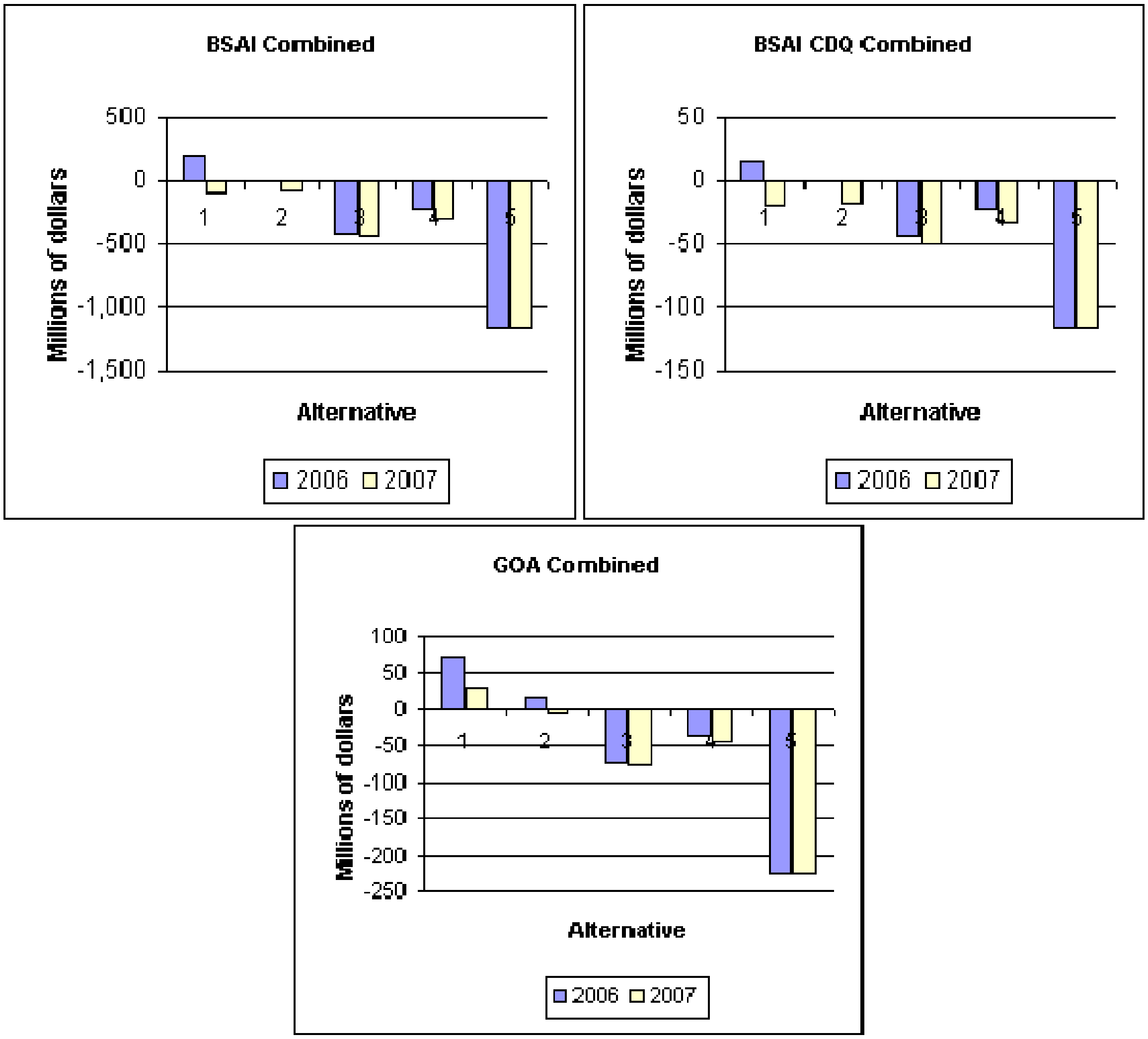
BSAI CDQ	Estimated Earned Revenue			Projected Revenue	
Combined	2003	2004	2005	2006 Alt. 2	2007 Alt. 2
Pollock	93,879,357	93,894,450	94,174,930	94,757,018	78,119,705
Sablefish	1,444,805	1,444,805	1,218,563	1,153,533	1,178,213
Pacific cod	16,111,377	16,732,539	15,994,909	15,140,812	13,370,502
Arrowtooth	17,540	17,540	17,540	17,540	55,836
Flathead sole	149,375	141,906	145,640	149,375	377,918
Rock sole	110,207	102,693	103,946	105,198	290,797
Turbot	112,077	98,068	98,068	98,068	294,203
Yellowfin	864,509	888,509	936,106	929,025	1,131,346
Flats (other)	12,176	12,176	10,771	12,176	74,490
Rockfish	499,475	427,489	429,120	429,120	562,469
Atka	1,669,089	1,752,543	1,752,543	1,752,543	2,525,887
Other	237,559	197,371	209,811	211,197	414,701
Column total	115,107,547	115,710,089	115,091,946	114,755,604	98,396,068

Table 4.10-3 Estimated and Projected GOA Combined Revenue, 2003-2007.

GOA Combined	Estimated Earned Revenue			Projected Revenue	
	2003	2004	2005	2006 Alt. 2	2007 Alt. 2
Pollock	36,250,489	47,529,160	61,168,949	70,179,880	63,710,152
Sablefish	78,424,472	87,167,563	83,954,740	78,371,802	73,210,219
Pacific cod	44,789,411	53,067,829	49,090,476	61,207,039	51,484,622
Arrowtooth	2,990,563	2,990,563	2,990,563	2,990,563	2,990,563
Flathead sole	1,386,204	1,352,636	1,291,718	1,312,480	1,198,973
Rex sole	5,564,932	7,433,621	7,433,621	7,433,621	7,433,621
Flat (deep)	454,799	565,703	635,600	635,600	635,600
Flat (shallow)	3,698,974	3,548,415	3,548,415	3,548,415	3,548,415
Rockfish	15,396,975	14,036,770	14,524,929	14,119,773	13,889,959
Atka	103,278	103,278	103,278	103,278	103,278
Skates	0	964,797	1,123,734	1,123,596	1,123,596
Other	504,788	564,502	621,840	672,946	626,278
Column total	189,564,885	219,324,837	226,487,863	241,698,994	219,955,275

Notes: The skate fishery was in transition during this period. A targeted fishery emerged in 2003, and skates were moved from the "other fisheries" to the "target" category by FMP amendment in 2004.

Figure 4.10-1 Model Projections of Revenue by Alternative, Sector, and Region: 2006 and 2007 (millions of dollars)



As a means of comparing model output with tabulated values, Table 4.10-4 provides a comparison between 2003 model output and 2003 Revenue Estimates by species group from Table 36 of the 2004 Economic SAFE document. A species by species comparison shows that the model appears to underestimate revenue for all but the Atka mackerel species group. However, it is important to understand that the Economic SAFE data includes State of Alaska Managed Fishery data that is not included in the model.

The totals presented in Table 4.10-4 are the sum of the species totals and this appears to indicate that the model is within 2 percent of the SAFE document total. However, the grand total in Table 36 in the Economic Safe is increased to $1,519 million with the inclusion of State Managed Fisheries, Confidential data, and data not included in these species groups. Thus it is difficult to make exact comparisons, as the methods used to derive these two sets of numbers are inherently different and serve different purposes. The SAFE document is an overall accounting of catch and value from reported data, while the model uses catch and retention data by sector to attempt to predict sector specific revenue associated with future TAC specifications.

Table 4.10-4 Comparison of 2003 Model and Economic SAFE Total First Wholesale Revenue Estimates for the North Pacific Groundfish Fishery.

Species Group	Model	SAFE	Difference	Percent
Pollock	981	987	6	1%
Sablefish	93	95	2	2%
Pacific cod	272	278	5	2%
Flatfish	68	86	18	21%
Rockfish	23	25	2	7%
Atka Mackerel	23	23	0	0%
Total	**1,461**	**1,493**	**33**	**2%**

Sources: NMFS-AKR Gross Revenue Model and 2004 Economic SAFE, table 36, page 87.
Note, the SAFE document adds in state managed fisheries data and confidential data to get a grand total of $1,519 million.

The gross revenue estimates presented here were generated using methods similar to those used to generate gross revenues in 2004. This year analysis has been begun to significantly extend the gross revenue model to break gross revenues out separately for catcher-processors, catcher-vessels, and shoreside processors. This analysis is ongoing, however the preliminary results have been summarized in Appendix F to this document.

Operating Cost Impacts

There is very little information on operating and capital costs in the BSAI and GOA groundfish fisheries and processing sectors. Complex surveys are required to obtain useful fishing and processing cost information. Information needs to be continually updated to address evolving operating conditions. Difficult questions of data confidentiality and of the protection of trade secrets are raised. In the past, voluntary survey collection of groundfish cost data has not been successful.

The classification of costs into variable and fixed costs is not exact, but is instead dependent on the time frame considered. It is important to recognize that fishermen may incur loans to pay for capital goods over extended periods, and that the associated costs may not be avoidable over the length of the loan. Similarly, operators may incur maintenance costs for fishing and processing gear, even if that gear is unemployed in a particular year.

Models that would predict behavioral changes associated with changes in these TAC specifications, and that would generate estimates of cost impacts associated with these behavioral changes, are not available. Therefore it is not possible to provide numerical estimates of the operating cost impacts associated with the proposed alternatives.

Harvesting, delivering, processing, and transportation, of larger volumes of fish would increase the variable costs, although without empirical data quantitative estimates of the increase can't be made. Conversely, reductions in production imposed by reduced specifications would decrease variable costs. Under Alternative 5, no groundfish fishing would be allowed during 2006 and 2007. In these circumstances, there would be a large reduction in costs incurred for active fishing and processing operations. As noted above, however, firms would continue to have expenditures for fixed costs such as loans and maintenance of existing vessels and plant. Fishermen would experience transitional expenses as they move into their next best alternative employment. However, on balance, costs would be expected to decline.

Net Returns to Industry

Although it has been possible to make rough estimates of gross first wholesale revenues under the alternatives, without cost information, it is not possible to make corresponding estimates of net returns to the fishing and processing industries. As noted, NMFS has little information on the value of capital investments or the operating costs in Alaska's groundfish fisheries. Therefore, treatment of net revenues will, by default, be qualitative.

In general, net returns should be larger fisheries that have been rationalized. This may be the case in the BSAI pollock fisheries, where the American Fisheries Act (AFA) allowed fishing and processing operations to rationalize through the medium of fishing cooperatives. Likewise, it may be the case in the portions of BSAI fisheries conducted under the auspices of the Community Development Quotas, and it may be the case in the sablefish fisheries which operate under an IFQ program. Each of these programs should allow fishermen to operate more efficiently. However, many of the groundfish fisheries in the GOA and the BSAI are conducted in an essentially open-access. While a limited entry program has been adopted, the numbers of permits provide little constraint on fishing effort. Theory suggests that economic costs and benefits would be closely balanced in these fisheries, and that in equilibrium net revenues would be only large enough to cover the opportunity costs of labor and capital.

Alternative 1 increases TACs, thereby likely increasing fishing/processing activity and time at sea, and as noted earlier in this section, may be associated with higher gross revenues to fishing and processing operations. To the extent that fishing operations are unable to take advantage of the increased opportunities under Alternative 1, perhaps because of poor market opportunities, or because harvests are effectively constrained by halibut PSC limits, the revenue effects may be small and non-existent. Price effects could offset some of the potential for revenue increases, although, as noted in the discussion of consumer effects, demand for many of these products may be relatively elastic and price effects may be small. Operating costs would be expected to increase under this scenario. Because Alternative 1 is likely to result in different costs and revenues, it is not possible to determine whether net revenues will increase or decrease without additional information on the structure of the cost and revenue functions.[26]

Alternative 2 has TACs very similar to those in 2005.[27] Alternatives 3 and 4 generally involve cuts in 2005 TACs. Alternative 5 stops all fishing for groundfish. Under these conditions, there would be no groundfish vessels at sea, and fishing and processing revenues would drop to zero. Nevertheless, fishing and processing operations, anticipating renewal of fishing in subsequent

[26] As pointed out by the SSC in December 2004 (Council, 2004_, pages 25-26)

[27] The TACs in this EA are based on ABC recommendations made by the Council Plan Teams at their September 2005 meeting. These TACs take account of fishery optimum yields, and past Council decisions. For more details on the methods used to make the TAC projections incorporated here see Chapter 2.

years, would continue to incur costs associated with the maintenance of their existing assets. Thus these firms would incur net losses during the period. Moreover, while many skippers, crew, and other industry employees are likely to find alternative work, many others may not. Generally, they would face transitional costs of moving, at least temporarily, into other work, and many would be unable to find work that was equally satisfying, or that generated equivalent incomes. There would thus face a net loss of income.

Safety and Health Impacts

Groundfish fishing off Alaska is a dangerous occupation. A figure in Lincoln and Conway suggests that the occupational fatality rate in groundfish, from 1991 to 1998, was about 50 persons per 100,000 worker years. This would be about 11-12 times their reported estimate of an overall United States occupational fatality rate of 4.4 persons per 100,000 worker years. (Lincoln and Conway, 2001. page 692). The Lincoln and Conway estimates are dated now, and may not reflect changes in the fisheries since the late 1990s. However, they remain suggestive of the dangers historically associated with groundfish fishing off of Alaska.

While rough estimates of mortality rates are available, much less is known about the connection between fisheries management measures and accident, injury, or fatality rates. Moreover, little is known about risk aversion among fishermen, or the values they place on increases or decreases in different risks. There is no way to connect changes in the harvests, expected under these alternatives, with changes in different risks, and the costs or benefits of these changes to fishermen.

Increases in TACs may improve fishing profitability and lead to greater investments in fishing vessel safety and greater care by skippers, particularly in rationalized fisheries. This may reduce the fatality rate (although this is conjecture). Conversely, increases in TACs may increase the number of operations, the average crew size per operation, and the average time at sea. These may increase the potential population at risk, and the length of time individuals may be exposed to the risks. Without additional information, the net impact of changes in TACs on accident rates and accident severity are thus difficult to determine. Large negative changes in production and fishery revenues are probably associated with stress and related health problems. The extent of stress related health problems associated with decreases in revenues is unknown.

Alternative 1 increases TACs, thereby likely increasing fishing/processing activity and time at sea. Increased fishing opportunities will increase the exposure of vessels and crew to potential accidents, and may thus be associated with increased annual risk. However, if increased TACs lead to greater net returns, then safety and health may be positively affected. To the extent that fishing operations are unable to take advantage of the increased opportunities under Alternative 1, perhaps because of poor market opportunities, or because harvests are effectively constrained by halibut PSC limits, both these effects may be relatively modest.

Alternative 2 has TACs very similar to those in 2005.[28] Alternatives 3 and 4 generally involve cuts in 2005 TACs. However, in general, the TAC changes are relatively modest, and suggest no substantial change in risks to safety and health.

---

[28] The TACs in this EA are based on ABC recommendations made by the Council Plan Teams at their September 2005 meeting. These TACs take account of fishery optimum yields, and past Council decisions. For more details on the methods used to make the TAC projections incorporated here see Chapter 2.

Alternative 5 stops all fishing for groundfish. Under these conditions, there would be no groundfish vessels at sea, and fatalities, injuries, and property damage to this sector would drop to zero. However, Alternative 5, by closing the fisheries for a year, and by eliminating this source of yearly income for thousands of fishermen and their families, would introduce new sources of stress, and stress-related health problems, for those connected with the affected fishing, processing, and support businesses. While the fishery closure would reduce at-sea accidents, increased stress associated with income loss could have an offsetting effect of unknown magnitude.

Impacts on Related Fisheries[29]

Specifications decisions can affect several categories of related fisheries. These include commercial (within the State of Alaska), sport, and subsistence fisheries for groundfish stocks in the GOA and BSAI, commercial, sport, and subsistence fisheries for PSC species, fisheries in other regions that target groundfish stocks that produce products that are substitutes or complements for Alaskan groundfish, and fisheries related on the production side, either because commercial groundfish fishermen could participate in them, or because they do participate in them as part of a diversified package of fishing activities. The impacts on subsistence and sport fisheries are discussed in later sub-sections of this analysis.

The State of Alaska manages groundfish fisheries within its waters. Many of these fisheries target on stocks covered by this action. State waters fisheries exist for several species of groundfish in internal waters: sablefish in Statistical Areas 649 (Prince William Sound) and 659 (Southeast Inside District), pollock in Area 649 (Prince William Sound), and Pacific cod in Areas 610 (South Peninsula District), 620, 630 (Chignik, Kodiak, and Cook Inlet Districts), and 649 (Prince William Sound). These fisheries are based on Guideline Harvest Levels (GHLs) that are independent of Federal TACs, or, in the case of Pacific cod in the GOA, Federal TACs are adjusted down from ABC levels to take account of state GHLs levels. State waters Pacific cod fisheries are conducted at times when Federal fisheries are closed.

Guideline harvest levels for the State waters seasons for sablefish in Prince William Sound (Area 649) and the Southeast Inside District (Area 659) and for pollock in Prince William Sound (Area 649) are assessed independently from Federal assessments of these stocks in EEZ waters. NMFS does not consider pollock in Prince William Sound to constitute a distinct stock separate from the western GOA, and includes this pollock in its assessment of the combined 649, 640, 630, 620, and 610 pollock stock. The annual GHL established by the State for PWS is subtracted from the ABC for the combined stock. None of the alternatives considered would have an effect on the GHLs established by the State for these fisheries.

Guideline harvest levels for Pacific cod in the State waters seasons are based on a fraction of the Federal ABC apportionments in the GOA (not to exceed 25%). These GHLs would proportionately change with the Federal ABCs established for Pacific cod.

When Federal groundfish fishing is authorized, the state conducts "parallel" fisheries within its waters, against the same TACs being harvested in Federal waters. Unless otherwise specified by the State, open and closed seasons for directed fishing within State waters are concurrent with

[29] The impact of bycatches in the groundfish fisheries on fisheries targeting PSC species is discussed under another heading in this section.

Federal seasons. These fisheries have been referred to as “parallel fisheries” or “parallel seasons in State waters.” Harvests of groundfish in these fisheries accrue towards their respective Federal TACs.

In recent years, the State has modified state waters GHLs, necessitating changes in Federal TAC deductions. The State is also currently considering establishing fisheries for pollock in its internal waters in several areas from South Central Alaska to the Central Aleutians.

Incidental catches of Chinook and chum salmon in BSAI Pollock fisheries have increased in recent years. Tabular information on changes in catches may be found in Section 4.5 on PSC.

The Council is considering modifications in salmon PSC regulations in the BSAI FMP and in regulations to provide more flexibility for industry “hot spot” efforts to address incidental catches. Under current PSC regulations, fishermen may have been forced out of areas with relatively low salmon incidental catches into areas with higher incidental catches in 2004.

Commercial fishermen are allowed to harvest returning salmon once inseason escapement goals and anticipated subsistence harvest needs are both met. Thus, fluctuations in salmon returns are most likely to be felt by commercial fishermen first. The RIR evaluating the salmon PSC modifications under consideration by the Council monetized the incidental salmon catch in the BSAI pollock fishery over the period 1999-2003. To be conservative, the evaluation was made assuming that all fish would have returned to Alaska, that there would have been no natural at-sea mortality between the time they would have escaped harvest and the time they returned to their natal streams. The analysis did not account for discounting over the period between escape and availability to commercial fishing. The values of foregone salmon fishing revenues were about $1 million for Chinook and about $250,000 for chum, in 2003. The author notes that, because of the assumptions used, the values “greatly overstate the actual harvest that might have occurred if salmon bycatch had not been taken in the Bering Sea pollock trawl fishery.” (NPFMC, 2005e, page 151)

In the IPHC 2004 assessment of Pacific halibut for the 2005 fishing year, the total CEY for Alaska was 34,460 mt (round weight equivalents). The combined halibut PSC limit for 2006 and 2007 is expected to be similar to the amount in 2004 and 2005. If the combined halibut PSC limits in Alaska totaling 6,875 mt for 2005 were reached this would represent a reduction in the amount of the total CEY available to the directed fishery of about 20%. However it is worth noting that the reductions in CEY amounts for the directed commercial fishery are not proportional over all halibut management areas. The halibut PSC limits are fixed, rather than floating with the condition of halibut stocks. Indirect effects of a downstream reduction in the potential yield of the halibut stock (1.7 pounds on average for each 1 pound of mortality) coupled with projected declines in the exploitable biomass in the halibut stock suggest that at some future time the effect of incidental catch of halibut in the groundfish fisheries could have an adverse effect on the directed halibut fishery.

Due to the herring PSC limit of 1% of estimated biomass in the BSAI, and the present low volume of incidental catch in the GOA, the impact of changes in groundfish harvests on the commercial catches of herring is believed to be small under the status quo (2005).

Based on floating crab PSC limits, which are based on stock abundance in the BSAI, and the present low numbers of crab taken in the GOA, the effect of incidental catch of crab in the groundfish fisheries coupled with seasonal and area closures to trawl gear on all crab stocks is believed to have a small impact under the status quo (2005).

Changes in Alaska groundfish TACs may also affect other fisheries through market impacts. Alaska groundfish products are substitutes for groundfish products produced elsewhere. For example, Pacific cod may have a relatively close substitute in Atlantic cod. Reductions in Pacific cod harvests, and consequent price increases for Pacific cod, may shift demand curves for substitute species out, and lead to price increases for those species. Price increases and associated profit increases may lead to increased fishing effort in the fisheries for those species. Models market demand, and fishing behavior, models that would permit estimates of the impacts on other fisheries from this source are not available.

Many of the operations active in groundfish fishing are diversified operations, participating in other fisheries. Groundfish fishing may provide a way for fishermen to supplement their income from other fisheries and to reduce fishing business risk by diversifying their fishery "portfolios." Moreover, Pacific cod pot fishermen often fish for crab as well, and Pacific cod harvests provide them with low cost, high quality bait. Changes in specifications, and consequent changes in groundfish availability, could lead to more or less activity by groundfish fishermen in other fisheries, affecting competition in those other fisheries.

In general, reductions in groundfish availability would be expected to have a negative affect on related fisheries, as fishermen move out of groundfish fishing and into those activities, or crab fishermen find bait costs rising. Conversely, increases in groundfish availability should have a positive impact on those fisheries. However, little is known about how these processes would take place and what their quantitative impacts would be.

CDQ groups use revenues from their CDQ operations to invest in new fishery related activities. Many of these investments take place in fisheries other than groundfish fisheries. For example, the Coastal Villages Region Fund operates seasonal halibut buying stations, and has invested in a custom salmon processing plant in Quinhagak. (ADCED 2001, page 54). The impact of a reduction in groundfish revenue is difficult to predict. CDQ groups may have smaller revenues to invest in other fishing related activities. However, they may also accelerate their diversification into other non-groundfish fishing activities, in order to offset the risks associated with lower groundfish harvests.

The projected TACs under Alternative 2 are similar to those in place in 2005. Alternative 1 significantly increases the TAC for several species, while Alternatives 3 and 4 produce reductions in fish harvests. Alternative 5 sets all TACs equal to zero. This alternative would clearly create strong incentives for fishermen to explore other fisheries (although most fisheries in the U. S. EEZ are fully subscribed and entry into many is strictly limited), would make it harder for CDQ programs to develop additional local fishery resources (even if it would increase the incentive for them to do so), and would increase prices and incentives to use more effort in fisheries that can be used as substitutes in markets.

Consumer Effects

Economists typically measure the consumer effects of changes in production by changes in consumers' surplus. Consumers' surplus is a measure of what consumers would be willing to pay to be able to buy a given amount of a product or service at a given price. A decrease in quantity supplied, and an associated increase in price will reduce consumer welfare as measured by consumers' surplus. An increase in quantity supplied and a consequent decrease in price will increase consumer welfare as measured by consumers' surplus.[30] A decrease in consumers' surplus is not a total loss to society, since some of that loss is usually transferred to producers in the form of higher prices and an accompanying increase in producers' surplus. However, this transfer is still a loss to consumers.

There are relatively few recent empirical evaluations of markets for Alaska groundfish products available. Huppert and Best have recently reported two simple econometric models of sablefish markets (Huppert and Best, 2004). The most recent econometric analysis of Pollock markets is Hermann, Criddle, Feller and Greenberg. This analysis was published in 1996 using data from 1986 to 1993. Thus, the results of the model are dated, and do not reflect changes since 1993. (Hermann, Criddle, Feller, and Greenberg, 1996). The AFSC is currently supporting work on an econometric model of pollock markets. However, this work is in its early stages, and no results are available. Halibut are not treated as a groundfish species for the purposes of specifications, however, for completeness, a recent study by Criddle and Herrmann is also listed here (Criddle and Herrmann, 2004).

The effect of changes in production of pollock, Pacific cod, Atka mackerel, sole, and rockfish products on domestic consumers might be fairly modest, because pollock surimi and roe, and Atka mackerel are principally sold overseas. Pacific cod and pollock fillets are, by in large, sold into domestic markets in which there are many relatively close substitutes. (NMS 2004b, pages 3.9-131 to 3.9-134 - PSEIS) Moreover, the PSEIS notes that:

> …numerous past studies have indicated that the price elasticity of demand for those products, especially fillets, is fairly high…In other words, market price is not appreciably affected by the quantity supplied. This is because the domestic fillet market is competitive in terms of product form…supplying country, and fillets from other species, including hake and hoki. The U.S. market for all fillets, particularly cod, has also been influenced by the increased production of aquaculture-grown whitefish…Furthermore, seafood, in general, must compete with other animal protein sources in the American diet such as chicken, pork and beef. Consequently, the per unit price for Pollock or Pacific cod fillets would probably rise only if there were a large decrease in the amount of Pollock or Pacific cod fillets supplied to the domestic marketplace by U.S. firms. (NMFS 2004b, page 3.9-135 to 3.9-136)

Under these circumstances, U.S. consumers may not gain or lose much from modest changes in supply.[31]

The groundfish fisheries also make donations of salmon and halibut PSC bycatch to hunger relief organizations under BSAI FMP Amendment 28, and GOA Amendment 29. (NMFS 2004b, page 3.9-136)

[30] As a technical matter, in the standard diagram of supply and demand curves, the amount of the consumers' surplus is approximated by the area under the demand curve and above the horizontal line used to indicate the market clearing price of the good.

[31] Note that the assumption of a change in consumers's surplus requires inelasticity in the demand curve. The gross revenue analysis used a perfectly elastic demand curve as a simplifying assumption. If that assumption is correct, it would imply that there would be no change in consumers' surplus.

Alternative 1 would significantly increase TAC's for some species in 2006 with more modest increases projected for 2007. As a result, this alternative would tend to decrease market prices, and increase consumer surplus. TACs projected under Alternative 2 are not expected to change much from those in 2004. Alternatives 3 and 4 lead to some reductions in a number of TACs. These alternatives would be expected to lead to relatively small changes in price and consumer surplus. Alternative 5 would close Federal groundfish fisheries off Alaska in 2006 and 2007, creating large reductions in supplies to U.S. consumers (as well as, severe disruptions of world seafood markets). This alternative would eliminate the consumers' surplus from consumption of groundfish from the EEZ off Alaska and lead to price increases in markets for substitute species.

Management and Enforcement Costs[32]

New estimates of fishery management costs were prepared for inclusion of the FMPs at the time these were revised in 2004.[33] Many agencies make management contributions to the groundfish fisheries.

Among the agencies identified were the North Pacific Fishery Management Council ($2.4 million annually for groundfish management), the NOAA Fisheries Alaska Region (about $8 million annually), the Alaska Fisheries Science Center ($28.2 million), the NOAA Office of General Counsel, Alaska Region (no estimate provided, $2 million for all regional activity), the NOAA Office of Law Enforcement ($2.4 million), the US Coast Guard (unable to break out among functions, but less than $40.2 million), the Alaska Department of Fish and Game (more then $2.5 million), other agencies of the State of Alaska such as the Commercial Fisheries Entry Commission, the Department of Environmental Conservation (no estimate given), the US Fish and Wildlife Service (no estimate given), the Alaska Fisheries Information Network ($0.7 million), and the North Pacific Research Board ($5.5 million). (NPFMC, 2005a, pages 128-133)

The FMPs note that the private sector "incurs costs that could fairly be described as management costs. These include the costs of paperwork associated with the management system, the private costs associated with the observer program, the costs of operating various cooperative or CDQ catch management programs, and the costs of participating in the Council and regulatory processes." Paperwork costs were estimated at $3.7 million, while observer program costs were estimated at more than $10.8 million. (NPFMC, 2005a, pages 132)

Enforcement expenses are related to TAC sizes in complicated ways. Larger TACs may mean that more offloads would have to be monitored and that each offload would take longer. Both these factors might increase the enforcement expenses to obtain any given level of compliance. Conversely, smaller TACs may lead to increased enforcement costs as it becomes necessary to monitor more openings and closures and to prevent poaching.[34]

---

[32] For a recent collection of papers on the theory of management costs and cost recoverry, with case studies, see Schrank, Arnason, and Hannesson (2003).

[33] The methods used to make the following estimates may be found in Sections 6.2 of the BSAI and GOA FMPs.

[34] Jeff Passer. (2001). NOAA Enforcement. "Personal Communication." NMFS Alaska Region, P.O. Box 21668, Juneau, Alaska 99802. November 19, 2001.

In-season management expenses are believed to be more closely related to the nature and complexity of the regulations governing the fishery (for example, on the number of separate quota categories that must be monitored and closed on time) than to TAC sizes. Over a wide range of possible specifications, in-season management expenses are largely fixed. For example, increases in TACs from 50% above 2004 levels, to 50% below 2002 levels could probably be handled with existing in-season management resources[35] (Tromble, pers. comm.[36]).

Alternative 1 does not increase overall TACs in the BSAI by more than 50 % above 2005 levels, and is therefore unlikely to lead to large increases in management and enforcement costs. Overall TACs in the GOA do increase by at least that amount, but the increase is associated with large flatfish TACs that are unlikely to be harvested because of halibut PSC limits. Alternative 2, 3 and 4 do not change TACs to this extent. In general, none of these alternatives appear to be likely to create large changes in these costs.

Under Alternative 5, in which there would be no groundfish fishing in 2006 and 2007, management and enforcement costs would be reduced, but not eliminated. Prohibitions on fishing activity would still need to be enforced to prevent poaching; however, enforcement expenses would be reduced because it would be immediately clear, in any instance, that a vessel found using groundfish gear in the Federal waters would be in violation. In-season management expenses and activities would be eliminated if there were no fishing in 2006 and 2007, however, management and research efforts devoted to the longer term would still continue.

Excess Capacity

Open access fisheries are often characterized by excess capacity. This may take the form of more capital invested in fishing vessels for the purpose of fishing competitively, of more fishing vessels than are needed to harvest the resource, of excessive investment or development of onshore processing plants and other infrastructure, of onshore investments in regions that provide competitive advantages in harvesting an open access resource, and of more crew or processing workers than would be necessary to harvest the resource if fishing were governed by access rights to the surplus production from the fish stocks. While excess capacity is associated with fishery problems, and inefficient use of national resources, reductions in excess capacity create important distributional concerns. Fishery rationalization can mean that numbers of crew may experience transitional unemployment, or a move to less desirable jobs. In some rural areas without many alternative job opportunities, it may mean that people will face long-term unemployment, or that they will have to migrate to find work. It may also mean that communities that benefited from an open access fishery may lose to other communities that would gain under a program of rationalization. The Council takes these considerations into account when designing rationalization programs.

The PSEIS notes that the groundfish fleet expansion in the 1980s and early 1990s led to overcapacity, and that in 1992 the Council adopted its comprehensive rationalization program to

[35] Although at low levels of TACs (but above a zero level) in-season management costs might increase due to the difficulties in managing numerous small quotas (Tromble, pers. comm.).

[36] Galen Tromble. (2002). National Marine Fisheries Service. Silver Spring, Maryland. "Personal Communication." November 21, 2002.

address overcapacity. Since then the Council has adopted a number of programs that should have the effect of reducing overcapacity. These include the halibut and sablefish individual quota programs, the Western Alaska CDQ program, the moratorium of 1995, the license limitation program of 1998, and the AFA program in the Pollock fisheries. As noted in Section 3.2, additional rationalization programs are reasonably foreseeable. The Council approaches rationalization programs very carefully, seeking to obtain significant benefits from rationalization, while addressing distributional concerns as well.

In recent years a body of research on fishing fleet capacity has sought to develop methods of measuring excess capacity in fishing fleets. The NMFS Office of Science and Technology maintains a web page with links to a number of pages, and abstracts of others: http://www.st.nmfs.gov/st5/CommercialFisheriesEconomics.html .

Staff at the NMFS Alaska Fishery Science Center have been active in this research effort, and have examined capacity levels in Alaskan fisheries. (Felthoven, Hiatt and Terry, 2002; Felthoven and Paul, 2004) Felthoven, Hiatt, and Terry generally found evidence of excess capacity in groundfish fisheries. Felthoven and Paul examined the special case of Pollock CPs in the EBS, and found evidence of continuing overcapacity in 2001. This was three years after the Pollock fishery had been rationalized under the AFA. The authors noted that, this may have been due in part to sideboard and limitations on alternative fishing opportunities, which may have reduced the opportunity costs of continuing to use these vessels in the Pollock fisheries, may have slowed the elimination of overcapacity. (Felthoven and Paul, 2004, page 631)

Alternative 1 increases TACs significantly for several species in 2006, while providing more modest increases in 2007. Significantly greater TACs may be expected to improve capacity utilization in limited entry fisheries. Note however, that actual harvests may be constrained below the maximums allowed by TACs, as some fisheries run into halibut PSC constraints and must stop fishing. TACs projected under Alternatives 2, 3, and 4 change by relatively small amounts from those in 2005. Under Alternative 5, no groundfish fishing would occur in 2005 and 2006, thus increasing "excess capacity" in 2006 and 2007, by a considerable amount.

Bycatch and Discards

MSA National Standard 9 requires that "Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch. (MSA, Section 301(a)).

Bycatches were analyzed in Sections 4.3 (Non-specified species), 4.4 (Forage species), 4.5 (PSC species), and 4.7 (Seabirds). The Ecosystems Considerations SAFE contains information on time trends in bycatch of PSC and non-target species catches, and time trends in groundfish discards.

PSC regulations encourage fishermen to avoid bycatch. Regulations that permit charitable disposal of salmon and halibut taken as bycatch reduce the waste associated with discard and mortality of the bycatch without creating an incentive to target the species. Recent regulations requiring the use of streamers on groundfish hook-and-line fishing operations should act to discourage bird bycatches in those fisheries.

Halibut, salmon, king crab, Tanner crab, and herring are important species in other directed subsistence, commercial, and recreational fisheries. These species have been designated "prohibited species" in the BSAI and GOA groundfish fisheries. Groundfish fishing operations are required to operate so as to minimize their incidental harvests of prohibited species, and, under most circumstances, to discard prohibited species at-sea with a minimum of injury if they are taken.

In the BSAI, prohibited species are protected by harvest limits and/or the closure of areas to directed groundfish fishing, if high concentrations of the prohibited species are present. Because of the limits or other protection measures, changes in the harvests in the directed groundfish fisheries, associated with the different specifications alternatives, should have little impact on catches of prohibited species. Chinook and "other" salmon (primarily chums) may be an exception; as noted in Section 4.5, incidental catches of these species have been high in the BSAI pollock fishery in recent years. Salmon bycatches may be affected by increased or decreased pollock TACs under the different alternatives. Alternative 5, which, in shutting down the groundfish fisheries, clearly would reduce associated prohibited species catches to zero.

Halibut is the only prohibited species managed under a limit in the Gulf. In the GOA the only average bycatch amounts that are meaningful in terms of numbers or weight are Pacific halibut in the Pacific cod flatfish and rockfish fisheries, chinook salmon in the pollock fishery, "other" salmon (primarily chums) in the pollock fishery, and small amounts of *C. bairdi* crab in the Pacific cod fishery.

The Ecosystems Considerations SAFE for 2006 notes that "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 Bering Sea/Aleutian Islands and the Gulf of Alaska… These decreases are explained by reductions in the discard rates of Pollock and Pacific cod that resulted from regulations implemented in 1998 prohibiting discards of these two species. Discards in the Gulf of Alaska have increased somewhat since 1998 but are still lower than amounts observed in 1997, prior to the implementation of the improved retention regulations…" (NMFS 2005e, page 257)

Alternative 1 is associated with increases in TACs and potentially with increases in fishing activity, bycatches, and discards. Alternatives 2, 3, and 4 are associated with TAC levels that are similar to those under the status quo, and are likely to be associated with levels of bycatch and discard similar to those under the status quo. Under Alternative 5, there would be no groundfish harvests, no bycatch, and no discards.

Subsistence fishing

The commercial groundfish fisheries can affect subsistence fisheries in several ways. Commercial fisheries may target stocks, such as rockfish, that are also targeted by subsistence fishermen. Commercial groundfish fisheries may take incidental catches of non-groundfish species, such as salmon and halibut, that are also harvested by subsistence fishermen. Commercial fisheries may have ecosystem impacts on subsistence species if they harvest species used as prey by, that predate on, or that compete with, subsistence species. Such impacts may occur with Steller sea lions, or with Northern fur seals. Subsistence fishermen may earn income in groundfish fisheries that can then be used to support subsistence activities.

Subsistence use of groundfish resources in Alaska is described in Section 3.9.5 of the PSEIS (NMFS 2004b, pages 3.9-95 to 3.9-100). The PSEIS gives brief descriptions of subsistence consumption patterns for coastal communities from the Alaska Peninsula to Southeast Alaska. Communities in all the regions described make subsistence use of groundfish. In general, groundfish are a relatively small part of subsistence consumption, ranging from close to zero, up to about 9% by weight per capita, depending on the community and year. Species mentioned most often include cod and rockfish. Greenling, and flounder are important enough to be mentioned at least once. Halibut are not treated as a groundfish for this discussion.

Groundfish fisheries also incidentally catch non-groundfish species that are important to subsistence fishermen. These species include the PSC species of salmon, halibut, and herring. They may also include incidental catches of non-specified and forage fishes. Incidental PSC species catches are managed through the incidental catch restrictions imposed on fishing operations through regulation.

PSC limits on halibut are fixed limits that cannot be exceeded; these limits lead to closures of directed target fisheries when they are reached. Several fisheries, particularly the flatfish fisheries, are routinely shut down before reaching their TACs when they reach halibut PSC limits. Fluctuations in groundfish harvests are thus not likely to lead to increases in halibut bycatch beyond these PSC limits.

Most Chinook and chum salmon are harvested in pollock fisheries. PSC limits for Chinook and chum salmon are not absolute. When PSC limits are met, fishing areas may be closed and fishing operations moved to other areas. Thus, it is possible for fluctuations in pollock TACs and harvests to lead to changes in changes in salmon bycatch. However, while salmon bycatch has been rising in the BSAI in recent years, the changes in bycatch do not appear to be caused by changes in pollock TACs, which have been relatively stable. Increased bycatch appears to be associated with changing salmon bycatch CPUE, whether due to changes in pollock operations, or to environmental conditions.

Commercial fisheries may affect species interactions by harvesting species used as prey by, that predate on, or that compete ecologically with, important subsistence species. The mechanisms relating changes in the harvest of groundfish prey to changes in populations of animals used for subsistence purposes, and the mechanisms relating changes in populations of animals to changes in subsistence use are poorly understood. Impacts of groundfish species on marine mammals were discussed at length in Section 4.6, while impacts on seabirds were discussed in Section 4.7.

Commercial fishing often provides employment and income needed to support the purchase of inputs used in the pursuit of subsistence activities. Alternatives that affect employment and wages in the commercial fishery can be expected to have indirect impacts on subsistence activities.

In general, alternatives that reduce groundfish TACs available to commercial harvest will tend to decrease negative effects on subsistence fishing, while alternatives that increase TACs available for commercial harvest will tend to increase negative effects. However, the extent to which these effects would occur is unknown. Alternatives 2 through 4 would probably have relatively little impact on subsistence harvests, since they involve relatively modest changes in TACs. Alternative 1, which increases pollock bycatch in the BSAI in 2006 may be associated with somewhat larger salmon bycatch that year. Alternative 5, which completely shuts down the groundfish fisheries, would reduce bycatch to zero.

Sport fishing

The commercial groundfish fisheries can affect sport fisheries in several ways. Commercial fisheries may target stocks, such as demersal shelf rockfish, that are also targeted by sport fishermen. Commercial groundfish fisheries may take incidental catches of non-groundfish species, such as salmon and halibut, that are also harvested by sport fishermen. Commercial fisheries may have ecosystem impacts on sport species if they alter habitat used by important sport species, or if they harvest species used as prey by, that predate on, or that compete with, sport species.

Sport groundfish harvests (excluding halibut) appear to be dominated by rockfish and ling cod. Both species are harvested in Southeast Alaska and in South Central Alaska, but not to any extent in the AYK Region. (ADF&G sport fish survey website accessed at http://www.sf.adfg.state.ak.us/Statewide/ParticipationAndHarvest/index.cfm on August 31, 2005). A rough estimate of the sport demersal shelf rockfish harvest in Southeast Alaska (a fishery for yelloweye rockfish) in 2001 suggested a landed catch on the order of 35 mt. Total mortality is likely to be higher since there is a bag limit of 1 or 2 fish a day depending on area, and the mortality rate for discarded yelloweye rockfish is believed to be high. (NMFS, 2003a, page 628) Because of the relatively limited sport fishing for groundfish, this is not likely to be a major source of impacts on sport fisheries.

Chinook salmon, and halibut are the objects of important sport fisheries. Chum salmon are also taken as incidental catches in sport fisheries, and are the object of smaller targeted sport fisheries. All three species are PSC species, harvested subject to PSC constraints contained in the groundfish FMPs and in regulations. The PSC limits on halibut are fixed limits that cannot be exceeded; these limits lead to closures of directed target fisheries when they are reached. Several fisheries, particularly in the GOA, are routinely shut down before reaching their TACs when they reach halibut PSC limits. Fluctuations in groundfish harvests are thus not likely to lead to increases in halibut bycatch beyond these PSC limits.

Most Chinook and chum salmon are harvested in pollock fisheries. PSC limits for Chinook and chum salmon are not absolute. When PSC limits are met, fishing areas may be closed and fishing operations moved to other areas. Thus, it is possible for fluctuations in pollock TACs and harvests to lead to changes in changes in salmon bycatch. However, while salmon bycatch has been rising in the BSAI in recent years, the changes in bycatch do not appear to be caused by changes in pollock TACs. Increased bycatch appears to be associated with changing salmon bycatch CPUE, whether due to changes in pollock operations, or to environmental conditions.

Two alternative approaches to evaluating the economic impact of groundfish fisheries on sport fisheries are available. A cost and benefit analysis would focus on how changes in the availability of groundfish and other fish species to sport fishermen would change demand and consumers' surplus by changing catch per unit of effort, and the characteristics of the available sport fish. An impact analysis would look at how changes in the groundfish harvests affect regional economies through recreational employment and income multipliers. Currently, the available information on the relationship between groundfish harvests and catch per unit of effort in sport fisheries, and information on the welfare, employment and income impacts of changes in catch per unit of effort in recreational fisheries, are not comprehensive enough to support a detailed analysis.

In general, alternatives that reduce groundfish TACs available to commercial harvest will tend to decrease negative effects on sport fishing, while alternatives that increase TACs available for commercial harvest will tend to increase negative effects. It is likely that an important mechanism would be through potential changes in Chinook bycatch. However, the extent to which these effects would occur is unknown. Alternatives 2 through 4 would probably have little impact on sport harvests, since they involve relatively modest changes in TACs. Alternative 1, which increases pollock bycatch in the BSAI in 2006 may be associated with somewhat larger bycatch that year. Alternative 5, which completely shuts down the groundfish fisheries, would reduce bycatch to zero; however, even under these conditions, it is not clear how much of the bycatch that had been eliminated would flow to sport fishermen, how much to commercial or subsistence fishermen targeting bycaught species, and how much would be lost to natural mortality.

Changes in the value of other ecosystem services

Boyd and Banzhaf define ecosystem services as "the end products of nature that yield human well-being." They note that ecosystem services are not the same thing as ecosystem functions. Functions are the interactions between different elements of the ecosystem itself, while services "…depend on these functions, but are different: they are the aspects of the ecosystem valued by people." (Boyd and Banzhaf, page 16)

The volumes of groundfish produced by the ecosystem are valued as inputs into commercial, subsistence, and sport fisheries. They contribute a physical product to those fisheries, and they contribute to the cultural and social values associated with participation in those fisheries. The marine ecosystems of the GOA and BSAI also contribute a range of other services, and the capacity of the ecosystem functions to generate these services may be affected by the scale of groundfish fishing.

Among the additional ecosystem service values are values associated with observing fish in nature, harvest values of ecologically related species, values associate with knowledge of the continued existence of a marine ecosystem with certain characteristics, values associated with preserving the opportunity to use a fishery resource at some future time, as well as the value of preserving the opportunity to use other resources that are dependent on the resource.

Some potential uses do not involve actual consumption of physical service flows. Eco-tourism, to the extent that it is unobtrusive and doesn't disturb animals and habitat, may be a non-consumptive use of ecosystem services.

A person need never actually use, nor even intend to use, a resource in order to derive value from it.[37] That is, people enjoy a benefit (which can be measured in economic terms) from simply knowing that an aspect of the natural environment exists in a certain state. Such "passive use values" can also arise from a knowledge that activities dependent on the ecosystem continue to take place. Arguably, some place a value on the existence of commercial fishing or on the continued existence of culturally distinct rural Alaskan communities, just as some people (even those living in distant urban centers) receive value knowing that cowboys still exist.

Many ecosystem services are "public goods." "Public goods" is a technical term for goods that have one or both of two characteristics: (1) if they are provided to one person in a group, other members of the relevant group can't be prevented from using them at a reasonable cost, and (2) one person's use doesn't reduce the amount available for use by others. The knowledge that Steller's sea lions continue to exist provides an example of both characteristics. If the species is preserved, one person's satisfaction from preservation won't reduce another person's; if the species is preserved, no one can be denied the pleasure of knowing that. Markets are often

[37] People are said to have an "existence value" for a resource if they place a value on its mere existence, whether or not they ever expect to interact with it.

believed to be poor methods of providing public goods, often failing to provide socially optimal amounts of these.

The absence of markets makes it hard to make monetary value estimates for many of these ecosystem services. Survey research suggests that ecosystem values can be significant, in at least some contexts. Survey research from the early 1990s suggests that the cost of ecosystem changes associated with the Exxon Valdez grounding and oil spill, to persons who simply valued the continued existence of the unaltered environment, were worth billions of dollars. These estimates did not address the loss of other flows of ecosystem services, such as the values accruing to commercial, subsistence, or sport users (Carson, et al. 2003).

Estimation of these values is difficult, technically complex, and often very costly. In the present context, it is not possible to derive empirical estimates of values of changes in ecological service flows attributable to the suite of alternatives under review. Useful models would need to illustrate the connection between groundfish harvests and impacts on ecosystem function, the connection between changes in ecosystem function and the flow of ecosystem services, and the connection between the change in flow of services and consumer welfare. At present, the models to describe these connections quantitatively are not available. Nonetheless, these considerations are appropriately included in the comparative assessment of these competing alternatives, albeit in a qualitative manner.

A clearly delineated class of resources in the GOA and BSAI, whose existence has been identified as at risk, include those that have been formally "listed" as endangered, under the U.S. Endangered Species Act. Under the Act, an endangered species is one that is "...in danger of extinction throughout all or a significant portion of its range..." and not one of certain insects designated as 'pests."(16 U.S.C. §1532(6).)

Changes in groundfish harvests in the GOA and the BSAI may impact non-consumptive use values by affecting the availability, or probability of continued existence or recovery of a listed species. At present, four endangered species or classes of endangered or threatened species range into the GOA and BSAI management areas: (a) Steller sea lions; (b) seven species of Great Whales; (c) Pacific Northwest salmon; and (d) three species of sea birds (Table 6.0-2 lists the affected species).

Section 4.5 of the EA described the effects of the alternatives on prohibited species. Section 4.6 described the effects on Marine Mammals (including ESA listed marine mammals). Section 4.7 described the effects on seabirds. The analysis identified adverse impacts on these resources, but not significantly adverse impacts.

Alternatives 2, 3 and 4 are likely to have impacts very similar to those observed in the status quo year, 2005. Alternative 1 is likely to be associated with increases in the flow of commercial fish production services. In connection with this, it may be associated with reductions in flows of other services as it takes energy from the system in the form of increased groundfish harvests (probably a relatively minor impact), or as fishing activity has impacts on other ecosystem functions. At the other end of the spectrum Alternative 5, under which no fishing takes place, would reduce commercial use of groundfish and potentially increase flows of other ecosystem services.

Communities

Changes in fishing activity can affect community employment and income levels (a) through changes in fishing income earned by community members as crewmembers, as owners of vessels and other equipment used in the fishery, or as holders of restricted access privileges to participate in the fishery, (b) through changes in the quantities of fishing equipment, supplies, and services, transportation, and housing services that are demanded in the community, and (c) through changes in the levels of fish processing and associated requirements for warehousing, transportation, and other services, that are demanded in the community.

Communities also depend on subsistence and sport fisheries for income, sustenance, and the preservation of cultural values. Commercial fisheries may have a complex relationship to these other flows of ecosystem services; increases in commercial fishing revenues may reduce the need for income from other sources, provide revenues to support subsistence activities, and – if sport fishing is a normal good, so that the quantity demanded increases with income – increase the demand for sport fishing opportunities. On the other hand, as noted above in the discussions of subsistence and sport fisheries, commercial fishing activity may also adversely affect the ability of the ecosystem to provide these services- perhaps because of bycatch of a species targeted by a subsistence or sport fishery, or because it harvests a prey on which the subsistence or sports species depends.

Several types of models are available for addressing fishery impacts on communities. These include simple economic base models, more sophisticated input-output models, and computable general equilibrium models. Seung and Waters (2005) provide a survey of the availability of impact models for evaluating fishery impacts in Alaska.

At the present time the level of sophistication of the revenue model used for the specifications analysis, and the level of development of regional impact modeling for Alaska available from NMFS sources doesn’t permit an employment or income impact analysis of the alternative specification levels. The NMFS Alaska Region is currently developing the gross revenue model so that it will provide estimates of regional gross revenue flows from the fishery. This ongoing work is described in Appendices F and G. Ongoing work at the NMFS AFSC is being devoted to development of regional economic models. A reasonable goal would be to develop an interface between a reasonably sophisticated and tested fishery revenue model, and regional impact models, to evaluate the regional impacts of alternative specifications in more detail.

One long-term obstacle to the development of the fine spatial scale implied in community level impact modeling will be concerns about the confidentiality of fisheries data. Many communities are served by a single processor, or by very few, and many only have a few fishermen delivering certain species. In cases like this, community modeling may be precluded, preventing a move beyond general regional impact analyses.

The Western Alaska CDQ Program was created by the Council in 1991 as part of the inshore/offshore allocations of pollock in the BSAI fishery. As stated in the BSAI Groundfish FMP, the purpose of the CDQ Program is as follows:

The Western Alaska Community Development Quota Program is established to provide fishermen who reside in western Alaska communities a fair and reasonable opportunity to participate in the Bering Sea/Aleutian Islands groundfish fisheries, to expand their participation in salmon, herring, and other nearshore fisheries, and to help alleviate the growing social economic crisis within these communities...Through the creation and implementation of community development plans, western Alaska communities will be able to diversify their local economies, provide community residents with new opportunities to obtain stable, long-term employment, and participate in the Bering Sea/Aleutian Islands fisheries which have been foreclosed to them because of the high capital investment needed to enter the fishery.

As practically implemented, the purpose of the CDQ Program is to help western Alaska communities strengthen their local economies by investing in both commercial fisheries and other fisheries-related projects, and to provide residents with education, training, and job opportunities in the fishing industry. The original CDQ Program regulations went into effect on November 18, 1992 and have been amended numerous times since then. In 1996, the Magnuson-Stevens Act institutionalized the program as part of the BSAI Groundfish FMP.

The fishery resources allocated under the CDQ Program are under federal jurisdiction, but the program is jointly managed by NMFS and the State of Alaska (State). The State is primarily responsible for the day-to-day administration and oversight of the economic development aspects of the program and for recommending quota allocations for each CDQ applicant. NMFS is primarily responsible for fisheries management aspects of the groundfish and halibut CDQ fisheries and broad program oversight. The specific criteria used to evaluate applications and make CDQ allocation recommendations are implemented in State regulations. The Alaska Regional Administrator, NMFS, acting on behalf of the U.S. Secretary of Commerce, and the Council review the State's recommendations and make the final decision about allocations among CDQ applicants.

The communities in the CDQ Program are predominantly Alaska Native villages. The communities are typically remote, isolated settlements with few natural assets with which to develop and sustain a viable diversified economic base. Basic community and social infrastructure is often underdeveloped or lacking, and transportation and energy costs are high. Historically, economic opportunities have been few, unemployment rates have been chronically high, and these communities (and the region) have been economically depressed.

While the CDQ communities border very productive fishing grounds, they were unable to exploit this proximity as the BSAI groundfish fisheries developed. The full development of the domestic fishing and processing industry in these fisheries occurred relatively quickly between 1976 and 1990. However, the very high capital investment required to compete in these fisheries precluded small communities from participating in them. The CDQ Program serves to ameliorate some of these circumstances by extending an opportunity to qualifying communities to directly benefit from the productive harvest and use of these publicly owned resources.

Currently, 65 communities participate in the CDQ Program, based on eligibility criteria listed in both the Magnuson-Stevens Act and federal regulation. The eligible communities have formed six non-profit corporations (CDQ groups) to manage and administer the CDQ allocations, investments, and economic development projects. The six CDQ groups are Aleutian Pribilof Island Community Development Association (APICDA), Bristol Bay Economic Development Corporation (BBEDC), Central Bering Sea Fishermen's Association (CBSFA), Coastal Villages Region Fund (CVRF), Norton Sound Economic Development Corporation (NSEDC), and Yukon Delta Fisheries Development Association (YDFDA).

Since 1992, the CDQ Program has expanded several times and now includes allocations of pollock, halibut, sablefish, crab, all of the remaining groundfish species (cod, Atka mackerel, flatfish, and rockfish), and prohibited species catch (i.e., as bycatch allowances for salmon, halibut, and crab). CDQ Program allocations vary by species. While originally set at 7.5 percent, Congress increased the pollock CDQ allocation to 10 percent in 1998 as part of the American Fisheries Act. The percentage of other catch limits allocated to the CDQ Program (as CDQ reserves) is determined by: the BSAI Crab Rationalization Program (10 percent of crab species, except for Norton Sound red king crab, which is 7.5 percent; the BSAI FMP for all other groundfish and prohibited species (7.5 percent, except 20 percent for fixed gear sablefish); and, 50 CFR 679 for halibut (20 percent to 100 percent, depending on management area).

Each CDQ group is eligible to receive a percentage allocation of each CDQ reserve and prohibited species quota (PSQ) reserve as recommended by the State and approved by the NOAA Fisheries. The percentages can vary by CDQ group, management area, and species. Such percentages are reviewed and amended on a periodic basis. Under the current regulations, all groundfish (except for squid and "other species") and prohibited species caught by vessels fishing for a particular CDQ group accrues against that group's CDQ and PSQ allocations. Besides squid and "other species," none of the groundfish or prohibited species caught in the groundfish CDQ fisheries accrues against the non-CDQ apportionment of TAC or PSC limits. The CDQ groups must manage their catch to stay within each of their annual CDQ allocations, as they are prohibited from exceeding them. This may have a bearing on how successfully or aggressively CDQ groups prosecute some target species.

The 2004 CDQ allocations included approximately 187,000 metric tons of groundfish, over 2 million pounds of halibut, and approximately 3 million pounds of crab. Annual CDQ allocations provide a revenue stream for CDQ groups through various channels, including the direct catch and sale of some species, leasing quota to various harvesting partners, and income from a variety of investments. The six CDQ groups had total revenues in 2003 of approximately $87 million, primarily from pollock royalties. Since 1992, the CDQ groups have accumulated assets worth approximately $350 million (as of 2004), including ownership of small local processing plants, catcher vessels, and catcher/processors that participate in the groundfish, crab, salmon, and halibut fisheries.[38]

One of the most tangible direct benefits of the CDQ Program has been employment opportunities for western Alaska village residents. CDQ groups have had some successes in securing career track employment for many residents of qualifying communities, and have opened opportunities for non-CDQ Alaskan residents, as well. Jobs generated by the CDQ program included work aboard a wide range of fishing vessels, internships with the business partners or government agencies, employment at processing plants, and administrative positions. In recent years, annual CDQ-related jobs have ranged from 1,339 people in 1999 to 2,080 in 2003. CDQ wages in those same years has ranged from $10.6 million to $11.9 million. CDQ groups continue to explore the means to provide both continuing and additional employment opportunities for local residents.

Communities may derive value from fishing activities that are not solely dependent on gross and net revenues derived from fishing. For example, there seems to be potential to inform the discussion of both community impacts and impacts on subsistence by considering the on-going debate in the Pribilofs over closed areas designed to protect marine mammals. This debate clearly illustrates the breadth of non-monetary concerns that can be associated with the linkages between communities and marine resources.

[38] State of Alaska, DCEED web site at http://www.commerce.state.ak.us/bsc/CDQ/, accessed September 3, 2005. This also is the source of statistics cited in section 3.2.4.

Changes in groundfish fishery revenues may impact fishery dependent communities. In general, specifications associated with gross revenues that are larger than current levels of production would "likely" relax constraints on fishermen and fish processors and could be associated with higher levels of profits, leading to improvements in the economic conditions in communities that are dependent on fishing activities. In contrast, and under the same set of caveats, specifications associated with lower gross revenues would increase the constraints on fishermen and would likely result in lower profits and may have negative effects on the economies of communities that are dependent on fishing activities.

Alternatives 2, 3 and 4 are likely to have impacts very similar to those observed in the status quo year, 2005. Alternative 1 is likely to be associated with increases in the commercial harvests. While this may have benefits to communities, as noted near the start of this sub-section, it may also have adverse impacts on community subsistence and sport fisheries. At the other end of the spectrum Alternative 5, under which no fishing takes place, would reduce commercial use of groundfish and potentially increase flows of other ecosystem services.

4.10.2 Cumulative effects

Ecosystem approaches to management: Ecosystem approaches to management, particularly those that impose constraints on fishing operations to protect other components of the ecosystem (non-target fish species, birds, mammals, habitat, ecosystem functions), are likely to impose additional costs on fishermen, reduce their catch per unit of effort, reduce the fish resources available to them, or otherwise increase their costs and reduce their revenues. Increased regulatory requirements are likely to be associated with increased costs for fishery management and enforcement. Regulations that work by increasing the number of separate quotas that must be monitored, may increase fishery management and enforcement costs, and could make it more difficult for fishermen to fully harvest available target species TACs. Ecosystem approaches should also contribute to the long run sustainability of target fish stocks, and the sustainability and continuing value received from other ecosystem services flows, including those from subsistence harvests, sport harvests, and other ecosystem services.

Rationalization: Ongoing rationalization programs should contribute to enhancing the profitability and income from target fisheries. Rationalization may make it possible to achieve ecosystem and environmental objectives while avoiding unduly high cost burdens on industry. Rationalization programs may contribute to increases in management and enforcement costs. The restructuring of fisheries that often follows rationalization may lead to temporary unemployment, or a shift to less desirable employment for some. Some communities which depend on the business associated with open access fisheries may see that business move to other communities. Increased use of community quotas in rationalization programs may anchor fishing income in rural communities. The actual impacts of rationalization will depend on the decisions that the Council makes in designing and implementing its rationalization programs. Increases in CDQ group income and assets may be associated with increased fisheries development in western Alaska.

Traditional management tools: The Council will authorize future groundfish fisheries in each of the other years (2008 to 2015) considered in the cumulative effects time period. Increasing regulatory protections for resource components, and increasing rationalization, will both increase the costs of fisheries management and enforcement. Technological and program changes will offset at least some of these additional costs, although some technological changes, for example, an extension of VMS requirements, would increase operating costs for fishermen.

Other federal, state and international actions: State of Alaska actions to create new Pollock fisheries in state waters may lead to a reallocation of the revenues from annual specifications to inshore fishermen. Either operations within state waters would benefit during parallel fisheries, or guideline harvest levels for state fisheries would increase while Federal TACs would decrease.

Private actions: Increasing economic development and population in Alaska may be associated with increasing demand for sport fishing opportunities. Substantially increased sport competition for groundfish stocks is unlikely, but there may be an increased demand for access to stocks such as Chinook salmon and halibut that are taken as PSC catch in groundfish fisheries.

Conclusions: As noted in Section 4.1, economic and social impacts differ in fundamental ways from impacts on other resource components examined in this EA. Significance findings for social and economic impacts would not affect a finding of no significant impact (FONSI); see 40 CFR 1508.14. Therefore, significance findings, including cumulative significance findings, have not been made for economic and social impacts.

5.0 Environmental Analysis Conclusions

As stated in section 1.4 of this EA (Purpose and need), the purpose of this action is to meet the requirements of the Magnuson-Stevens Act's national standards for fisheries conservation and management. One of the most important of these is National Standard 1: "Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry." (16 U.S.C. 1851). Section 1.4 cites the Council's management objectives including providing for orderly and controlled commercial fisheries (including CDQ fisheries) that will promote sustainable fisheries and communities and equitable and efficient use of fishery resources, while preventing overfishing and meeting the other environmental objectives described in the Council's objectives.

Five alternatives have been evaluated for all direct, indirect, and cumulative effects on resources, species, and issues within the action area as a result of specified TAC levels. The impacts of alternative TAC levels are assessed in Chapter 4 of this EA.

In addition to the PSEIS and other NEPA analyses for the groundfish fisheries, the significance of impacts of the actions analyzed in this EA is determined through consideration of the following information, as required by NEPA and 40 CFR 1508.27.

Context

For the 2006 and 2007 harvest specifications action, the setting of the proposed action is the groundfish fisheries of the BSAI and GOA. Any effects of this action are limited to these areas. The effects of the 2006 and 2007 harvest specifications on society within these areas are on individuals directly and indirectly participating in the groundfish fisheries and on those who use the ocean resources. Because this action has impacts that may go beyond the bounds of the BSAI and GOA and continues groundfish fisheries in BSAI and GOA into the future, this action may have impacts on society as a whole or regionally.

Intensity

Listings of considerations to determine intensity of the impacts are in 40 CFR 1508.27(b) and in the NOAA Administrative Order 216-6, Section 6. Each consideration is addressed below in order as it appears in the regulations.

Adverse or beneficial impact determinations for marine resources, **including sustainability of target and nontarget species, damage to ocean or coastal habitat or essential fish habitat, effects on biodiversity and ecosystems**, **and marine mammals** Significant impact determinations for marine resources accruing from alternatives to establish year 2006 and 2007 Federal groundfish fisheries harvest specifications are summarized in Table 5.0-1.

<u>Alternative 1</u> Alternative 1 may have adverse impacts on resources. While Alternative 1 involves increased TACs for many species, these may not lead to proportionate increases in fishing activity or fish production. Large increases in TACs for arrowtooth flounder may be difficult to market. In other instances, large increases in TACs for species that are currently constrained by PSC bycatch, or that are close to levels at which PSC constraints would be binding, may not be able to be fully harvest base on the increased TACs. For this reason, Alternative 1 was not found to have significant impacts. Note that Alternative 1 involves levels of harvest that are actually illegal in the BSAI (levels that exceed the regulatory 2 million mt

OY). While this almost certainly precludes Alternative 1 in 2006 and 2007, NEPA alternatives do not have to be currently authorized by regulation to be considered. In this case, Alternative 1 has been included because it provides a potentially biologically acceptable upper bound on the range of TAC specifications considered. The regulatory prohibition on Alternative 1 was not considered in the significance determinations. An unknown rating for Alternative 1 was found for PSC species, since the PSC constraints introduced in the past are assumed to be implemented within the OY limits. Adverse impacts are also expected for marine mammals, seabirds, habitat and ecosystems due to increased fishing effort, but these effects are considered either unknown or insignificant.

Alternative 2 (preferred alternative) Alternative 2 provided for TAC levels that were generally close to those of the 2005 status quo. This is the Council's preferred alternative. Alternative 2 had adverse impacts on some resource components, but all impacts are insignificant.

Alternatives 3 and 4 Alternatives 3 and 4 tended to be associated with somewhat less fish production than Alternative 2. In the GOA, Alternative 3 was actually associated with TACs that were somewhat larger than those under Alternative 2, but a large part of these were flatfish TACs; the full harvest of these TACS might be prevented by halibut PSC constraints. The effects of alternatives 3 and 4 for the environmental components were generally identified as similar to those of Alternative 2. Both alternatives had adverse impacts, but they were considered insignificant.

Alternative 5 Under Alternative 5, there would be no groundfish fisheries in 2006 and 2007. Alternative 5 had no adverse impacts on the environment and no significant impacts. However, Alternative 5 would be very disruptive to persons and firms directly involved in fishing, processing, transportation, and other operations that service these sectors, and to the persons, firms, and communities dependent on the health of these sectors, and to the consumers of fish products. This would be inconsistent with the portion of the guidelines for National Standard 1 that defines "optimum yield" as "the amount of fish that will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities…" (50 CFR 600.310)

Public health and safety will not be affected in any way not evaluated under previous actions or disproportionally for Alternatives 1-4. The harvest specifications will not change fishing methods, timing of fishing or quota assignments to gear groups which are based on previously established seasons and allocation formulas in regulations. Alternative 5 effects on safety and health are unknown. It is likely that no fishing would result in a reduction in fishery related injuries and mortality, but the lack of income may result in adverse effects on public health.

Cultural resources and ecologically critical areas: These actions take place in the geographic areas of the Bering Sea, Aleutian Islands, and GOA, generally from 3 nm to 200 nm offshore. The land adjacent to these areas contain cultural resources and ecologically critical areas. The marine waters where the fisheries occur contain ecologically critical area. Effects on the unique characteristics of these areas are not anticipated to occur with these actions and mitigation measures such as a bottom trawling ban in the Bering Sea are part of fisheries management measures.

Controversiality: These actions deal with management of the groundfish fisheries. Differences of opinion exist among various industry, environmental, management, and scientific groups on the appropriate levels of TAC to set for various target species and in particular fishery management areas. Alternative 2 is less likely to be controversial compared to the other alternatives analyzed because it continues to apply scientific and public processes used for harvest specifications that are similar to those used in the past for the groundfish fisheries. Alternatives 1 and 5 would be more likely to be controversial because of the large increase and decrease in harvest, respectively. Alternatives 3 and 4 also would be more likely than Alternative 2 to be controversial because they do not apply the scientific or public processes for harvest specifications development.

Risks to the human environment, **including social and economic effects:** Risks to the human environment by setting harvest specifications in the BSAI and GOA groundfish fisheries are described in detail in the PSEIS (NMFS 2004b) and in this EA. Because of the mitigation measures implemented with every past action, it is anticipated that there will be minimal or no risk to the human environment beyond that disclosed in the PSEIS (NMFS 2004b) or the Steller Sea Lion Protection Measures SEIS (NMFS 2001b). While Alternative 2 is expected to have some adverse impacts on the human environment, these were rated insignificant for the harvest specifications. Alternative 2 is very similar to, and effectively continues, the status quo fishery management regime. It is therefore likely to impose minimal disruption on persons, firms, and communities dependent on the fish resources.

Future actions related to this action may result in impacts and are addressed in Chapter 4.0 of this EA. A cumulative effects analysis for each resource component fully evaluated the impacts of reasonably foreseeable future actions. Section 3.2 of the EA surveyed the reasonably foreseeable future actions under the headings of ecological approaches to management, rationalization, traditional fishery management tools, other federal, state and international actions, and private actions. NMFS is required to establish fishing harvest levels for up to two years for the BSAI and GOA groundfish fisheries. In the future, changes may occur in the environment or in fishing practices that may result in significant impacts. Additional information regarding marine species may make it necessary to change management measures. NMFS has the ability to mitigate environmental emergencies by adopting emergency rules. In December 2006, the Council will adopt new specifications for 2007 and will have the opportunity to adapt to changing conditions at that time. The new specifications and alternatives will be reviewed in a NEPA analysis. The analysis of the cumulative effects Chapter 4 did not identify any significant incremental effects of the current action as a result of the foreseeable future actions. Pursuant to NEPA, appropriate environmental analysis documents will be prepared to inform the decision makers of potential impacts of future actions on the human environment, and mitigation measures are likely to be implemented, if necessary to avoid potentially significantly adverse impacts.

Cumulatively significant effects, including those on target and nontarget species
Cumulative impacts of the preferred alternative on each of the environmental resource components are analyzed in Chapter 4.0. The cumulative effects of this action, when added to past, present, and reasonably foreseeable future actions were insignificant.

The specifications were determined following a process that has been fully analyzed in the PSEIS and in the NEPA analysis for BSAI and GOA FMP Amendments 48/48 (NMFS 2004c). Moreover, this action in and of itself is of short duration, and its effects will be measurable only on a very fine scale. At the population level, the effects of up to two years of harvest specifications may be impossible to detect. Moreover, the Council will adopt new specifications for the second year of the period covered by this action, 2007, in December 2006. The agency will attempt to more fully assess cumulative effects in future editions of the PSEIS when sufficient time has passed for analysts to be able to evaluate more clearly the cumulative environmental consequences of the annual BSAI and GOA specifications.

Districts, sites, highways, structures, or objects listed or eligible for listing in the National Register of Historic Places: This action will have no effect on districts, sites, highways, structures, or objects listed or eligible for listing in the National Register of Historic Places, nor cause loss or destruction of significant scientific, cultural, or historical resources. This consideration is not applicable to this action.

Impact on ESA listed species and their critical habitat: ESA listed species that range into the fishery management areas are listed in Table 3.3-1. An FMP level Section 7 consultation BiOp was completed for the groundfish fisheries in November 2000 (NMFS 2000). The FMP level BiOp is limited to those species under NMFS jurisdiction and covers most of the endangered and threatened species occurring in the action area, including marine mammals, turtles, and Pacific salmon.

Under NMFS' FMP level BiOp (NMFS 2000), the western distinct population segment of Steller sea lions was the only ESA listed species identified as likely to be jeopardized by the groundfish fisheries. A subsequent biological opinion on the Steller sea lion protection measures was issued in 2001 (NMFS 2001b, appendix A). The 2001 BiOp found that the groundfish fisheries conducted in accordance with the Steller sea lion protection measures were unlikely to cause jeopardy of continued survival and recovery or adverse modification or destruction of critical habitat for Steller sea lions. This action would be implemented within the protection measures.

The effects of the groundfish fisheries on ESA listed salmon are discussed in section 4.5. The incidental take statement of 55,000 chinook salmon from the 1999 BiOp (NMFS 1999) was exceeded in the 2004 groundfish fishery. NMFS Alaska Region is currently consulting with NMFS NW Region to determine if the exceedence of the ITS is likely to adversely affect ESA listed salmon and the Council is evaluating the current bycatch management methods to determine if changes are needed.

Listed seabirds are under the jurisdiction of the USFWS which has completed an FMP level (USFWS 2003a) and project level BiOp (USFWS 2003b) for the groundfish fisheries. Both USFWS BiOps concluded that the groundfish fisheries and the annual setting of harvest specifications were unlikely to cause the jeopardy of extinction or adverse modification or destruction of critical habitat for ESA listed birds.

NMFS is currently consulting with the USFWS on northern sea otters and may consult on Northern right whales after designation of critical habitat. No other consultations are required for the 2006 and 2007 harvest specification because the proposed actions will not modify the actions already analyzed in previous BiOps, are not likely to adversely affect ESA listed species beyond the effects already analyzed. Summaries of the ESA consultations on individual listed species are located in the section 3.0 and accompanying tables of the PSEIS under each ESA listed species' management overview (NMFS 2004b).

This action poses **no known violation by NMFS of Federal, State, or local laws or requirements for the protection of the environment**. Implementation of the harvest specifications would be conducted in a manner consistent, to the maximum extent practicable, with the enforceable provisions of the Alaska Coastal Management Program within the meaning of section 30(c)(1) of the Coastal Zone Management Act of 1972 and its implementing regulations.

Alternatives 2-5 pose **insignificant effects on the introduction or spread of nonindigenous species** into the BSAI and GOA because they do not change fishing, processing or shipping practices that may lead to the introduction of nonindigenous species. Because Alternative 1 is associated with potentially increased levels of harvests, it was given an unknown significance rating on this criterion.

Comparison of Alternatives and Selection of a Preferred Alternative

Alternative 1 would set TACs in the BSAI above the upper limit of 2,000,000 mt for OY and has more potential for adverse effects on a number of environmental components compared to Alternatives 2-5. It does not provide as much flexibility as Alternative 2 for the reduction of fishing rates below the $maxF_{ABC}$ in order to take account of biological and conservation issues unique to each species. Alternative 5 under which no fishing takes place, eliminates the adverse impacts of fishing on the environment, but at a very high cost, since setting TACs equal to zero in both the BSAI and GOA would result in severe socioeconomic impacts. Neither Alternative 3 nor 4 uses the best and most recent scientific information on status of groundfish stocks nor takes into account socioeconomic benefits to the nation.

Alternative 2 is the preferred alternative because: 1) it takes into account the best and most recent information available regarding the status of the groundfish stocks, public testimony, and socio-economic concerns; 2) it sets all TACs at levels equal to or below ABC levels; 3) it falls within the specified range of OY for both the BSAI and GOA, 4) it is consistent with the ESA and the National Standards and other requirements of the Magnuson Stevens Fishery Conservation and Management Act, and 5) it does not disrupt the persons, firms, and fishing communities that are dependent on the fish resources.

Table 5.0-1 Summary of Significance Determinations

		Alternative 1	Alternative 2	Alternative 5	Alternative 4	Alternative 5
Target species (Section 4.2)	Evaluated with respect to level of mortality, changes in genetic structure, reproductive success, prey availability, and habitat	Harvest levels will be consistent with OFL and ABC constraints identified by scientists. These are expected to create a low probability of overfishing and prevent significant adverse impacts to genetic structure, reproductive success, prey availability and habitat. Impacts not significant.	Harvest levels will be consistent with OFL and ABC constraints identified by scientists. These are expected to create a low probability of overfishing and prevent significant adverse impacts to genetic structure, reproductive success, prey availability and habitat. Impacts not significant.	Harvest levels will be consistent with OFL and ABC constraints identified by scientists. These are expected to create a low probability of overfishing and prevent significant adverse impacts to genetic structure, reproductive success, prey availability and habitat. Impacts not significant.	Harvest levels will be consistent with OFL and ABC constraints identified by scientists. These are expected to create a low probability of overfishing and prevent significant adverse impacts to genetic structure, reproductive success, prey availability and habitat Impacts not significant.	There would be no harvest under this alternative, and no impacts.
Non-specified species (4.3)	Evaluated using 50% change in target species TACs as a proxy for impact on non-specified species.	Target species TAC changes did not trigger the threshold. Direct, indirect, and cumulative effects analyses did not identify significant impacts.	Target species TAC changes did not trigger the threshold. Direct, indirect, and cumulative effects analyses did not identify significant impacts.	Target species TAC changes did not trigger the threshold. Direct, indirect, and cumulative effects analyses did not identify significant impacts.	Target species TAC changes did not trigger the threshold. Direct, indirect, and cumulative effects analyses did not identify significant impacts.	There would be no harvest under this alternative, and no impacts.
Forage species (4.4)	Evaluated using 100% change in Pollock TACs as a proxy for impact on forage species.	Pollock TAC changes did not trigger the threshold. Direct, indirect, and cumulative effects analyses did not identify significant impacts.	Pollock TAC changes did not trigger the threshold. Direct, indirect, and cumulative effects analyses did not identify significant impacts.	Pollock TAC changes did not trigger the threshold. Direct, indirect, and cumulative effects analyses did not identify significant impacts.	Pollock TAC changes did not trigger the threshold. Direct, indirect, and cumulative effects analyses did not identify significant impacts.	There would be no harvest under this alternative, and no impacts.
PSC species (4.5)	Evaluated with respect to consistency with PSC protection measures incorporated in the FMPs and in regulations.	Alternative 1 was given an unknown significance rating for this resource component. PSC protection measures have been evaluated and adopted under the assumption that the BSAI OY cap would be met. This alternative	Fisheries will be conducted in accordance with FMP provisions and regulations directly limited PSC harvests, or constraining fishing behavior to prevent overfishing of PSC species. These provisions were	Fisheries will be conducted in accordance with FMP provisions and regulations directly limited PSC harvests, or constraining fishing behavior to prevent overfishing of PSC species. These provisions were	Fisheries will be conducted in accordance with FMP provisions and regulations directly limited PSC harvests, or constraining fishing behavior to prevent overfishing of PSC species. These provisions were	There would be no harvest under this alternative, and no adverse impacts.

		would allow harvests greater than that cap. It has thus been given an unknown significance rating.	adopted pursuant to NEPA analyses and FONSIs. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	adopted pursuant to NEPA analyses and FONSIs. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	adopted pursuant to NEPA analyses and FONSIs. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	
Marine mammals (4.6)	Evaluated with respect to incidental take and entanglement in marine debris, harvest of prey species, and disturbance.	TACs are higher, but it is not clear if harvests will rise proportionately. Market considerations for some species (arrowtooth flounder) may limit harvest, in other instances halibut PSC bycatch may be a limiting factor. This was rated adverse, but not significantly adverse. Existing protection measures were also found to constrain the impacts of increased TACs	Incidental takes were found to be within PBR levels (the threshold), and entanglement, harvest of prey, and disturbance, were adverse but not significant. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	Incidental takes were found to be within PBR levels (the threshold), and entanglement, harvest of prey, and disturbance, were adverse but not significant. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	Incidental takes were found to be within PBR levels (the threshold), and entanglement, harvest of prey, and disturbance, were adverse but not significant. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	There would be no harvest under this alternative, and no adverse impacts.
Seabirds (4.7)	Evaluated with respect to incidental take, prey availability, and impact on benthic habitat.	The analysis concluded that takes would be small compared to population, that they would have little impact on prey availability or on species that exploit benthic habitat for prey. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	The analysis concluded that takes would be small compared to population, that they would have little impact on prey availability or on species that exploit benthic habitat for prey. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	The analysis concluded that takes would be small compared to population, that they would have little impact on prey availability or on species that exploit benthic habitat for prey. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	The analysis concluded that takes would be small compared to population, that they would have little impact on prey availability or on species that exploit benthic habitat for prey. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	There would be no harvest under this alternative, and no adverse impacts.
Habitat (4.8)	Evaluated with respect to impact on benthic habitat, using minimal and temporary standard for impacts	TACs are higher, but it is not clear if harvests will rise proportionately. Market considerations	Analysis in the EFH EIS concluded that impacts on habitat would be no more than minimal and	Analysis in the EFH EIS concluded that impacts on habitat would be no more than minimal and	Analysis in the EFH EIS concluded that impacts on habitat would be no more than minimal and	There would be no harvest under this alternative, and no adverse impacts.

	on EFH as a proxy	for some species (arrowtooth flounder) may limit harvest, in other instances halibut PSC bycatch may be a limiting factor. This was rated adverse, but not significantly adverse.	temporary. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	temporary. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	temporary. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	
Ecosystem relationships (4.9)	Evaluated with respect to nine key impacts, including pelagic forage availability, spatial and temporal concentration of fishy impact on forage, removal of top predators, introduction of non-native species, energy redirection, energy removal, and species, functional, and genetic diversity.	Because of the potential increase in harvests that would be permitted under this alternative, it was found to have adverse impacts of unknown significance for several criteria. These included spatial and termporal concentration, removal ot top predators, introduction of non-native species, energy removal, species diversity, functional diversity and genetic diversity.	Alternative 2 was found to have impacts generally similar to those under the status quo baseline. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	Alternative 3 was found to have impacts generally similar to those under the status quo baseline. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	Alternative 4 was found to have impacts generally similar to those under the status quo baseline. Direct, indirect, and cumulative effects analyses identified adverse, but not significant, impacts.	There would be no harvest under this alternative, and no adverse impacts.

6.0 Initial Regulatory Flexibility Analysis

What's in this chapter:

What does the law require in an IRFA?	Sections 6.1, 6.2 and 6.3
What is a small entity?	Section 6.4
How many small entities may be directly regulated by this action?	Section 6.7
How will small entities by impacted by this action?	Section 6.8
Does this action impose any new recordkeeping or reporting requirements?	Section 6.9
Does this action duplicate, overlap or conflict with other Federal rules?	Section 6.10
How do the small entity impacts of this action compare to those of alternative approaches?	Section 6.11

6.1 Introduction

This Initial Regulatory Flexibility Analysis (IRFA) evaluates the adverse impacts on small entities of the proposed harvest level specifications for the groundfish fisheries in the Bering Sea and Aleutian Islands and the Gulf of Alaska in 2006 and 2007. This IRFA meets the statutory requirements of the Regulatory Flexibility Act (RFA) of 1980, as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996 (5 U.S.C. 601-612).

6.2 The purpose of an IRFA

The Regulatory Flexibility Act (RFA), first enacted in 1980, was designed to place the burden on the government to review all regulations to ensure that, while accomplishing their intended purposes, they do not unduly inhibit the ability of small entities to compete. The RFA recognizes that the size of a business, unit of government, or nonprofit organization frequently has a bearing on its ability to comply with a Federal regulation. Major goals of the RFA are: (1) to increase agency awareness and understanding of the impact of their regulations on small business, (2) to require that agencies communicate and explain their findings to the public, and (3) to encourage agencies to use flexibility and to provide regulatory relief to small entities. The RFA emphasizes predicting impacts on small entities as a group distinct from other entities and on the consideration of alternatives that may minimize the impacts while still achieving the stated objective of the action.

On March 29, 1996, President Clinton signed the Small Business Regulatory Enforcement Fairness Act. Among other things, the new law amended the RFA to allow judicial review of an agency's compliance with the RFA. The 1996 amendments also updated the requirements for a final regulatory flexibility analysis, including a description of the steps an agency must take to minimize the significant economic impact on small entities. Finally, the 1996 amendments expanded the authority of the Chief Counsel for Advocacy of the Small Business Administration (SBA) to file *amicus* briefs in court proceedings involving an agency's violation of the RFA.

In determining the scope, or 'universe', of the entities to be considered in an IRFA, NMFS generally includes only those entities that can reasonably be expected to be directly regulated by the proposed action. If the effects of the rule fall primarily on a distinct segment, or portion thereof, of the industry (e.g., user group, gear type, geographic area), that segment would be considered the universe for the purpose of this analysis. NMFS interprets the intent of the RFA to address negative economic impacts, not beneficial impacts, and thus such a focus exists in analyses that are designed to address RFA compliance.

Data on cost structure, affiliation, and operational procedures and strategies in the fishing sectors subject to the proposed regulatory action are insufficient, at present, to permit preparation of a "factual basis" upon which to certify that the preferred alternative does not have the potential to result in "significant adverse impacts on a substantial number of small entities" (as those terms are defined under RFA). Because, based on all available information, it is not possible to 'certify' this outcome, should the proposed action be adopted, a formal IRFA has been prepared and is included in this package for Secretarial review.

6.3 What is required in an IRFA?

Under 5 U.S.C., Section 603(b) of the RFA, each IRFA is required to contain:

- A description of the reasons why action by the agency is being considered;
- A succinct statement of the objectives of, and the legal basis for, the proposed rule;
- A description of and, where feasible, an estimate of the number of small entities to which the proposed rule will apply (including a profile of the industry divided into industry segments, if appropriate);
- A description of the projected reporting, record keeping and other compliance requirements of the proposed rule, including an estimate of the classes of small entities that will be subject to the requirement and the type of professional skills necessary for preparation of the report or record;
- An identification, to the extent practicable, of all relevant Federal rules that may duplicate, overlap or conflict with the proposed rule;
- A description of any significant alternatives to the proposed rule that accomplish the stated objectives of the proposed action, consistent with applicable statutes, and that would minimize any significant economic impact of the proposed rule on small entities. Consistent with the stated objectives of applicable statutes, the analysis shall discuss significant alternatives, such as:

    1. The establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;

    2. The clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;

    3. The use of performance rather than design standards;

    4. An exemption from coverage of the rule, or any part thereof, for such small entities.

6.4 What is a small entity?

The RFA recognizes and defines three kinds of small entities: (1) small businesses, (2) small non-profit organizations, and (3) and small government jurisdictions.

Small businesses. Section 601(3) of the RFA defines a ‘small business’ as having the same meaning as ‘small business concern’, which is defined under Section 3 of the Small Business Act. ‘Small business’ or ‘small business concern’ includes any firm that is independently owned and operated and not dominant in its field of operation. The SBA has further defined a “small business concern” as one “organized for profit, with a place of business located in the United States, and which operates primarily within the United States or which makes a significant contribution to the U.S. economy through payment of taxes or use of American products, materials or labor...A small business concern may be in the legal form of an individual proprietorship, partnership, limited liability company, corporation, joint venture, association, trust or cooperative, except that where the firm is a joint venture there can be no more than 49 percent participation by foreign business entities in the joint venture.”

The SBA has established size criteria for all major industry sectors in the United States, including fish harvesting and fish processing businesses. A business involved in fish harvesting is a small business if it is independently owned and operated and not dominant in its field of operation (including its affiliates) and if it has combined annual receipts not in excess of $3.5 million for all its affiliated operations worldwide. A seafood processor is a small business if it is independently owned and operated, not dominant in its field of operation, and employs 500 or fewer persons on a full-time, part-time, temporary, or other basis, at all its affiliated operations worldwide. A business involved in both the harvesting and processing of seafood products is a small business if it meets the $3.5 million criterion for fish harvesting operations. Finally a wholesale business servicing the fishing industry is a small businesses if it employs 100 or fewer persons on a full-time, part-time, temporary, or other basis, at all its affiliated operations worldwide.

The SBA has established “principles of affiliation” to determine whether a business concern is “independently owned and operated.” In general, business concerns are affiliates of each other when one concern controls or has the power to control the other, or a third party controls or has the power to control both. The SBA considers factors such as ownership, management, previous relationships with or ties to another concern, and contractual relationships, in determining whether affiliation exists. Individuals or firms that have identical or substantially identical business or economic interests, such as family members, persons with common investments, or firms that are economically dependent through contractual or other relationships, are treated as one party with such interests aggregated when measuring the size of the concern in question. The SBA counts the receipts or employees of the concern whose size is at issue and those of all its domestic and foreign affiliates, regardless of whether the affiliates are organized for profit, in determining the concern’s size. However, business concerns owned and controlled by Indian Tribes, Alaska Regional or Village Corporations organized pursuant to the Alaska Native Claims Settlement Act (43 U.S.C. 1601), Native Hawaiian Organizations, or Community Development Corporations authorized by 42 U.S.C. 9805 are not considered affiliates of such entities, or with other concerns owned by these entities solely because of their common ownership.

Affiliation may be based on stock ownership when (1) A person is an affiliate of a concern if the person owns or controls, or has the power to control 50 percent or more of its voting stock, or a block of stock which affords control because it is large compared to other outstanding blocks of stock, or (2) If two or more persons each owns, controls or has the power to control less than 50 percent of the voting stock of a concern, with minority holdings that are equal or approximately equal in size, but the aggregate of these minority holdings is large as compared with any other stock holding, each such person is presumed to be an affiliate of the concern.

Affiliation may be based on common management or joint venture arrangements. Affiliation arises where one or more officers, directors or general partners controls the board of directors and/or the management of another concern. Parties to a joint venture also may be affiliates. A contractor and subcontractor are treated as joint venturers if the ostensible subcontractor will perform primary and vital requirements of a contract or if the prime contractor is unusually reliant upon the ostensible subcontractor. All requirements of the contract are considered in reviewing such relationship, including contract management, technical responsibilities, and the percentage of subcontracted work.

Small organizations The RFA defines "small organizations" as any not-for-profit enterprise that is independently owned and operated and is not dominant in its field.

Small governmental jurisdictions The RFA defines small governmental jurisdictions as governments of cities, counties, towns, townships, villages, school districts, or special districts with populations of less than 50,000.

6.5 Reason for considering the action

Detailed descriptions of each alternative analyzed in this EA/IRFA can be found in Section 2.0. The proposed action is adoption of TAC specifications, for 2005 and 2006, based on the ABCs recommended by the BSAI and GOA plan teams during their September 2004 meetings. The details of these specifications may be found in Tables 2.22-1, 2.23-1, 2.32-1, and 2.33-1 of this EA/IRFA

The reasons for the proposed action are discussed in detail in Sections 1.2 of this EA/IRFA.

TAC specifications define upper retained harvest limits, or fishery removals, for the subject fishing year. Catch specifications are made for each managed species or species group, and in some cases, by species and sub-area. Sub-allocations of TAC are made for biological and socio-economic reasons according to percentage formulas established through fishery management plan (FMP) amendments. For particular target fisheries, TAC specifications are further allocated within management areas (Eastern, Central, Western Aleutian Islands; Bering Sea; Western, Central, and Eastern Gulf of Alaska) among management programs (open access or community development quota program), processing components (inshore or offshore), specific gear types (trawl, non-trawl, hook-and-line, pot, jig), and seasons according to regulations § 679.20, § 679.23, and § 679.31. TAC can be sub-allocated to the various gear groups, management areas, and seasons according to pre-determined regulatory actions and for regulatory announcements by NMFS management authorities opening and closing the fisheries accordingly. The entire TAC amount is available to the domestic fishery. The gear authorized in the Federally managed groundfish fisheries off Alaska includes trawl, hook-and-line, longline pot, pot, and jig (50 CFR 679.2).

Fishing areas correspond to the defined regulatory areas within the fishery management units. The BSAI is divided into nineteen reporting areas, some of which are combined for TAC specifications purposes. The Aleutian Islands group comprises regulatory Areas 541, 542, and 543. When the Aleutian Islands are referred to individually, 541 represents the Eastern Aleutian Islands, 542 the Central Aleutian Islands, and 543 the Western Aleutian Islands. The GOA is divided into eight reporting areas. The Western Gulf is Area 610, the Central Gulf includes Areas 620 and 630, and the Eastern Gulf includes Areas 640 and 650. State waters in Prince William Sound is Area 649. State waters in southeast Alaska is Area 659. Management areas are shown in Figures 1.2-1 and 1.2-2 of this EA.

The fishing year coincides with the calendar year, January 1 to December 31 (§ 679.2 and 679.23). Depending on the target species' spatial allocation, additional specifications are made to particular seasons (defined portions of the year or combinations of defined portions of the year) within the fishing year. Any TACs not harvested during the year specified are not rolled over from that fishing year to the next. Fisheries are opened and closed by regulatory announcement. Closures are made when inseason information indicates the apportioned TAC or available prohibited species catch (PSC) limit has been or will soon be reached, or at the end of the specified season, if the particular TAC has not been taken.

TAC specifications for the federal groundfish fisheries are set annually. The process includes review by the North Pacific Fishery Management Council (Council), its Advisory Panel, and its Scientific and Statistical Committee of the SAFE reports (Appendices A, B, C, and D). Using the information from the SAFE Reports and the advice from Council committees, the Council makes both ABC and TAC recommendations toward the next year's TAC specifications. NMFS packages the recommendations into specification documents and forwards them to the Secretary of Commerce for approval.

6.6 Objectives of, and legal basis for, the proposed action

The objectives of the proposed action (publication of specifications) are to (1) allow commercial fishing for the groundfish stocks in the BSAI and GOA, (2) while protecting the long run health of the fish stocks and the social and ecological values that those fish stocks provide.

Under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) of 1996, the United States has exclusive fishery management authority over all living marine resources, except for marine mammals and birds, found within the exclusive economic zone (EEZ) between 3 and 200 nautical miles from the baseline used to measure the territorial sea. The management of these marine resources is vested in the Secretary of Commerce (Secretary) and in Regional Fishery Management Councils. In the Alaska region, the North Pacific Fishery Management Council (Council) has the responsibility to prepare fishery management plans (FMPs) for the marine resources it finds require conservation and management. The National Marine Fisheries Service (NMFS) is charged with carrying out the federal mandates of the Department of Commerce with regard to marine fish. The Alaska Regional Office of NMFS and Alaska Fisheries Science Center (AFSC), research, draft, and support the management actions recommended by the Council.

The Magnuson-Stevens Act requires that the FMPs must specify the optimum yield from each fishery to provide the greatest benefit to the Nation, and must state how much of that optimum yield may be harvested in U.S. waters. The FMPs must also specify the level of fishing that would constitute overfishing. Using the framework of the FMPs and current information about the marine ecosystem (stock status, natural mortality rates, and oceanographic conditions), the Council annually recommends to the Secretary total allowable catch (TAC) specifications and prohibited species catch (PSC) limits and/or fishery bycatch allowances based on biological and economic information provided by NMFS. The information includes determinations of acceptable biological catch (ABC) and overfishing level (OFL) amounts for each of the FMP established target species or species groups.

6.7 Number and description of small entities regulated by the proposed action

The entities directly regulated by this action are those entities that harvest groundfish in the EEZ of the BSAI and/or GOA. These entities include the groundfish catcher vessels and groundfish catcher/processor vessels active in these areas. It also includes organizations to which direct allocations of groundfish are made. In the BSAI, this includes the CDQ groups and the AFA fishing sectors (i.e., at-sea, inshore).

Table 6.7-1 shows the estimated numbers of small and large entities in the BSAI and GOA groundfish fisheries. The reasoning behind these estimates is summarized in the paragraphs, which follow the table.

Table 6.7-1 Estimated numbers of regulated entities in the BSAI and GOA groundfish fisheries

Fleet segment	Number small entities	Number large entities	Total number of entities
Catcher vessels	758	< 98	< 856
Catcher processors	24	< 60	< 84
Motherships	0	3	3
CDQ groups	6	0	6
Shoreside Processors	<= 65	> 8	73
Notes: Numbers of small CVs and CPs are calculated as described in the paragraphs below. The numbers of large CPs and CVs are estimates of vessel numbers and are upper bound estimates of entities. Actual numbers of large entities in these categories are considerably smaller, as many of these vessels are affiliated with AFA cooperatives and should not be independently counted as entities. Catcher vessel and catcher/processor estimates prepared from fishtickets, weekly processor reports, product price files, and intent-to-operate listing. The methodology used may overstates the numbers of small entities. Shoreside processors include all Alaska processors that reported processing of groundfish to NOAA Fisheries in 2002. The number of small processing entities cannot be determined at this time due to insufficient ownership and affiliation information. All CDQ groups are non-profits and are therefore treated as small.			

Fishing vessels, both catcher vessels and catcher/processors, are small if their annual total gross receipts, from all their economic activities combined, as well as those of any and all their affiliates anywhere in the world, (including fishing in Federally managed non-groundfish fisheries, and in Alaska managed fisheries), are less than $3.5 million in a year. An estimated 940 vessels fished for groundfish in the Federal waters off of Alaska in 2003. [39]

Small entities were identified as vessels that did not have AFA permits in 2003, and that grossed less than $3.5 million dollars in 2003. The same criterion was used for catcher-vessels and catcher processors. This criterion led to an estimate of 758 small catcher-vessels and 24 small catcher processors.

These estimates may actually be high because they do not take into account affiliations between entities, other than those associated with membership in an AFA cooperative. There is not a strict one-to-one correspondence between vessels and entities; many persons and firms are known to have ownership interests in more than one vessel, and many vessels with different ownership, are otherwise affiliated with each other. Moreover, these estimates only include fishery revenues earned from fishing activity in the Federal waters off of Alaska and from fishing within Alaskan waters. Because of data limitations, they do not include revenues from fishing activity off of the West Coast of the U.S., or revenues from other sources.

The 758 small catcher vessels had total gross revenues, from all Alaskan fishing sources, of $292 million dollars. Mean gross revenues were about $384,000, and median gross earnings were about $223,000. Groundfish revenues accounted for about 39% of total revenues for these operations. Halibut and crab were also important species, accounting for 35% and 20% of total gross revenues respectively. Salmon accounted for about 5% of gross revenues. Groundfish revenues were mainly from sablefish (60% of

[39] The description of the small vessels operating in the Federal fisheries of the EEZ off of Alaska is based on data supplied by the Alaska Fisheries Information Network in December 2004. AKFIN used somewhat different selection criteria than those used by the Alaska Fisheries Science Center to prepare its annual Economic SAFE document. AKFIN reports 940 small vessels off of Alaska in 2003, while the economic SAFE reports 1,037 vessels (Tables 26.1 and 26.2, pages 61-62)

groundfish revenues) and Pacific cod (30% of groundfish revenues). [Estimates derived from data supplied by the Alaska Fisheries Information Network (AKFIN)].[40]

The 24 small catcher-processors had total gross revenues, from all Alaskan region fishing sources, of $50 million. Mean gross revenues were about $2.1 million, and median gross earnings were about $2.4 million. Groundfish accounted for about 95% of total revenues for these operations. Halibut and crab accounted for 3.5% and 1.9% of total gross revenues respectively. Groundfish revenues for catcher-processors were overwhelmingly first wholesale revenues from Pacific cod (82% of groundfish revenues). Wholesale revenues from pollock accounted for 2.4% of groundfish revenues, sablefish accounted for 6.1%, and other groundfish species accounted for 6.1% (Estimates derived from data supplied by AKFIN).

The estimates of the number of shoreside processors, in Table 7.7-1, include all Alaska processors that reported processing groundfish to NOAA Fisheries in 2002. It is not possible, at this time, to determine how many of the 73 shoreside processors qualify as small entities, due to insufficient employment, ownership, and affiliation information. At least eight, i.e., those affiliated with AFA cooperatives, would be considered large, based on SBA criteria. (a list of the inshore processors affiliated with the AFA cooperatives may be found here: http://www.fakr.noaa.gov/ram/daily/afa_ip.htm accessed on November 9, 2004) However, while shoreside processors are potentially affected by this action, because the specifications will affect deliveries by catcher vessels, they are not directly regulated by it.

The three motherships are believed to be large entities, based upon SBA criteria.

Through the Community Development Quota (CDQ) program, the North Pacific Fishery Management Council and NMFS allocate a portion of the BSAI groundfish, prohibited species, halibut, and crab TAC limits to 65 eligible Western Alaska communities. These communities work through six non-profit CDQ Groups to use the proceeds from the CDQ allocations to start or support commercial fishing activities that

---

[40] The AKFIN data set is compiled from three data sources:

- NMFS Catch Accounting – Source for catcher/processor groundfish
- NMFS CDQ Catch Report – Additional source for catcher/processor groundfish
- Fish Ticket Data Compiled by the CFEC – Source for catcher/vessel groundfish and all entities non-groundfish data

Only retained groundfish data for catcher/processors were included from the NMFS sources by querying the primary reported and CDQ catch report tables. Vessels selected for the diversification include all catcher/processors reporting in the Catch Accounting data source. Wholesale revenues were determined by applying wholesale prices as received from NMFS. The CFEC source is filtered to include only commercial, retained harvest so that the following is reported or removed from the source:

- Commercial harvest, as determined by the CFEC, is included
- Non-retained catch such as discard-at-sea, landed/discarded, and deadloss was removed from report data
- Ancillary product was removed from report data
- By-catch harvest removed by including only the primary species grouping from each fish ticket fishery

Vessels selected for this diversification include all vessels reporting in the CFEC fish ticket data source harvesting commercial groundfish in Federal waters. Ex-vessel revenues, determined by the CFEC gross earnings values, were used for all species except halibut; halibut was priced at $2.165 per round pound.

will result in ongoing, regionally based, commercial fishery or related businesses. Because they are non-profit entities, the CDQ groups are considered small, for RFA purposes.

The CDQ program began in 1992, with the allocation of 7.5 percent of the BSAI pollock TAC. The fixed gear halibut and sablefish CDQ allocations began in 1995, as part of the halibut and sablefish Individual Fishing Quota Program. In 1998, allocations of 7.5 percent of the remaining groundfish TACs, 7.5 percent of the prohibited species catch limits, and 7.5 percent of the crab guideline harvest levels were added to the CDQ program. At this time, the CDQ share of the pollock TAC was increased to 10 percent. The CDQ groups may, and do, both lease their quota to third parties, on a royalty-basis, or fish the quota directly, themselves.

In 2003, the CDQ groups are reported to have had gross revenues of about $89 million. Almost half of these came from pollock royalties ($43 million). Total royalty payments were $52 million. (Alaska Department of Community and Economic Development web site, http://www.commerce.state.ak.us/bsc/CDQ/cdqstats.htm accessed 1-3-04).

6.8 Impacts on regulated small entities

The impacts of the preferred alternatives on first wholesale revenues in the BSAI and the GOA are summarized in Table 6-8-1. More details on the gross revenues estimation methodology may be found at the start of Section 4.10 of the EA, and in Appendix F to this document. First wholesale gross revenues are used as an index of the potential adverse burden of the alternatives on directly regulated small entities.

Table 6.8-1 Model Projections of Revenue by Alternative and Region: 2006 and 2007 (millions of dollars)

	BSAI		BSAI CDQ		GOA	
Alternative	2006	2007	2006	2007	2006	2007
Alt 1	$1,353	$1,070	$131	$97	$296	$257
Alt 2 (proposed)	$1,149	$1,085	$115	$98	$242	$220
Alt 3	$735	$716	$71	$66	$154	$150
Alt 4	$930	$861	$94	$82	$191	$183
Alt 5	$0	$0	$0	$0	$0	$0

Model estimated BSAI non-CDQ first wholesale gross revenues were $1,156 million in 2005. The BSAI gross revenues decline from that level in 2006 and 2007 under the preferred alternative. However, revenues are higher under the preferred alternative than under Alternatives 3, 4 or 5. Revenues are only higher under Alternative 1 in 2006 (they are lower in 2007). However, TAC levels under Alternative 1 exceed the statutory 2 million mt optimum yield in the BSAI, and therefore this alternative is not legally available.

Model estimated BSAI CDQ gross revenues were $115 million in 2005. Under the preferred alternative, Alternative 2, these revenues remain at that level in 2006, and then decline in 2007. Revenues, however, are smaller under Alternatives 3, 4, and 5. They are larger under Alternative 1, but as noted earlier, Alternative 1 is not legally available.

Model estimated GOA revenues were $226 million in 2005. Under the preferred alternative, Alternative 2, these revenues rise from that level in 2006, and then decline somewhat in 2007. Revenues, however, are smaller under Alternatives 3, 4, and 5. They are larger under Alternative 1. Alternative 1 is not precluded by statutory limits in the GOA. Fishing rates are often set lower under Alternative 2 than under Alternative 1 to take account of biological concerns that may be unique to each species. Thus, Alternative 2 is a more biologically prudent approach than Alternative 1.

6.9 Recordkeeping and reporting requirements

The IRFA should include "a description of the projected reporting, record keeping and other compliance requirements of the proposed rule, including an estimate of the classes of small entities that will be subject to the requirement and the type of professional skills necessary for preparation of the report or record..."

This regulation does not impose new recordkeeping or reporting requirements on the regulated small entities.

6.10 Federal rules that may duplicate, overlap, or conflict with proposed action

An IRFA should include "An identification, to the extent practicable, of all relevant Federal rules that may duplicate, overlap or conflict with the proposed rule..."

This analysis did not reveal any Federal rules that duplicate, overlap or conflict with the proposed action.

6.11 Description of significant alternatives

An IRFA should include "A description of any significant alternatives to the proposed rule that accomplish the stated objectives of the proposed action, consistent with applicable statutes, and that would minimize any significant economic impact of the proposed rule on small entities."

There are no significant alternatives to the proposed rule that accomplish the stated objectives, are consistent with applicable statutes, and that would minimize the economic impact of the proposed rule on small entities. Alternative 1 of the action alternatives provides high revenues, however, it is precluded by optimum yield restrictions in the BSAI. Alternatives 3, 4, and 5 are associated with lower gross revenues and a greater impact on small entities.

7.0 List of Preparers

Contributors

Brown, Melanie. Regulatory Specialist, Sustainable Fisheries Division, NMFS Alaska Region, P.O. Box 21668, Juneau, Alaska 99802. 907-586-7006. Melanie.Brown@noaa.gov (project coordination team, marine mammal analysis, habitat analysis, Chapter 5)

Campbell, Rebecca. Sustainable Fisheries Division. NMFS Alaska Region, P.O. Box 21668, Juneau, Alaska 99802. 907-586-7228 Rebecca.Campbell@noaa.gov (supervision of physical document production).

Davis, Obren. Sustainable Fisheries Division. NMFS Alaska Region, P.O. Box 21668, Juneau, Alaska 99802. 907-586-7228 Obren.Davis@noaa.gov (CDQ program review text in Section 4.10)

Furuness, Mary. Sustainable Fisheries Division, NMFS Alaska Region, P.O. Box 21668, Juneau, Alaska 99802. 907-586-7447 Mary.Furuness@noaa.gov (BSAI 2005 projections, Preparation of GOA 2006 and 2007 OFL, ABC, and TAC estimates, in-season management text)

Hale, Jim. Analytical Team, NMFS Alaska Region, P.O. Box 21668, Juneau, Alaska 99802 907-586-7491 Jim.Hale @noaa.gov (Chapter 3)

Harrington, Gretchen. Regulatory Specialist. NMFS Alaska Region, P.O. Box 21668, Juneau, Alaska 99802. 907-586-77445. Gretchen.Harrington @noaa.gov (Project coordination team, significance criteria, marine mammals analysis, habitat analysis)

Ianelli, Jim, Ph.D.. Alaska Fisheries Science Center. National Marine Fisheries Service, 7600 Sand Point Way N.E., Building 4, Seattle, Washington 98115, 206-526-6510. Jim.Ianelli@noaa.gov (OFL and ABC projections for selected species for 2005 and 2006)

Messing, Kiera. Student Intern. Sustainable Fisheries Division, , NMFS Alaska Region, P.O. Box 21668, Juneau, Alaska 99802. 907-586-7228. Kiera.Messing@noaa.gov (Preparation of reference list)

Miller, Scott. Analytical Team, NMFS Alaska Region, P.O. Box 21668, Juneau, Alaska 99802 907-586-7416 Scott.Miller@noaa.gov (Gross revenues analysis in Section 4.10, IRFA, Appendices F and G)

Muse, Ben, Ph.D. Economist, Sustainable Fisheries Division, NMFS Alaska Region, P.O. Box 21668, Juneau, Alaska 99802. 907-586-7234. Ben.Muse@noaa.gov (Project coordination team, seabirds, ecosystem, economics analyses)

Pearson, Tom. Sustainable Fisheries Division, NMFS Alaska Region, P.O. Box 21668, Juneau, Alaska 99802. 907-586-7447 Tom.Pearson @noaa.gov (GOA 2005projections, Preparation of GOA 2006 and 2007 OFL, ABC, and TAC estimates, Target fisheries, non-specified fisheries, forage fisheries, and PSC analysis, review of target species, other and non-specified species, and forage species sections)

Persons consulted

Ackley, David. Supervisory Fisheries Management Specialist, Sustainable Fisheries Division. Alaska Region. National Marine Fisheries Service.

Anderson, Jason. Observer Program Coordinator. Sustainable Fisheries Division. Alaska Region. National Marine Fisheries Service.

Bibb, Sarah. Community Development Program Manager, Sustainable Fisheries Division. Alaska Region. National Marine Fisheries Service.

Boldt, Jennifer. Alaska Fisheries Science Center. National Marine Fisheries Service. 7600 Sand Point Way, N.E., Building 4. Seattle, Washington 98115. 206-526-4553. Jennifer.Boldt @noaa.gov (review of ecosystem)

Brix, Kaja. Protected Resources Division. Alaska Region. National Marine Fisheries Service.

Capron, Shane. Protected Resources Division, Alaska Region. National Marine Fisheries Service.

Fitzgerald, Shannon. Alaska Fisheries Science Center. National Marine Fisheries Service. 7600 Sand Point Way, N.E., Building 4. Seattle, Washington 98115. 206-526-4553. Shannon.Fitzgerald@noaa.gov (review of seabirds analysis)

Gaichas, Sarah, Alaska Fisheries Science Center National Marine Fisheries Service. 7600 Sand Point Way, N.E., Building 4. Seattle, Washington 98115. (non target species)

Kinsolving, Alan. Sustainable Fisheries Division. Alaska Region. National Marine Fisheries Service. (video monitoring)

Kurland, Jon. ARA for Habitat. Alaska Region, National Marine Fisheries Service. P.O. Box 21668, Juneau, Alaska 99802. 907-586-7638. Jon.Kurland @noaa.gov (Review of habitat text)

Livingston, Pat, Ph.D. Alaska Fisheries Science Center. National Marine Fisheries Service. 7600 Sand Point Way, N.E., Building 4. Seattle, Washington 98115. 206-526-4242. Pat.Livingston @noaa.gov (review of ecosystems discussion in Section 3.2)

Merrill, Glenn. Sustainable Fisheries Division. Alaska Region. National Marine Fisheries Service.

Passer, Jeff. Special Agent In Charge. Office of Law Enforcement. Alaska Region. National Marine Fisheries Service

Rivera, Kim. Protected Resources Division, NMFS Alaska Region. P.O. Box 21668, Juneau, Alaska 99802 907-586-7424 Kim.Rivera @noaa.gov (review of seabirds analysis)

Sagalkin, Nick. Area Manager for Shellfish and Groundfish. Kodiak Office, Alaska Department of Fish and Game. (Scallop fishery)

Walker, Sue. Habitat Division, NMFS Alaska Region. P.O. Box 21668, Juneau, Alaska 99802 907-586-7646 Sue.Walker @noaa.gov (reasonably foreseeable habitat impacts)

(This page is blank)

8.0 References

Alaska Department of Fish and Game. 2005. SB 113 "An Act relating to entry into and management of Gulf of Alaska groundfish fisheries." Discussion Points. March 2005. ADG&G, P. O. Box 25526 Juneau, AK 99802.

Ames, R. T., G. H. Williams, and S.M. Fitzgerald. Using Video Monitoring Systems in Fisheries: application for Monitoring Compliance of Seabird Avoidance Devices and seabird Mortality in Pacific Halibut Longline Fisheries. U.S. Dep. Comer., NOAA Tech. Memo. NMFS-AFSC-152

Angliss, R.P. and K.L. Lodge. 2004. Alaska Marine Mammal Assessments, 2003. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-144. 230 p.

Aydin, K. and J. Jurado-Molina. 2005 Multispecies Modeling and Multispecies and Ecosystem Modeling. Resource Ecology and Fisheries Management Division AFSC Quarterly Report January-February-March, 2005. pages 22-23.

Boldt, J., ed. 2005. Fisheries and the Environment: Ecosystem Indicators for the North Pacific and Their Implications for Stock Assessments. May 2005. DOC, NOAA, NMFS. Available from http://www.afsc.noaa.gov/Publications/ProcRpt/PR%202005-04.pdf. Page iii.

Boyd, James W., and H. Spencer Banzhaf. 2005. Ecosystem Services and Government Accountability: The Need for a New Way of Judging Nature's Value. *Resources*. Summer 2005. pages 16-19.

Carson, Richard T., Robert C. Mitchell, Michael Hanemann, Raymond J. Kopp, Stanley Presser, and Paul A. Ruud. 2003. Contingent Valuation and Lost Passive Use: Damages from the Exxon Valdez Oil Spill. Environmental and Resource Economics. 25: 257-286.

Clark, W. and Hare, S. 1998. Accounting for Bycatch in Management of the Pacific halibut Fishery. North American Journal of Fisheries Management 18:809-821.

Conners, M.E. and E. Logerwell. 2005. Fishery Interaction Team (FIT) Presentations to the North Pacific Fishery Management Council (NPFMC). June 2005.

Council, 2005. Essential Fish Habitat. North Pacific Fishery Management Council News and Notes. Volume 1-05. Anchorage, February 2005.

Council, 2005. Ecosystem Committee Minutes. June 2, 2005

Council on Environmental Quality (CEQ), Executive Office of the President. 1999. Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act. July, 1999

Criddle, Keith and Mark Herrmann. 2004. An Economic Analysis of the Pacific Halibut Commercial Fishery. Final report prepared for the Alaska Sea Grant Program on a project funded by NOAA under grant no. NA 16RG2321 project no. RR/32-02.

Dragoo, D. E., G. V. Byrd, and D. B Irons. 2003 Breeding status, population trends and diets of seabirds in Alaska, 2001. U. S. Fish and Wildlife Service Report AMNWR 03/05.

Evans, Diana, and Bill Wilson. 2005. Role of the North Pacific Fishery Management Council in the development of an Ecosystem Approach to Management for the Alaska large marine ecosystems. North Pacific Fishery Management Council. Anchorage, AK.

Felthoven, Ronald G. and Catherine J. Morrison Paul. 2004. Multi-output, Nonfrontier Primal Measures of Capacity and Capacity Utilization. *Amer.J.Agr. Econ.* 86(3): 619-633.

Furness, Robert W. 1999. Will Reduced Discarding help or harm Seabird Populations. In *Ecosystem Approaches for Fisheries Management. Proceedings of the Symposium on Ecosystem Considerations in Fisheries Management, September 30-October 3, Anchorage, Alaska*. University of Alaska Sea Grant College Program. AK-SG-99-01. Fairbanks, Alaska.738 pages.

Heifetz, Jonathan, Robert P. Stone, Patrick W. Malecha, Dean L. Courtney, Jeffrey T. Fujioka, and Phillip W. Rigby. Research at the Auke Bay Laboratory On Benthic Habitat. AFSC Quarterly Report. July-August-September, 2003. pages 1-10.

Herrmann, Mark, Keith R. Criddle, Erika M. Feller, and Joshua A. Greenberg. 1996. Estimated Economic Impacts of Potential Policy Changes Affecting the Total Allowable Catch for Walleye Pollock. *North American Journal of Fisheries Management*. 16:770-782.

Hiatt, T., R. Felthoven, C. Seung, J. Terry. 2004. Stock Assessment And Fishery Evaluation Report For The Groundfish Fisheries Of The Gulf Of Alaska And Bering Sea/Aleutian Island Area: Economic Status Of The Groundfish Fisheries Off Alaska, 2003. November 19, 2004. 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

Huppert, D.D., and Best, B. 2004. Final Report: Study of Supply Effects on Sablefish Market Price. University of Washington: School of Marine Affairs and Department of Economics, Seattle Washington.

Kuletz, Kathy. 2004. Kittlitz's Murrelet – a Glacier Bird in Retreat. Notes accessed at http://alaska.fws.gov/media/murrelet/overview.pdf on August 16, 2005

Law, Richard and Kevin Stokes. 2004. Evolutionary Impacts of Fishing on Target Populations. In *Marine Conservation Biology* edited by Elliott A. Norse and Larry B. Crowder. Island Press. Pages 232-246.

Lowry, L.F. 1982. Documentation and assessment of marine mammal-fishery interactions in the Bering Sea. Trans. 47th North American Wildlife and Natural Resource Conference, Portland, Oregon, pp 300-311.

Lowry, L.F., Frost, K.J., Calkins, D.G., Swartzman, G.L., and Hills, S. (1982) "Feeding habits, food requirements, and status of Bering Sea marine mammals." Document Nos. 19 and 19A, North Pacific Fishery Management Council, 605 W. 4th Avenue, Suite 306, Anchorage, Alaska 99501-2252. p.574.

McCarthy, Brian. n.d. Basic Species Diversity Concepts. PowerPoint slides prepared for a course on plant ecology at Ohio University. Accessed at http://www.plantbio.ohiou.edu/epb/instruct/commecology/ on August 18, 2005.

McElderry, H., J. Schrader, D. McCullough, J. Illingworth, S. Fitzgerald, and S. Davis. 2004. Electronic monitoring of seabird interations with trawl third-wire cables on trawl vessels – a pilot study. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-147, 39 p.

Melvin, Edward F., Kimberly S. Dietrich, and Tim Thomas. 2004. Pilot Tests of Techniques to Mitigate Seabird Interations with Catcher Processor Vessels in the Bering Sea Pollock Trawl Fishery: Final Report. Washington Sea Grant Program. University of Washington. Seattle. November 19, 2004.

Minerals Management Service. 2003. Cook Inlet Planning Area Oil and Gas Lease Sales 191 and 199 Environmental Impact Statement (Final), November 2003.

National Marine Fisheries Service (NMFS), Protected Resources Division, Pacific Northwest Region. 1999. "Endangered Species Act – Reinitiated Section 7 Consultation. BIOLOGICAL OPINION. Take of Listed Salmon in the Groundfish Fisheries Conducted under the Bering Sea and Aleutian Islands and Gulf of Alaska Fishery Management Plans."

NMFS. 2000. Section 7 consultation of the authorization of the Bering Sea and Aleutian Islands groundfish fishery under the BSAI FMP and the authorization of the Gulf of Alaska groundfish fishery under the GOA FMP. Office of Protected Resources, NMFS. November 30, 2000. p. 352.

NMFS. 2001a. Steller Sea Lion Protection Measures Final Supplemental Environmental Impact Statement. Implemented under the Fishery Management Plans for the Groundfish of the GOA and the Groundfish of the BSAI. 2001. NMFS, Alaska Region P.O. Box 21668, Juneau, AK 99801. November 2001. Accessed at http://www.fakr.noaa.gov/sustainablefisheries/seis/sslpm/default.htm on August 15, 2005.

NMFS. 2001b. Environmental Assessment for the Total Allowable Catch Specifications for the Year 2002 Alaska Groundfish Fisheries. NMFS, P.O. Box 21668, Juneau, AK 99801. 72pp.

NMFS. 2002. Final Environmental Impact Statement for American Fisheries Act Amendments 61/61/13/8. NMFS P.O. Box 21668, Juneau, AK 99801. February 2002. Accessed at http://www.fakr.noaa.gov/sustainablefisheries/afa/final_eis/executivesummary.pdf on August 15, 2005.

NMFS. 2003. Environmental Assessment for the Total Allowable Catch Specifications for the Year 2003 Alaska Groundfish Fisheries. NMFS, P.O. Box 21668, Juneau, AK 99801. 95 pp., Appendices A-D.

NMFS. 2004a. Final Environmental Impact Statement for Bering Sea and Aleutian Islands Crab Fisheries. DOC, NOAA, National Marine Fisheries Service, AK Region, P.O. Box 21668, Juneau AK 99802-1668, August 2004.

NMFS. 2004b. Programmatic Supplemental Environmental Impact Statement for the Alaska Groundfish Fisheries Implemented Under the Authority of the Fishery Management Plans for the Groundfish Fishery of the Gulf of Alaska and the Groundfish of the Bering Sea and Aleutian Islands Area. June 2004. DOC, NOAA, NMFS P.O. Box 21668, Juneau, AK 99802. Accessed at http://www.fakr.noaa.gov/sustainablefisheries/seis/intro.htm on September 14, 2005.

NMFS. 2004c. Draft Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis for Amendments 48/48 for the Process by Which Annual Harvest Specifications Are Established for Alaska Groundfish Fisheries. June 2004. Accessed at http://www.fakr.noaa.gov/npfmc/analyses/4848_604.pdf.

NMFS. 2005a. Environmental Assessment/Initial Regulatory Flexibility Analysis for Harvest Specifications for the years 2005-2006 Alaska Groundfish Fisheries Implemented Under the Authority of the BSAI and GOA Groundfish Fishery Management Plans. Juneau: September 2004. Accessed at http://www.fakr.noaa.gov/npfmc/analyses/4848_604.pdf on August 15, 2005.

NMFS. 2005b. Environmental Assessment/Final Regulatory Flexibility Analysis for the Harvest Specifications for the Years 2005-2006 Alaska Groundfish Fisheries Implemented Under the Authority of the BSAI and GOA Groundfish Fishery Management Plans. NMFS P.O. Box 21668, Juneau, AK 99801. February 2005.

NMFS. 2005c. Environmental Impact Statement for Essential Fish Habitat Identification and Conservation in Alaska. DOC, NOAA, NMFS P.O. Box 21668, Juneau, AK 99802. April 2005. Accessed at http://www.fakr.noaa.gov/habitat/seis/efhpeis.htm

NMFS. 2005d. Final Environmental Impact Statement for Setting the Annual Subsistence Harvest of Northern Fur Seals on the Pribilof Islands. DOC, NOAA, NMFS P.O. Box 21668, Juneau, AK 99802. May 2005.

NMFS. 2005e. Ecosystems Considerations for 2006. AFSC. September, 2005. 281 pgs

NMFS. 2005f. New Priorities for the 21st Century. National Marine Fisheries Service Strategic Plan, Updated for FY 2005-FY 2010. DOC, NOAA, National Marine Fisheries Service, Silver Spring, MD.

NMFS. 2005g. Summary of Seabird Bycatch in Alaskan Groundfish Fisheries, 1993-2003. Updated 8 March 2005. 12 pages. Accessed at http://www.fakr.noaa.gov/protectedresources/seabirds/93_03bycatchest.pdf, on July 20 2005.

North Pacific Fishery Management Council (NPFMC). 2003a. Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Gulf of Alaska. November 2003. NPFMC 605 West 4th Ave., Suite 306 Anchorage, AK 99501. Accessed at http://www.afsc.noaa.gov/refm/stocks/assessments.htm on September 27, 2005.

NPFMC. 2004a. Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Bering Sea/Aleutian Islands Regions. November 2004. NPFMC 605 West 4th Ave., Suite 306 Anchorage, AK 99501. Accessed at http://www.afsc.noaa.gov/refm/stocks/assessments.htm on September 14, 2005.

NPFMC. 2004b. Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Gulf of Alaska. November 2004. NPFMC 605 West 4th Ave., Suite 306 Anchorage, AK 99501. Accessed at http://www.afsc.noaa.gov/refm/stocks/assessments.htm on September 14, 2005.

NPFMC. 2005a. Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area. Anchorage: January, 2005. Accessed at http://www.fakr.noaa.gov/npfmc/fmp/bsai/BSAI.pdf on August 15, 2005.

NPFMC. 2005b. Fishery Management Plan for Groundfish of the Gulf of Alaska. Anchorage: January, 2005. Accessed at http://fakr.noaa.gov/npfmc/fmp/goa/GOA.pdf on August 15, 2005.

NPFMC. 2005c. Environmental Assessment / Regulatory Impact Review /Initial Regulatory Flexibility Analysis for Allocation of Non-Pollock Groundfish and Development of a Cooperative Program for the Non-AFA Trawl Catcher Processor Sector Proposed Amendment 80 to the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area. September 16, 2005. North Pacific Fishery Management Council 605 W. 4th Avenue, suite 306 Anchorage, AK 99501.

NPFMC. 2005d. Staff Discussion Paper for BSAI Amendment 85, Bering Sea Aleutian Island Pacific Cod Allocation. October 2005. Available from http://www.fakr.noaa.gov/npfmc/default.htm

NPFMC. 2005e. Environmental Assessment / Regulatory Impact Review /Initial Regulatory Flexibility Analysis For Modifying Existing Chinook And Chum Salmon Savings Areas Proposed Amendment 84 To The Fishery Management Plan For Groundfish Of The Bering Sea And Aleutian Islands Management Area. August 31, 2005. North Pacific Fishery Management Council 605 W. 4th Avenue, suite 306 Anchorage, AK 99501.

Northern Economics Inc, 2002. An Assessment of the Socioeconomic Impacts of the Western Alaska Community Development Quota Program. Alaska Department of Community and Economic Development, Division of Community and Business Development. Juneau, Alaska. Pew Oceans Commission. 2003. America's Living Oceans. Charting a Course for Sea Change. May 2003.

Nuka Research & Planning Group, LLC. and Cape International, Inc. 2005. Vessel Traffic in the Aleutians Subarea. Report to Alaska Department of Environmental Conservation. Seldovia, Alaska. 51 pgs.

Pew Oceans Commission 2003. America's Living Oceans, Charting a Course for Sea Change. Report to the Nation. Recommendations for a New Ocean Policy. May 2003. available at http://www.pewtrusts.org/ideas/ideas_item.cfm?content_item_id=1635&content_type_id=8&issue_name=Protecting%20ocean%20life&issue=16&page=8&name=Grantee%20Reports. Page x.

PICES 2005. Report on the Study Group on Fisheries and Ecosystem Responses to Recent Regime Shifts. PICES Scientific Report No. 28, 2005. Accessed at http://www.pices.int on August 25, 2005.

Plotnick, M and D. M. Eggers, eds. 2004. Run Forecasts and Harvest Projections for 2004Alaska Salmon Fisheries and Review of the 2003 Season. Regional Information Report No. 5J04-01. January 2004. Alaska Department of Fish and Game, P. O. Box 25526, Juneau, AK 99802.

.

Robertson, Tim. 2005. Nuka Research. Personal communication. August 1, 2005.

Rohlf, D. J. (1989). "The Endangered Species Act, A Guide to its Protections and Implementation.", Stanford Environmental Law Society, Stanford Law School, Stanford, CA 94305. p. 207.

Rose, Craig. "Conservation Engineering." AFSC Quarterly Report. January-February-March, 2005. page 22.

Seung, Chang K. and Edward C. Waters. 2005. A Review of Regional Economic Models for Alaska Fisheries. AFSC Processed Report 2005-01. Alaska Fisheries Science Center. Seattle, WA. 119 pages.

Sumalia, U.R., Volpe, J.P., and Liu, Y. 2005. Ecological and Economic Impact Assessment of Sablefish Aquaculture in British Columbia. Fisheries Center Research Report 13(3): 1-33. University of British Columbia, Vancouver, B.C.

U.S. Coast Guard, 2005. Selendang Ayu grounding Unified Command press release (April 23, 2005), 17th Coast Guard District Office, Juneau Alaska.

U.S. Commission on Ocean Policy. 2004. An Ocean Blueprint for the 21st Century.

United States Department of Agriculture(USDA). 2005. China's Agricultural Imports Boomed During 2003-04. Electronic Outlook Report from the Economic Research Service. WRS-05-04. May 2005. Accessed at http://www.ers.usda.gov on September 15, 2005.

USFWS (2003a). "Programmatic Biological Opinion on the effects of the Fishery Management Plans (FMPs) for the Gulf of Alaska (GOA) and Bering Sea/Aleutian Islands (BSAI) groundfish fisheries on the endangered short-tailed albatross (Phoebastria albatrus) and threatened Steller's eider (Polysticta stelleri)". Anchorage Fish and Wildlife Field Office. Available from NOAA Fisheries website: http://www.fakr.noaa.gov/protectedresources/seabirds.html.

USFWS. (2003b). "Biological Opinion on the Effects of the Total Allowable Catch (TAC)-Setting Process for the Gulf of Alaska (GOA) and Bering Sea/Aleutian Islands (BSAI) Groundfish Fisheries to the Endangered Short-tailed Albatross (Phoebastria albatrus) and Threatened Steller's Eider (Polysticta stelleri)". Anchorage Fish and Wildlife Field Office. Available from NOAA Fisheries website: http://www.fakr.noaa.gov/protectedresources/seabirds.html

Walters, Carl J. and Steven J.D. Martell. 2004. *Fisheries Ecology and Management*. Princeton University Press.

Washington Sea Grant. 2004. Report on the third wire trawl research.

Williams, Gregory. 2005. Population Projections. Projections for Alaska population, 2005-2029. Alaska Economic Trends. 25(2):4-16. February 2005.

Witherell, David and Clarence Pautzke. 1997. A Brief History of Bycatch Management Measures for Eastern Bering Sea Groundfish Fisheries. *Marine Fisheries Rev*. 59(4): 15-22.

Zweig, David and Bi Jianhai. 2005. China's Global Hunt for Energy. *Foreign Affairs*. September/October 2005.

(This page is blank)

Appendix A: BSAI Stock Assessment and Fishery Evaluation (SAFE) Reports

This document is included by reference. The 2004 versions for each species or species group may be found here: http://www.afsc.noaa.gov/refm/stocks/assessments.htm

Appendix B: GOA Stock Assessment and Fishery Evaluation (SAFE) Reports

This document is included by reference. The 2004 versions for each species or species group may be found here: http://www.afsc.noaa.gov/refm/stocks/assessments.htm

Appendix C: Ecosystem Considerations

This document is included by reference. The 2004 version may be found here: : http://www.afsc.noaa.gov/refm/stocks/assessments.htm

Appendix D: Economic Status Report

This document is included by reference. The 2004 version may be found here: : http://www.afsc.noaa.gov/refm/stocks/assessments.htm

(This page is blank)

Appendix E: OFL, ABC, and TAC projection methodology

This analysis is a simple update of the methods used in each assessment chapter of the SAFE for EA specifications and MSST determinations. The age-structured projection model (requiring inputs on 2004 estimates of numbers at age, a time series of recruitment estimates (since 1978) and age-specific schedules of average weight, maturity, natural mortality, and selectivity) is used with the following modification: the catch for 2005 is based on the estimates (presented below) rather than expected based on harvest control rules as specified in the SAFE.

1 BSAI Projections

OFL, ABC and TAC projections for species with relatively good information[41]

The OFL, ABC, and TAC projections for Tier 1 to 3 species for 2006 and 2007 were made using species-specific Alaska Fisheries Science Center (AFSC) population models.[42] These models incorporate the best available scientific information on species age structure, reproduction rates, growth rates, and natural mortality rates. Given this information, and information on the size and age composition of the biomass at the start of the year, and on fishery induced mortality during the year, these models can be used to project the species biomass and age composition at the start of the next year.[43]

The following discussion explains how the AFSC population models were used to project OFLs, ABCs, and TACs for species in 2006 and 2007. These models are available for, and used to make projections for, the Tier 1 to 3 species about which biological information is best.[44] Alternative methods were used for species in Tiers 4 to 6, for which biological information is not as good. These methods are described later in this section.

Mortality estimates for the calendar year 2005 were prepared in April 2005. These estimates took account of the 2005 TACs, the harvest up to April 12, and average harvests from April 12 to the end of the year in previous years. The details of the procedures used to make these fishing mortality projections are described below.

The mortality estimates for 2005 were used in the population models to project the biomass and its age structure for the start of 2006. OFL and ABC projections are based on harvest rate schedules described in the overfishing criteria in the groundfish FMPs (Section 3.2.4 in each of

[41] These Tiers 1 to 3 species include Pollock, Pacific cod, sablefish, yellowfin sole, Greenland turbot, arrowtooth flounder, rock sole, flathead sole, Alaska plaice, Pacific Ocean perch, northern rockfish, and Atka mackerel.

[42] Overfishing criteria for species, summarized in species OFL and ABC estimates, vary depending on the amount of biological information available on that species. Species are assigned to one of six “Tiers,” depending on the amount of information available. Tier 1 status requires the most available information, Tier 6 status the least. Each Tier uses a different set of rules to determine OFL and ABC. NPFMC 2005a, Section 3.2.4.

[43] The AFSC uses single species stock models to make these projections. These models do not fully account for ecological interactions among different target species. AFSC is actively working to develop multi-species models that take account of ecological interactions among species.

[44] These are almost all “Tier 3” species.

the FMPs). Once biomass for 2006 is known, the OFLs and ABCs that would produce those rates in 2006 can be calculated.

The TACs and fishing rates for Alternatives 1, 3, 4, and 5 are tightly constrained by the alternatives. Once the biomass is known, and the ABC calculations are available, it is possible to prepare 2006 TAC estimates for Alternatives 1 (maxF_{ABC}) and 3 (1/2 maxF_{ABC}). The target fishing rate for Alternative 4 is the most recent five year average F rate. The TAC for this alternative is the harvest that would generate that rate, given the 2006 biomass. The TAC for Alternative 5 is set to zero.

Alternative 2 is the Council's preferred alternative. In December 2004 the Council recommended TAC levels for 2006 as well as for 2005. These recommendations were adopted into specifications by the Secretary of Commerce (70 *FR* 8958, 70 *FR* 8679). The TACs for Alternative 2 were those recommended by the Council for 2006.

The fishing mortality for 2006 is assumed to equal the 2006 TACs as calculated above for each alternative. These mortality estimates can be used to prepare biomass estimates for 2007, and once the 2007 biomass is known, the overfishing criteria from the FMPs, and target fishing mortality rates from the alternatives, can be used to calculate the OFLs, ABCs, and TACs for these alternatives. For Alternatives 1, 3, 4, and 5, these are calculated in the same way as the 2006 OFLs, ABCs, and TACs.

The 2007 TACs for Alternative 2 were estimated by drawing on past Council practice, and were influenced by a decrease in the 2007 Eastern Bering Sea (EBS) pollock ABC. In order to keep the sum of the BSAI TACs equal to the two million mt optimum yield (OY), it was necessary to offset the decrease in Pollock ABC (and TAC) with an increase in the TACs for other species. The ABCs for both 2006 and 2007 may be found in Table 2.4-1, in the last section of this chapter.

The ABC for EBS pollock decreased by 398,500 mt from 2006 to 2007 (dropping from 1,617,000 mt in 2006 to 1,218,500 mt in 2007. The 2006 EBS pollock TAC is 1,487,756 mt which is almost 270,000 mt higher than the 2007 ABC. Since the EBS pollock ABC has decreased to such a degree in 2007, the 2007 TAC for EBS pollock is set equal to the 2007 ABC.

This decrease in the EBS pollock TAC allows for most of the remaining 2007 BSAI TACs to be set at their respective ABCs and the sum of the total TACs to remain under the OY of 2 million mt. Only three TACs were set lower than their ABCs. The Aleutian Islands pollock TAC was set at 19,000 mt because that is the maximum amount allowed by regulations at 50 CFR 679.20(a)(5)(iii)(B)(1). The Bogoslof pollock TAC was set at 10 mt because that area is closed to directed fishing for pollock. The Alaska plaice is set at 62,831 mt so the total BSAI TAC are under 2 million mt. This 2007 TAC for Alaska plaice is over 50,000 mt higher than in previous years.

OFLs, ABCs, and TACs for species about which less is known[45]

There are species about which too little is known to allow the use of projections based on the population models, as described above. These are the species falling into Tiers 4, 5 and 6. In these instances, the 2006 OFLs, ABCs, and TACs for Alternatives 1, 2, 3, and 5 were those

[45] These Tiers 4 to 6 species include the other flatfish complex, shortraker, rougheye, the other rockfish complex, squid, and the other species complex.

adopted by the Council for 2006 when it met in December 2004. The 2007 OFLs, ABCs, and TACs were set equal to these 2006 values.

2. GOA Projections

The procedures used to project 2006 and 2007 OFLs, ABCs and TACs were similar to those used for the BSAI. AFSC population models were used for stocks in Tiers 1 to 3; for other stocks, the 2006 OFLs, ABCs, and TACs adopted by the Council in December 2004 were rolled over.

OFL, ABC and TAC projections for species with relative good information[46]

Tier 1 through 3 modeling followed the BSAI process. Fishing mortalities for 2005 were projected in April 2005. These were used in the population models to prepare OFL and ABC estimates for 2006. For Alternatives 1, 3, 4, and 5, TACs were set equal to ABCs. Under Alternative 2, the TACs that the Council would be likely to set were approximated. The 2006 TACs were estimated for each species, by following the ABC-TAC patterns adopted by the Council in past years.[47] If the Council had set TAC equal to ABC, it was set equal to ABC here; if the Council had set TAC less than ABC by some average proportion in recent years, it was set lower by that proportion here. These TACs were used as 2006 mortality estimates, and the population models were rerun to project 2007 OFLs and ABCs. The 2007 TACs were then projected using the same rules as those used in 2006.[48]

For all species the apportionments of the GOA TAC to the different management areas in the GOA based on the most recent estimates of biomass distribution found in the November 2004 SAFE reports.

OFLs, ABCs, and TACs for species about which less is known[49]

For stocks in tiers 4 and below the TAC alternatives are unchanged for 2006 from those for 2006 found in the final EA for the 2005-06 specifications (NMFS 2005b).

---

[46] These Tiers 1 to 3 species included Pollock, Pacific cod, arrowtooth flounder, flathead sole, sablefish, Pacific Ocean perch, and northern rockfish.

[47] For Pollock, sablefish, Pacific Ocean perch, and northern rocksish, TACs were set equal to ABC. For Pacific cod, TAC was set equal to ABC, minus an allowance for a State of Alaska GHL, calculated as described in the next footnote. For arrowtooth and flathead sole I've changed the Alt 2 amounts to reflect that the Council usually sets TAC at levels well below the ABC in the GOA except that the Council usually sets the TACs for flathead sole in the WYK and SEO Districts at ABC levels.

[48] Note that the AFSC population model did not model the Pollock population in the Southeast Outside (SEO) district of the Eastern GOA. For the SEO district, the 2005 TAC was rolled over. For Pacific cod the council usually sets TAC at a level equal to ABC minus the State's GHLs. The State has raised the GHL in the Central GOA from 24.25% to 25% of the ABC for that area, and this change is reflected in Alt 2. Ii is assumed that the entire amounts of the GHLs plus the TACs will be harvested in 2006 except in the Eastern GOA. Note that, for modeling purposes, fishing mortality was assumed equal to the TAC plus the GHL.

[49] These Tiers 4 to 6 species include the deep water flatfish complex, rex sole, the shallow water flatfish complex, the other slope rockfish complex, shortraker, rougheye, the pelagic shelf rockfish complex, the demersal shelf rockfish complex, thornyhead rockfish, Atka mackerel, big skates, longnose skates, the other skates complex, and the other species complex.

3 2005 Mortality projections

2005 Catch Projection for BSAI Groundfish as of April 12, 2005

In 2004, a catch projection for the 2004 fishing year was made in late May to assist in the preparation of the 2004 SAFE report. The current catch projection for 2005 was made in mid April 2005 to facilitate the preparation of the EA for the proposed 2006 and 2007 harvest specifications. This catch projection may be updated when more catch information becomes available later in the year.

This catch projection is based on the year to date catch of groundfish through April 9, 2005 plus the average catch for the years 2002, 2003, 2004 from mid-April to December 31 (week ending dates 4/13/02, 4/12/03, and 4/10/04 through 12/31). At this time, many of the fisheries have not yet concluded for the year but the TACs for these fisheries are fully utilized, so the entire TAC amount was used as a logical upper limit for the catch. This adds some conservative elements to the estimates for next years OFLs and ABCs. This was done for pollock, Pacific cod, pacific ocean perch, and Atka mackerel. For some species the projection is more than the 2005 TAC and in these cases the 2005 TAC is used (Alaska plaice, arrowtooth flounder, greenland turbot, “other flatfish”, “other species”, rock sole, squid, and yellowfin sole).

During 2002 and 2003, a large amount of the shortraker and rougheye rockfish catch was reported using a combined species code. The amounts of shortraker and rougheye in Table 13.1 of the 2003 SAFE report are used to calculate the separate catch amounts of shortraker and rougheye for 2002 and 2003.

Data used to make these projections came from the NMFS blend reports for 2002 and from the NMFS catch accounting system for 2003 through 2005.

2005 Catch Projections for GOA Groundfish as of April 12, 2005

In 2004, a catch projection for the 2004 fishing year was made in late May to assist in the preparation of the 2004 SAFE report. This catch projection for 2005 was made in mid April to facilitate the preparation of the EA for the proposed 2006 and 2007 harvest specifications. This catch projection may be updated when more catch information becomes available later in the year.

This catch projection is based on the year to date catch of groundfish through April 9, 2005 plus the average catch for the years 2002, 2003, 2004 from mid April to December 31 (week ending dates 4/13/02, 4/12/03, and 4/10/04 through 12/31). At this time, many of the fisheries have not yet concluded for the year but the TACs for these fisheries are fully utilized, so the entire TAC (ABC in the case of Pacific cod) amount was used as a logical upper limit for the catch (with some exceptions for the Eastern GOA). This adds some conservative elements to the estimates for next years OFLs and ABCs. This was done for pollock, Pacific cod, sablefish, Pacific ocean perch, northern rockfish, pelagic shelf rockfish, and skates. Insufficient information is currently unavailable to make projections for the skate targets and so the full TAC amounts for these targets to add a more conservative approach. Projections were made for those targets not fully utilized and those targets which are normally on bycatch status throughout the year. These under utilized targets include pollock, Pacific cod, Pacific ocean perch, and demersal shelf rockfish in portions of the Eastern GOA; and deep water flatfish, rex sole, flathead sole, shallow water sole, arrowtooth flounder, and demersal shelf rockfish gulfwide. Those species normally on bycatch status include shortraker and rougheye rockfish, other (slope) rockfish, and thornyheads.

Insufficient information is available to determine the average catch of shortraker and rougheye rockfish individually so they are presented combined, the stock assessment authors may wish to make estimates of individual species.

Data used to make these projections came from the NMFS blend reports for 2002 and from the NMFS catch accounting system for 2003 through 2005 and from ADF&G.

For the 2006 projections the same procedure was used, except that ADC and TAC amounts from the final 2005 - 2006 groundfish harvest specifications (Table 2) we're used for fully utilized species. For under utilized species and bycatch species the 2005 projections were carried forward for 2006. The 2006 GHL for pollock in Prince William Sound has not yet been established for 2006. ADF&G will base the GHL for 2006 based on survey information to be collected in 2005. The 2006 catch projection included here is based on the average catch of pollock during the years 2003 – 2005 (1097 mt in 2003, 923 mt in 2004, and 761 mt in 2005).

Projections were made for individual managements areas (such as the Eastern, Central, and Western GOA) as well as for the GOA as a whole.

Table E-1 BSAI 2005 mortality projections

Bering Sea		2005 TAC	2005 YTD Catch	2005 CDQ catch	2005 Remaining	2002-2004 Average Catch (May-Dec)**	2005 YTD catch + 02-04 average	2005 Projected Catch*
Other Rockfish		460	15	2	443	279	296	296
Pacific ocean perch		1,400	143	1	1,256	678	822	822
Sablefish		2,440	34	37	2,369	827	898	898
Greenland Turbot		2,700	19	2	2,679	2,427	2,448	2,448
Pollock		1,478,500	533,683	59,064	885,753	886,718	1,479,465	1,478,500
Pollock, Bogoslof***		10	0		10	15	15	15
Aleutian Islands								
Other Rockfish		590	63	2	525	306	371	371
Pacific ocean perch	Eastern	3,080	249	-	2,831	2,711	2,960	3,080
Pacific ocean perch	Central	3,035	188	-	2,847	2,885	3,073	3,035
Pacific ocean perch	Western	5,085	100	-	4,985	5,478	5,578	5,085
Atka mackerel	Eastern	7,500	770	1	6,729	5,056	5,827	7,500
Atka mackerel	Central	35,500	16,499	70	18,931	14,631	31,200	35,500
Atka mackerel	Western	20,000	2,661	-	17,339	13,190	15,851	20,000
Sablefish		2,620	440	6	2,174	846	1,292	1,292
Greenland Turbot		800	40	2	758	574	616	616
Pollock, ICA***		19,000	732	-	18,268	517	1,249	19,000
Bering Sea Aleutian Islands								
Alaska Plaice		8,000	5,603	-	2,397	4,970	10,573	8,000
Arrowtooth Flounder		12,000	2,116	29	9,855	11,103	13,248	12,000
Flathead Sole		19,500	4,330	163	15,007	10,055	14,548	14,548
Other Flatfish		3,500	1,715	10	1,775	1,792	3,517	3,500
Other Species		29,000	9,132	1,010	18,858	16,210	26,352	29,000
Pacific Cod		206,000	115,140	7,345	83,515	81,720	204,205	206,000
Rock Sole		41,500	21,812	154	19,534	13,791	35,757	41,500
Squid		1,275	302		973	630	932	932

Yellowfin Sole	90,686	41,666	6	49,014	50,780	92,452	90,686
Northern Rockfish BSAI	5,000	1,195	2	3,803	3,205	4,402	4,402
Rougheye Rockfish	223	6	0	217	201	207	207
Shortraker Rockfish	596	77	3	516	186	266	266
Total	2,000,000	758,730	67,909	1,173,361		1,958,420	1,989,499

*Projected catch is either:

1. 2005 TAC amount - highlighted. TAC amounts are used for these species because they are fully utilized or the 2005 projection exceeds the TAC.
2. 2005 open access and CDQ catch through 4/9/05 plus 2002-2004 average catch from April 10 - December 31 (includes CDQ).

** 2002 4/13-12/31, 2003 4/12-12/31, 2004 4/10-12/31 source NMFS Blend Estimates (2002) and Catch Accounting System (2003, 2004)

***Pollock ICA CDQ is included in open access pollock ICA

Table E-2 GOA 2005 mortality projections

2005 and 2006 GOA Catch Projections		Post 4/13/2002	Post 4/12/2003	Post 4/10/2004	Total	2002-4 Average	Catch through 4/9/2005	2005 Catch Projection	2006 Catch Projection
Species	Area								
Pollock									
	610							30380	30452
	620							34,404	34485
	630							18716	18762
	640						1876	1876	1691
	PWS*						761	761	927
	W/C/WYK							86137	86317
	650	0	0	0	0	0	0	0	0
	gulfwide							86137	86317
*P cod***	W							20916	18396
	C							33117	29127
	E	0	0	0	0	0	0	0	0
	gulfwide							54033	47523
Deepwater Flatfish	W	19	28	6	53	18	1	19	19
	C	330	664	203	1197	399	79	478	478
	WYK	2	2	55	59	20	0	20	20
	SEO	6	3	4	13	4	0	4	4
	gulfwide	357	697	268	1322	441	80	521	521
Rex sole	W	347	544	350	1241	414	476	890	890
	C	2122	2038	719	4879	1626	709	2335	2335
	WYK	0	1	0	1	0	0	0	0
	SEO	0	1	0	1	0	0	0	0
	gulfwide	2469	2584	1069	6122	2041	1185	3226	3226
Flathead sole	W	226	319	249	794	265	525	790	790

	C	1365	1418	1042	3825	1275	940	2215	2215
	WYK	0	0	0	0	0	0	0	0
	SEO	0	0	0	0	0	0	0	0
	gulfwide	1591	1737	1291	4619	1540	1465	3005	3005
Shallow flatfish	W	129	163	70	362	121	25	146	146
	C	6055	3495	1731	11281	3760	436	4196	4196
	WYK	1	0	1	2	1	0	1	1
	SEO	1	3	0	4	1	0	1	1
	gulfwide	6186	3661	1802	11649	3883	461	4344	4344
Arrowtooth									
	W	5712	7599	1558	14869	4956	1887	6843	6843
	C	13202	19149	9474	41825	13942	5857	19799	19799
	WYK	54	28	73	155	52	3	55	55
	SEO	96	45	27	168	56	1	57	57
	gulfwide	19064	26821	11132	57017	19006	7748	26754	26754
Sablefish	W							2540	2407
	C							7250	6870
	WYK							2580	2445
	SEO							3570	3383
	gulfwide							15940	15105
POP	W							2567	2525
	C							8535	8375
	WYK							841	813
	SEO	1	0	0	1	0	0	0	0
	gulfwide							11943	11713
SR/RE	W	250	189	210	649	216	26	242	242
	C	594	736	256	1586	529	36	565	565
	E	313	271	370	954	318	52	370	370

	gulfwide	1157	1196	836	3189	1063	114	1177	1177
Other Rockfish	W	219	121	239	579	193	6	199	199
	C	473	714	523	1710	570	5	575	575
	WYK	32	223	76	331	110	2	112	112
	SEO	17	17	22	56	19	12	31	31
	gulfwide	741	1075	860	2676	892	25	917	917
Northern Rockfish	W							808	755
	C							4283	3995
	E***								
	gulfwide							5091	4750
Pelagic S Rockfish	W							377	366
	C							3067	2973
	WYK							211	205
	SEO	9	13	12	34	11	1	12	12
	gulfwide							3667	3556
Thornyheads	W	351	237	239	827	276	30	306	306
	C	456	684	361	1501	500	32	532	532
	E	154	87	127	368	123	7	130	130
	gulfwide	961	1008	727	2696	899	69	968	968
Demersal S Rockfish	SEO	181	155	160	496	165	45	210	210
Big Skates****	W						20	727	727
	C						398	2463	2463
	E						5	809	809
	gulfwide						423	3999	3999
Longnose Skates****	W						7	66	66
	C						420	1972	1972

	E						85	780	780
	gulwide						512	2818	2818
Other Skates****	gulfwide						352	1327	1327
Other Species*****	gulfwide	2949	4570	631	8150	2717	1362	4079	4079
Atka Mackerel	gulfwide	82	539	799	1420	473	20	493	

* PWS pollock - In previous years the GHL established by the State for PWS has been deducted from from the W/C/WYK ABC. The pollock fishery has concluded for the year, the actual harvest is reported for 2005. The 2006 projection is based upon average harvest between 2003 and 2005.
** P cod - ABCs were used rather than TACs to include removals from the state managed fisheries in the Western and Central GOA.
*** Northern Rockfish E GOA - In the E GOA northern rockfish are included in the other rockfish assemblage. Annual harvests are on the order of 10 mt.
**** skate harvest by species are not available from 2002 and 2003 and only partially available from 2004.
****** other species catch includes skates from 2002 and 2003.

(This page is blank)

Appendix F: Gross Revenues Methodology[50]

This Appendix provides a detailed description of the methods used to calculate gross revenues. A detailed presentation of the model results may be found in Appendix G. The detailed results presented here go beyond those used in the Section 4.10 of the analytical chapter of the EA, and are a status report on work in progress.

The gross value analysis provides estimates of gross revenues received for products at the first wholesale level, the ex-vessel level, the shoreside level, and for the three combined. The sum of Catcher Vessel Ex-Vessel value and shoreside revenues is mathematically equivalent to the first wholesale gross revenue value estimated for Catcher Processors. Thus, the “combined” revenue category provides result in total first wholesale gross revenue terms that are procedurally equivalent to those estimated in the gross revenue models used for the TAC Specifications process since 2002. The difference in the model at this stage of development is that, for the first time, a disaggregated revenue model has been developed with a breakout of CP, CV, and shoreside sectors. Though somewhat crude due to data limitations, this model is a large step forward.

How revenues were estimated

The gross revenue model utilizes TAC specifications provided initially by the Groundfish Plan Team and amends those TACs within the model as the plan team and Council take action to make changes. The TACs are treated as exogenous inputs to the model. The TACs are provided in great detail with individual species disaggregated by region, subregion and alternative. There are currently approximately 85 individual GOA and 33 individual BSAI TACs specified for each of the five alternatives. However, data limitations in catch and price reporting, confidentiality restrictions, and the need to consolidate the information dictate aggregation of these individual TACs into major species groups. The gross revenue model thus aggregates individual species TACs into 12 species groups in the BSAI and 12 in the GOA, however, not all species groups are used in both regions.

To estimate revenue by major species group, sector, and region, the model must determine what proportion of the species group regional TAC is likely to be caught by vessels operating in the CP and CV sectors respectively. This is done by calculating the quantity weighted average catch rate of all the species within a species group by the sector over the five most recent years that catch data is available. The catch rate that results is the parameter used to estimate what proportion of a species group TAC within a region has been caught by the sector. It is also used to project the catch for the proposed specifications in 2006 and 2007. It is important to note that the catch rate parameter is not the rate of harvest that the sector has had of any specific sector based allocation with a region. It is simply the proportion of the overall regional TAC that the sector has historically taken in the region in question.

[50] As noted at the start of Section 4.10, NMFS AKR is in the process of developing the gross revenues model to differentiate between revenues flowing to the CP sector, and revenues flowing to the CV and shoreside processing sectors. When this work is completed, it may be combined with regional impact models to provide a more complete picture of the interaction of the fisheries and onshore communities. This will address the needs of an ecosystem approach to management for a more complete view of the fishery-human community interactions. Appendices F and G provide a status report on the state of this project.

Multiplication of the sector/species group based catch rates by the appropriate TAC specification yields an estimate of potential revenue generating tonnage harvested by each sector, in each region, and for each species group. However, not all that is caught is retained. Thus, the model must also estimate the retention rate for each sector, region, and species group. This is done by calculating the sum of retained tons by sector, region, and species group for the past five years and dividing it by the similarly summed catch tons. The retention rate is then multiplied by the estimated catch with the result being an estimate of revenue generating tonnage harvested and retained by each sector, in each region, and for each species group. Multiplication of these estimates by an appropriate price vector results in estimated revenue for each sector/region/species group[51]. However, the prices that must be used have different meanings.

The model uses three price vectors: two that are exogenous to the model and one that is calculated within the model. The exogenous prices are the round weight equivalent first wholesale prices per metric ton from the CP sector and ex-vessel prices per metric ton from the CV sector that are also in round weight form. The endogenously calculated price vector is simply the difference between the first wholesale price and the ex-vessel price for a species group in a region. It is used to value the shoreside processing sector "value added" processing revenues. It is calculated from the other two price vectors because first wholesale prices for shorebased processed product are confidential for several regions and species groups. Rather than aggregate species groups for the shoreside sector analysis, the difference between first wholesale price for catcher processors and ex-vessel price for catcher vessels is used to proxy shorebased value added and to make the estimates as consistent as possible across sectors and regions.

The round weight equivalent first wholesale prices are defined as the total value of all products derived (by CPs) from the species group divided by the total round weight of retained catch for the species group. The source of this data is industry reported values and tonnages from weekly production reports (WPR) and the commercial operators annual reports (COAR). Ex-vessel prices are calculated similarly, however, the source data is Alaska Commercial Fisheries Entry Commission (CFEC) corrected fish ticket data. CFEC does extensive work on fish ticket data to correct for end of season bonuses and other price anomalies. As discussed above, the shoreside price is the difference between the first wholesale and ex-vessel prices[52].

The price estimates described above are constrained in availability for the most recent years. The September version of the gross revenue model uses 2003 prices, as the 2004 prices do not become available until November. As a result, the model is annually updated in November to add in the new prices. The 2003 price vectors are applied to all revenue estimates in the model in order to compare past estimates of revenues and projections of future revenues in nominal dollar terms. What this means is that estimates of 2003, 2004, and 2005 revenue are being made with 2003 prices and projections of 2006 and 2007 revenues are made with the same 2003 price vector (will be 2004 prices by November). Thus, the availability of prices and the lack of stochastic price estimation/projection models that can be used in this analysis are serious limitations.

Table F-1 and F-2 provide model parameter data on catch rates, retention rates, and prices used in the model for the BSAI and GOA respectively. The data is provided by species group and sector. It is important to note that the shoreside sector uses the CV sector catch and retention rates under

---

[51] Data on available harvest actually taken and retained were provided specifically for this analysis by Mary Furuness of the NOAA Fisheries Alaska Region In-Season Management Staff

[52] These prices have been prepared specifically for this analysis by Terry Hiatt of the Alaska Fisheries Science Center

the obvious assumption that all CV catch that is retained is processed by the shoreside sector. Also, the model provides revenue estimates for both the CDQ and non-CDQ allocations of TAC in the BSAI. However, available data did not allow calculation of a CDQ specific set of parameters and so the overall BSAI non-CDQ parameters are used.

Table F-1 BSAI Model Parameters: Catch Rates, Retention Rates, and Prices by Sector and Species Group.

Species Group	Catcher Processors			Catcher Vessels			Shoreside		
	C%	R%	Price	C%	R%	Price	C%	R%	Price
Pollock	41%	97%	649	58%	99%	165	58%	99%	484
Sablefish	22%	83%	6,132	24%	97%	4,729	24%	97%	1,403
Pacific cod	70%	98%	1,126	29%	99%	658	29%	99%	468
Arrowthooth	26%	32%	530	2%	17%	43	2%	17%	487
Flathead sole	47%	76%	843	3%	45%	34	3%	45%	809
Rock sole	56%	54%	687	4%	16%	77	4%	16%	610
Turbot	65%	89%	1,779	6%	26%	423	6%	0%	1,356
Yellowfin	48%	84%	531	43%	72%	30	43%	72%	501
Flats (other)	21%	17%	1,348	1%	52%	34	1%	52%	1,314
Rockfish	84%	60%	687	2%	49%	386	2%	49%	301
Atka	86%	86%	507	1%	34%	35	1%	34%	472
Other	86%	18%	583	8%	12%	276	8%	12%	307

Using the methods described above, the gross revenue model estimates revenues earned in 2003, 2004, and 2005. Using identical methods, the model projects revenues by alternative for 2006 and 2007. These estimates are provided separately for the BSAI and GOA regions and were further divided into two BSAI categories: the fish available in the CDQ reserves, and the fish available for use by fishermen harvesting non-CDQ TACs. The CDQ reserve was assigned 10% percent of the pollock TAC, 20% of the sablefish allocated to hook-and-line and pot fishermen, 7.5% of the sablefish allocated to trawl fishermen, and 7.5% of all other groundfish species. Unfortunately, available CDQ fishery data is not sufficiently detailed to allow estimation of CDQ fishery specific catch and retention rates and so the overall BSAI rates are used.

Table F-2 GOA Model Parameters: Catch Rates, Retention Rates, and Prices by Sector and Species Group.

Species Group	Catcher Processors			Catcher Vessels			Shoreside		
	C%	R%	Price	C%	R%	Price	C%	R%	Price
Pollock	1%	70%	788	86%	98%	153	86%	98%	635
Sablefish	18%	84%	5,849	79%	95%	5,048	79%	95%	802
Pacific cod	17%	96%	1,240	76%	96%	641	76%	96%	599
Arrowtooth	36%	44%	341	21%	35%	60	21%	35%	280
Flathead sole	8%	78%	772	12%	87%	167	12%	87%	605
Rex sole	27%	97%	2,094	3%	79%	362	3%	79%	1,732
Flats deep	5%	20%	672	14%	89%	189	14%	89%	483
Flats shallow	2%	58%	762	24%	91%	230	24%	91%	532
Rockfish	40%	85%	802	34%	91%	259	34%	91%	543
Atka	27%	65%	815	6%	62%	35	6%	62%	780
Skates	18%	47%	485	29%	67%	189	29%	67%	296
Other	7%	19%	485	25%	31%	397	25%	31%	88

There are several important conceptual problems with this modeling approach. First, changes in the quantity of fish produced, might be expected to lead to changes in the price paid. However, in this analysis, a constant price, by species and product form, was used to value the different quantities that would be produced under the different alternatives. Since, all else equal, an increase in quantity should reduce price, while a decrease in quantity should increase price, leaving price changes out of the calculation may lead to an exaggeration of actual gross revenue changes across alternatives. The magnitude of this exaggeration is unknown. This is probably not a serious issue for Alternative 2, because TAC changes are relatively small. However, Alternative 1 often increases TACs significantly, so the absence of a price effect may overstate revenue increases because prices would be expected to decline. In contrast, the method may cause the revenue reductions for Alternatives 3 and 4, which have moderate reductions in TACs of highly valued species, to be overstated, since the declines in TACs might be offset to some extent by increases in prices. It is not an issue for Alternative 5, since with no harvests, prices are undefined.

Second, many of the groundfish fisheries become limited by PSC catch constraints, rather than attainment of TAC. PSC constraints are not proportional to groundfish specifications and are likely to bind sooner, or impose greater costs on groundfish fishermen, given higher levels of TAC specifications. This suggests that gross revenues for alternatives with generally higher levels of TAC specifications will be biased upward. This may not be an issue for most alternatives in this instance, since TACs generally are the same as or lower than TACs in 2005. The exception could be Alternative 1, which may increase TACs significantly.

Other assumptions incorporated into the model may affect the results in ways that are difficult to determine. These include (1) the use of first wholesale prices per metric ton of retained weight, implies that outputs at the wholesale level change in proportion to the production of the different species; (2) the use of broad species categories in the analysis implies that changes in specifications would result in proportional changes in the harvest by all the gear groups harvesting a species; (3) similarly, the lumping of species together in categories implies that changes in specifications would result in proportional changes in the harvest of all the species included in the category.

Estimates of first wholesale gross revenues

Estimates of the projected TACs, by species group, are summarized for both the BSAI and for the GOA in Tables F-3 and F-4 for 2006 and 2007 respectively. Estimates of the percentage changes between 2005 TACs and the 2006 and 2007 projected TACs for the alternatives are summarized in Tables F-5 and F-8.

Estimates of the 2006 and 2007 gross revenues by alternative and sector are summarized in Table F-9. Detailed Estimates of the 2006 and 2007 values for each of the CP, CV, shoreside and combined sectors for the BSAI, BSAI CDQ, and GOA regional breakouts are provided in the 24 tables labeled F-10 through F-33

Table F-3 2006 Projected TACs in metric tons (based on plan team 2005 ABC recommendations)

Species	A1	A2	A3	A4	A5	2005
BSAI						
Pollock	1,685,500	1,506,766	928,050	1,212,737	0	1,497,510
Sablefish	5,300	4,790	2,700	4,100	0	5,060
Pacific cod	214,300	195,000	112,600	169,800	0	206,000
Arrowtooth	104,200	12,000	55,000	8,300	0	12,000
Flathead sole	54,900	20,000	28,600	10,000	0	19,500
Rock sole	121,700	42,000	62,900	23,100	0	41,500
Turbot	14,700	3,500	7,800	3,700	0	3,500
Yellowfin	117,700	90,000	60,400	37,500	0	90,686
Flats (other)	204,791	13,000	116,096	17,362	0	11,500
Rockfish	25,319	19,469	12,810	18,626	0	19,469
Atka	107,000	63,000	58,800	65,000	0	63,000
Other	70,780	30,475	35,390	28,893	0	30,275
Total	**2,726,190**	**2,000,000**	**1,481,146**	**1,599,118**	**0**	**2,000,000**
GOA						
Pollock	122,220	105,220	64,210	81,304	0	91,710
Sablefish	14,880	14,880	7,600	12,110	0	15,940
Pacific cod	70,100	55,400	37,100	50,500	0	44,433
Arrowtooth	213,140	38,000	109,420	16,780	0	38,000
Flathead sole	47,487	10,557	25,780	6,480	0	10,390
Rex sole	12,650	12,650	6,325	3,055	0	12,650
Flats deep	6,820	6,820	3,279	901	0	6,820
Flats shallow	52,070	20,740	26,035	5,270	0	20,740
Rockfish	30,551	27,218	16,153	21,140	0	27,999
Atka	4,700	600	2,350	232	0	600
Skates	8,144	8,144	4,073	8,144	0	8,145
Other	29,138	15,011	15,116	10,296	0	13,871
Totals	**611,900**	**315,240**	**317,441**	**216,212**	**0**	**291,298**

Table F-4: 2007 Projected TACs in metric tons (based on plan team 2005 ABC recommendations)

Species	A1	A2	A3	A4	A5	2005
BSAI						
Pollock	1,208,900	1,242,210	839,350	1,037,327	0	1,497,510
Sablefish	4,900	4,900	2,700	4,000	0	5,060
Pacific cod	182,600	172,200	116,300	161,600	0	206,000
Arrowthooth	83,900	38,200	49,400	8,200	0	12,000
Flathead sole	45,500	50,600	25,700	9,500	0	19,500
Rock sole	106,600	116,100	58,600	22,400	0	41,500
Turbot	9,500	10,500	6,300	3,500	0	3,500
Yellowfin	106,900	109,600	57,700	36,500	0	90,686
Flats (other)	128,591	79,531	89,896	17,062	0	11,500
Rockfish	25,119	25,519	13,110	18,626	0	19,469
Atka	74,100	90,800	50,400	54,600	0	63,000
Other	70,780	59,840	35,390	28,893	0	30,275
Total	**2,047,390**	**2,000,000**	**1,344,846**	**1,402,208**	**0**	**2,000,000**
GOA						
Pollock	104,520	95,520	63,310	81,004	0	91,710
Sablefish	13,900	13,900	7,720	11,830	0	15,940
Pacific cod	52,600	46,600	33,600	44,100	0	44,433
Arrowtooth	203,130	38,000	109,880	17,630	0	38,000
Flathead sole	35,680	9,644	22,450	6,360	0	10,390
Rex sole	12,650	12,650	6,325	3,055	0	12,650
Flats deep	6,820	6,820	3,279	901	0	6,820
Flats shallow	52,070	20,740	26,035	5,270	0	20,740
Rockfish	30,109	26,775	16,123	20,960	0	27,999
Atka	4,700	600	2,350	232	0	600
Skates	8,144	8,144	4,073	8,144	0	8,145
Other	26,216	13,970	14,757	9,974	0	13,871
Totals	**550,539**	**293,363**	**309,902**	**209,460**	**0**	**291,298**

Table F-5: Percent differences between 2006 BSAI TACs for the Alternatives, and 2005 BSAI TACs

Species	A1	A2	A3	A4	A5	2005 mt
Pollock	13%	1%	-38%	-19%	-100%	1,497,510
Sablefish	5%	-5%	-47%	-19%	-100%	5,060
Pacific cod	4%	-5%	-45%	-18%	-100%	206,000
Arrowtooth	768%	0%	358%	-31%	-100%	12,000
Flathead sole	182%	3%	47%	-49%	-100%	19,500
Rock sole	193%	1%	52%	-44%	-100%	41,500
Turbot	320%	0%	123%	6%	-100%	3,500
Yellowfin	30%	-1%	-33%	-59%	-100%	90,686
Flats (other)	1681%	13%	910%	51%	-100%	11,500
Rockfish	30%	0%	-34%	-4%	-100%	19,469
Atka	70%	0%	-7%	3%	-100%	63,000
Other	134%	1%	17%	-5%	-100%	30,275
Totals	**36%**	**0%**	**-26%**	**-20%**	**-100%**	**2,000,000**

Table F-6: Percent differences between 2007 BSAI TACs for the Alternatives, and 2005 BSAI TACs

Species	A1	A2	A3	A4	A5	2005 mt
Pollock	-19%	-17%	-44%	-31%	-100%	1,497,510
Sablefish	-3%	-3%	-47%	-21%	-100%	5,060
Pacific cod	-11%	-16%	-44%	-22%	-100%	206,000
Arrowtooth	599%	218%	312%	-32%	-100%	12,000
Flathead sole	133%	159%	32%	-51%	-100%	19,500
Rock sole	157%	180%	41%	-46%	-100%	41,500
Turbot	171%	200%	80%	0%	-100%	3,500
Yellowfin	18%	21%	-36%	-60%	-100%	90,686
Flats (other)	1018%	592%	682%	48%	-100%	11,500
Rockfish	29%	31%	-33%	-4%	-100%	19,469
Atka	18%	44%	-20%	-13%	-100%	63,000
Other	134%	98%	17%	-5%	-100%	30,275
Totals	**2%**	**0%**	**-33%**	**-30%**	**-100%**	**2,000,000**

Table F-7: Percent differences between 2006 GOA TACs for Alternatives, and 2005 GOA TACs

Species	A1	A2	A3	A4	A5	2005 mt
Pollock	33%	15%	-30%	-11%	-100%	91,710
Sablefish	-7%	-7%	-52%	-24%	-100%	15,940
Pacific cod	58%	25%	-17%	14%	-100%	44,433
Arrowtooth	461%	0%	188%	-56%	-100%	38,000
Flathead sole	357%	2%	148%	-38%	-100%	10,390
Rex sole	0%	0%	-50%	-76%	-100%	12,650
Flats deep	0%	0%	-52%	-87%	-100%	6,820
Flats shallow	151%	0%	26%	-75%	-100%	20,740
Rockfish	9%	-3%	-42%	-24%	-100%	27,999
Atka	683%	0%	292%	-61%	-100%	600
Skates	0%	0%	-50%	0%	-100%	8,145
Other	110%	8%	9%	-26%	-100%	13,871
Totals	**110%**	**8%**	**9%**	**-26%**	**-100%**	**291,298**

Table F-8: Percent differences between 2007 GOA TACs for Alternatives, and 2005 GOA TACs

Species	A1	A2	A3	A4	A5	2005 mt
Pollock	14%	4%	-31%	-12%	-100%	91,710
Sablefish	-13%	-13%	-52%	-26%	-100%	15,940
Pacific cod	18%	5%	-24%	-1%	-100%	44,433
Arrowtooth	435%	0%	189%	-54%	-100%	38,000
Flathead sole	243%	-7%	116%	-39%	-100%	10,390
Rex sole	0%	0%	-50%	-76%	-100%	12,650
Flats deep	0%	0%	-52%	-87%	-100%	6,820
Flats shallow	151%	0%	26%	-75%	-100%	20,740
Rockfish	8%	-4%	-42%	-25%	-100%	27,999
Atka	683%	0%	292%	-61%	-100%	600
Skates	0%	0%	-50%	0%	-100%	8,145
Other	89%	1%	6%	-28%	-100%	13,871
Totals	**89%**	**1%**	**6%**	**-28%**	**-100%**	**291,298**

Table F-9: Estimates of Gross Revenue by Sector (millions of dollars)

BSAI	CP		CV		Shoreside		Combined	
Alternative	2006	2007	2006	2007	2006	2007	2006	2007
Alt 1	$692	$530	$189	$157	$472	$383	$1,353	$1,070
Alt 2 (proposed)	$562	$536	$169	$158	$418	$391	$1,149	$1,085
Alt 3	$374	$348	$103	$106	$259	$262	$735	$716
Alt 4	$459	$408	$138	$135	$333	$319	$930	$861
Alt 5	$0	$0	$0	$0	$0	$0	$0	$0
BSAI CDQ	**CP**		**CV**		**Shoreside**		**Combined**	
Alternative	2006	2007	2006	2007	2006	2007	2006	2007
Alt 1	$112	$83	$5	$4	$13	$10	$131	$97
Alt 2 (proposed)	$98	$84	$5	$4	$12	$10	$115	$98
Alt 3	$61	$56	$3	$3	$7	$7	$71	$66
Alt 4	$80	$70	$4	$3	$10	$8	$94	$82
Alt 5	$0	$0	$0	$0	$0	$0	$0	$0
GOA	**CP**		**CV**		**Shoreside**		**Combined**	
Alternative	2006	2007	2006	2007	2006	2007	2006	2007
Alt 1	$58	$52	$113	$99	$125	$106	$296	$257
Alt 2 (proposed)	$42	$39	$100	$91	$99	$90	$242	$220
Alt 3	$30	$29	$59	$57	$65	$63	$154	$150
Alt 4	$30	$29	$83	$79	$78	$75	$191	$183
Alt 5	$0	$0	$0	$0	$0	$0	$0	$0

Notes: All estimates have been rounded to the nearest million dollars. This causes some cells to read "0" when actual value is non-zero. Cells may not sum to totals due to rounding.

Table F-10: Projected BSAI CP 2006 First Wholesale Gross Revenue (millions of dollars)

Species Group	First Wholesale Value by Alternative (millions of dollars)				
	A1	**A2**	**A3**	**A4**	**A5**
Pollock	393.347	351.635	216.580	283.018	0
Sablefish	5.123	4.632	2.611	3.966	0
Pacific cod	153.203	139.405	80.498	121.390	0
Arrowthooth	4.161	0.479	2.196	0.331	0
Flathead sole	15.430	5.621	8.038	2.811	0
Rock sole	23.701	8.179	12.250	4.499	0
Turbot	13.856	3.299	7.352	3.488	0
Yellowfin	23.513	17.979	12.066	7.491	0
Flats (other)	8.834	0.561	5.008	0.749	0
Rockfish	8.187	6.296	4.142	6.023	0
Atka	37.185	21.894	20.434	22.589	0
Other	5.799	2.497	2.900	2.367	0
Total	**692.339**	**562.478**	**374.075**	**458.721**	**0**

Table F-11 Projected BSAI CV 2006 EX-Vessel Gross Revenue (millions of dollars)

Species Group	Ex-Vessel Value by Alternative (millions of dollars)				
	A1	**A2**	**A3**	**A4**	**A5**
Pollock	144.082	128.803	79.333	103.669	0
Sablefish	5.027	4.545	2.562	3.891	0
Pacific cod	37.988	34.567	19.960	30.100	0
Arrowthooth	0.015	0.002	0.008	0.001	0
Flathead sole	0.027	0.010	0.014	0.005	0
Rock sole	0.053	0.018	0.027	0.010	0
Turbot	0.086	0.020	0.046	0.022	0
Yellowfin	0.994	0.760	0.510	0.317	0
Flats (other)	0.039	0.002	0.022	0.003	0
Rockfish	0.093	0.072	0.047	0.069	0
Atka	0.014	0.008	0.007	0.008	0
Other	0.167	0.072	0.084	0.068	0
Total	**188.584**	**168.879**	**102.620**	**138.162**	**0**

Table F-12 Projected BSAI Shoreside 2006 Value Added Revenue (millions of dollars)

Species Group	Shoreside Value Added by Alternative (millions of dollars)				
	A1	A2	A3	A4	A5
Pollock	423.450	378.546	233.155	304.677	0
Sablefish	1.491	1.348	0.760	1.154	0
Pacific cod	27.039	24.604	14.207	21.424	0
Arrowthooth	0.176	0.020	0.093	0.014	0
Flathead sole	0.641	0.233	0.334	0.117	0
Rock sole	0.421	0.145	0.218	0.080	0
Turbot	0.275	0.066	0.146	0.069	0
Yellowfin	16.767	12.821	8.604	5.342	0
Flats (other)	1.524	0.097	0.864	0.129	0
Rockfish	0.073	0.056	0.037	0.054	0
Atka	0.183	0.108	0.101	0.111	0
Other	0.186	0.080	0.093	0.076	0
Total	**472.225**	**418.124**	**258.611**	**333.247**	**0**

Table F-13 Projected BSAI Combined 2006 Revenue (millions of dollars)

Species Group	First Wholesale Value by Alternative (millions of dollars)				
	A1	A2	A3	A4	A5
Pollock	960.879	858.985	529.068	691.364	0
Sablefish	11.641	10.525	5.933	9.011	0
Pacific cod	218.230	198.576	114.665	172.914	0
Arrowthooth	4.352	0.501	2.297	0.347	0
Flathead sole	16.097	5.864	8.386	2.932	0
Rock sole	24.175	8.343	12.495	4.589	0
Turbot	14.217	3.385	7.544	3.579	0
Yellowfin	41.273	31.559	21.180	13.150	0
Flats (other)	10.397	0.660	5.894	0.881	0
Rockfish	8.354	6.423	4.226	6.145	0
Atka	37.381	22.010	20.542	22.708	0
Other	6.152	2.649	3.076	2.511	0
Total	**1,353.148**	**1,149.481**	**735.305**	**930.130**	**0**

Table F-14 Projected BSAI CP 2007 First Wholesale Gross Revenue (millions of dollars)

Species Group	First Wholesale Value by Alternative (millions of dollars)				
	A1	A2	A3	A4	A5
Pollock	282.122	289.896	195.880	242.082	0
Sablefish	4.740	4.740	2.611	3.868	0
Pacific cod	130.541	123.106	83.143	115.528	0
Arrowthooth	3.350	1.525	1.973	0.327	0
Flathead sole	12.788	14.222	7.223	2.670	0
Rock sole	20.760	22.610	11.412	4.362	0
Turbot	8.955	9.897	5.938	3.299	0
Yellowfin	21.355	21.894	11.527	7.291	0
Flats (other)	5.547	3.431	3.878	0.736	0
Rockfish	8.123	8.252	4.239	6.023	0
Atka	25.751	31.555	17.515	18.975	0
Other	5.799	4.903	2.900	2.367	0
Total	**529.831**	**536.031**	**348.238**	**407.529**	**0**

Table F-15 Projected BSAI CV 2007 EX-Vessel Gross Revenue (millions of dollars)

Species Group	Ex-Vessel Value by Alternative (millions of dollars)				
	A1	A2	A3	A4	A5
Pollock	114.823	117.987	79.723	98.527	0
Sablefish	5.493	5.493	3.027	4.484	0
Pacific cod	34.993	33.000	22.287	30.969	0
Arrowthooth	0.013	0.006	0.008	0.001	0
Flathead sole	0.024	0.026	0.013	0.005	0
Rock sole	0.050	0.054	0.028	0.011	0
Turbot	0.060	0.066	0.040	0.022	0
Yellowfin	0.976	1.000	0.527	0.333	0
Flats (other)	0.026	0.016	0.018	0.003	0
Rockfish	0.100	0.102	0.052	0.074	0
Atka	0.010	0.012	0.007	0.007	0
Other	0.181	0.153	0.090	0.074	0
Total	**156.750**	**157.917**	**105.820**	**134.511**	**0**

Table F-16 Projected BSAI Shoreside 2007 Value Added Revenue (millions of dollars)

Species Group	Shoreside Value Added by Alternative (millions of dollars)				
	A1	A2	A3	A4	A5
Pollock	337.459	346.758	234.301	289.565	0
Sablefish	1.630	1.630	0.898	1.330	0
Pacific cod	24.908	23.489	15.864	22.043	0
Arrowthooth	0.153	0.070	0.090	0.015	0
Flathead sole	0.574	0.638	0.324	0.120	0
Rock sole	0.399	0.434	0.219	0.084	0
Turbot	0.192	0.213	0.128	0.071	0
Yellowfin	16.463	16.879	8.886	5.621	0
Flats (other)	1.034	0.640	0.723	0.137	0
Rockfish	0.078	0.079	0.041	0.058	0
Atka	0.137	0.168	0.093	0.101	0
Other	0.201	0.170	0.100	0.082	0
Total	**383.227**	**391.166**	**261.667**	**319.227**	**0**

Table F-17 Projected BSAI Combined 2007 Revenue (millions of dollars)

Species Group	First Wholesale Value by Alternative (millions of dollars)				
	A1	A2	A3	A4	A5
Pollock	734.404	754.640	509.904	630.174	0
Sablefish	11.863	11.863	6.536	9.682	0
Pacific cod	190.441	179.594	121.294	168.539	0
Arrowthooth	3.517	1.601	2.071	0.344	0
Flathead sole	13.386	14.887	7.561	2.795	0
Rock sole	21.209	23.099	11.659	4.457	0
Turbot	9.207	10.176	6.106	3.392	0
Yellowfin	38.793	39.773	20.939	13.246	0
Flats (other)	6.608	4.087	4.619	0.877	0
Rockfish	8.301	8.433	4.332	6.155	0
Atka	25.898	31.735	17.615	19.083	0
Other	6.181	5.225	3.090	2.523	0
Total	**1,069.808**	**1,085.114**	**715.726**	**861.267**	**0**

Table F-18 Projected BSAI CDQ CP 2006 First Wholesale Gross Revenue (millions of dollars)

Species Group	First Wholesale Value by Alternative (millions of dollars)				
	A1	A2	A3	A4	A5
Pollock	88.470	79.088	48.712	63.655	0
Sablefish	0.203	0.184	0.103	0.157	0
Pacific cod	16.399	14.922	8.617	12.994	0
Arrowthooth	0.147	0.017	0.077	0.012	0
Flathead sole	0.396	0.144	0.206	0.072	0
Rock sole	0.299	0.103	0.155	0.057	0
Turbot	0.390	0.093	0.207	0.098	0
Yellowfin	1.211	0.926	0.621	0.386	0
Flats (other)	0.182	0.012	0.103	0.015	0
Rockfish	0.522	0.401	0.264	0.384	0
Atka	2.974	1.751	1.634	1.806	0
Other	0.488	0.210	0.244	0.199	0
Total	**111.679**	**97.850**	**60.944**	**79.835**	**0**

Table F-19 Projected BSAI CDQ CV 2006 EX-Vessel Gross Revenue (millions of dollars)

Species Group	Ex-Vessel Value by Alternative (millions of dollars)				
	A1	A2	A3	A4	A5
Pollock	4.450	3.978	2.450	3.202	0
Sablefish	0.830	0.748	0.422	0.640	0
Pacific cod	0.140	0.128	0.074	0.111	0
Arrowthooth	0.000	0.000	0.000	0.000	0
Flathead sole	0.001	0.000	0.000	0.000	0
Rock sole	0.001	0.000	0.000	0.000	0
Turbot	0.005	0.001	0.003	0.001	0
Yellowfin	0.000	0.000	0.000	0.000	0
Flats (other)	0.000	0.000	0.000	0.000	0
Rockfish	0.020	0.016	0.010	0.015	0
Atka	0.000	0.000	0.000	0.000	0
Other	0.001	0.001	0.001	0.001	0
Total	**5.449**	**4.872**	**2.961**	**3.970**	**0**

Table F-20 Projected BSAI CDQ Shoreside 2006 Value Added Revenue (millions of dollars)

Species Group	Shoreside Value Added by Alternative (millions of dollars)				
	A1	A2	A3	A4	A5
Pollock	13.078	11.691	7.201	9.409	0
Sablefish	0.246	0.222	0.125	0.190	0
Pacific cod	0.100	0.091	0.053	0.079	0
Arrowthooth	0.005	0.001	0.003	0.000	0
Flathead sole	0.014	0.005	0.007	0.003	0
Rock sole	0.005	0.002	0.003	0.001	0
Turbot	0.017	0.004	0.009	0.004	0
Yellowfin	0.004	0.003	0.002	0.001	0
Flats (other)	0.010	0.001	0.005	0.001	0
Rockfish	0.016	0.012	0.008	0.012	0
Atka	0.003	0.002	0.002	0.002	0
Other	0.002	0.001	0.001	0.001	0
Total	**13.498**	**12.033**	**7.417**	**9.703**	**0**

Table F-21 Projected BSAI CDQ Combined 2006 Revenue (millions of dollars)

Species Group	First Wholesale Value by Alternative (millions of dollars)				
	A1	A2	A3	A4	A5
Pollock	105.997	94.757	58.363	76.266	0
Sablefish	1.279	1.154	0.650	0.986	0
Pacific cod	16.639	15.141	8.743	13.184	0
Arrowthooth	0.152	0.018	0.080	0.012	0
Flathead sole	0.410	0.149	0.214	0.075	0
Rock sole	0.305	0.105	0.158	0.058	0
Turbot	0.412	0.098	0.219	0.104	0
Yellowfin	1.215	0.929	0.623	0.387	0
Flats (other)	0.192	0.012	0.109	0.016	0
Rockfish	0.558	0.429	0.282	0.411	0
Atka	2.977	1.753	1.636	1.808	0
Other	0.491	0.211	0.245	0.200	0
Total	**130.627**	**114.756**	**71.322**	**93.507**	**0**

Table F-22 Projected BSAI CDQ CP 2007 First Wholesale Gross Revenue (millions of dollars)

Species Group	First Wholesale Value by Alternative (millions of dollars)				
	A1	A2	A3	A4	A5
Pollock	63.454	65.202	44.057	54.448	0
Sablefish	0.187	0.187	0.103	0.153	0
Pacific cod	13.973	13.177	8.900	12.366	0
Arrowthooth	0.118	0.054	0.070	0.012	0
Flathead sole	0.328	0.365	0.185	0.068	0
Rock sole	0.262	0.285	0.144	0.055	0
Turbot	0.252	0.278	0.167	0.093	0
Yellowfin	1.100	1.127	0.593	0.375	0
Flats (other)	0.114	0.071	0.080	0.015	0
Rockfish	0.518	0.526	0.270	0.384	0
Atka	2.059	2.523	1.401	1.517	0
Other	0.488	0.412	0.244	0.199	0
Total	**82.853**	**84.209**	**56.214**	**69.686**	**0**

Table F-23 Projected BSAI CDQ CV 2007 EX-Vessel Gross Revenue (millions of dollars)

Species Group	Ex-Vessel Value by Alternative (millions of dollars)				
	A1	A2	A3	A4	A5
Pollock	3.192	3.279	2.216	2.739	0
Sablefish	0.764	0.764	0.422	0.625	0
Pacific cod	0.120	0.113	0.076	0.106	0
Arrowthooth	0.000	0.000	0.000	0.000	0
Flathead sole	0.000	0.001	0.000	0.000	0
Rock sole	0.001	0.001	0.000	0.000	0
Turbot	0.003	0.004	0.002	0.001	0
Yellowfin	0.000	0.000	0.000	0.000	0
Flats (other)	0.000	0.000	0.000	0.000	0
Rockfish	0.020	0.020	0.010	0.015	0
Atka	0.000	0.000	0.000	0.000	0
Other	0.001	0.001	0.001	0.001	0
Total	**4.102**	**4.184**	**2.728**	**3.487**	**0**

Table F-24 Projected BSAI CDQ Shoreside 2007 Value Added Revenue (millions of dollars)

Species Group	Shoreside Value Added by Alternative (millions of dollars)				
	A1	A2	A3	A4	A5
Pollock	9.380	9.638	6.512	8.048	0
Sablefish	0.227	0.227	0.125	0.185	0
Pacific cod	0.085	0.080	0.054	0.075	0
Arrowthooth	0.004	0.002	0.002	0.000	0
Flathead sole	0.012	0.013	0.006	0.002	0
Rock sole	0.004	0.005	0.002	0.001	0
Turbot	0.011	0.012	0.007	0.004	0
Yellowfin	0.004	0.004	0.002	0.001	0
Flats (other)	0.006	0.004	0.004	0.001	0
Rockfish	0.016	0.016	0.008	0.012	0
Atka	0.002	0.002	0.001	0.001	0
Other	0.002	0.001	0.001	0.001	0
Total	**9.751**	**10.004**	**6.727**	**8.333**	**0**

Table F-25 Projected BSAI CDQ Combined 2007 Revenue (millions of dollars)

Species Group	First Wholesale Value by Alternative (millions of dollars)				
	A1	A2	A3	A4	A5
Pollock	76.025	78.120	52.785	65.235	0
Sablefish	1.178	1.178	0.650	0.964	0
Pacific cod	14.178	13.371	9.030	12.547	0
Arrowthooth	0.123	0.056	0.072	0.012	0
Flathead sole	0.340	0.378	0.192	0.071	0
Rock sole	0.267	0.291	0.147	0.056	0
Turbot	0.266	0.294	0.177	0.098	0
Yellowfin	1.103	1.131	0.596	0.377	0
Flats (other)	0.120	0.074	0.084	0.016	0
Rockfish	0.554	0.562	0.289	0.411	0
Atka	2.061	2.526	1.402	1.519	0
Other	0.491	0.415	0.245	0.200	0
Total	**96.706**	**98.396**	**65.669**	**81.506**	**0**

Table F-26 Projected GOA CP 2006 First Wholesale Gross Revenue (millions of dollars)

Species Group	First Wholesale Value by Alternative (millions of dollars)				
	A1	A2	A3	A4	A5
Pollock	0.374	0.322	0.196	0.249	0
Sablefish	12.930	12.930	6.604	10.523	0
Pacific cod	14.202	11.224	7.516	10.231	0
Arrowtooth	11.424	2.037	5.865	0.899	0
Flathead sole	2.230	0.496	1.211	0.304	0
Rex sole	6.876	6.876	3.438	1.661	0
Flats deep	0.045	0.045	0.022	0.006	0
Flats shallow	0.405	0.161	0.202	0.041	0
Rockfish	8.296	7.391	4.386	5.740	0
Atka	0.662	0.085	0.331	0.033	0
Skates	0.343	0.343	0.171	0.343	0
Other	0.192	0.099	0.100	0.068	0
Totals	**57.979**	**42.007**	**30.043**	**30.098**	**0**

Table F-27 Projected GOA CV 2006 EX-Vessel Gross Revenue (millions of dollars)

Species Group	Ex-Vessel Value by Alternative (millions of dollars)				
	A1	A2	A3	A4	A5
Pollock	15.710	13.525	8.253	10.451	0
Sablefish	56.473	56.473	28.844	45.960	0
Pacific cod	32.688	25.833	17.300	23.548	0
Arrowtooth	0.948	0.169	0.487	0.075	0
Flathead sole	0.796	0.177	0.432	0.109	0
Rex sole	0.096	0.096	0.048	0.023	0
Flats deep	0.166	0.166	0.080	0.022	0
Flats shallow	2.564	1.021	1.282	0.260	0
Rockfish	2.440	2.174	1.290	1.688	0
Atka	0.006	0.001	0.003	0.000	0
Skates	0.304	0.304	0.152	0.304	0
Other	0.911	0.469	0.473	0.322	0
Totals	**113.104**	**100.409**	**58.644**	**82.762**	**0**

Table F-28 Projected GOA Shoreside 2006 Value Added Revenue (millions of dollars)

Species Group	Shoreside Value Added by Alternative (millions of dollars)				
	A1	A2	A3	A4	A5
Pollock	65.435	56.333	34.377	43.529	0
Sablefish	8.969	8.969	4.581	7.299	0
Pacific cod	30.558	24.150	16.173	22.014	0
Arrowtooth	4.402	0.785	2.260	0.347	0
Flathead sole	2.877	0.640	1.562	0.393	0
Rex sole	0.461	0.461	0.231	0.111	0
Flats deep	0.424	0.424	0.204	0.056	0
Flats shallow	5.940	2.366	2.970	0.601	0
Rockfish	5.113	4.555	2.703	3.538	0
Atka	0.141	0.018	0.070	0.007	0
Skates	0.477	0.477	0.239	0.477	0
Other	0.203	0.105	0.105	0.072	0
Totals	**124.999**	**99.283**	**65.474**	**78.443**	**0**

Table F-29 Projected GOA Combined 2006 Revenue (millions of dollars)

Species Group	First Wholesale Value by Alternative (millions of dollars)				
	A1	A2	A3	A4	A5
Pollock	81.519	70.180	42.827	54.228	0
Sablefish	78.372	78.372	40.029	63.782	0
Pacific cod	77.448	61.207	40.989	55.793	0
Arrowtooth	16.774	2.991	8.611	1.321	0
Flathead sole	5.904	1.312	3.205	0.806	0
Rex sole	7.434	7.434	3.717	1.795	0
Flats deep	0.636	0.636	0.306	0.084	0
Flats shallow	8.909	3.548	4.454	0.902	0
Rockfish	15.849	14.120	8.380	10.967	0
Atka	0.809	0.103	0.405	0.040	0
Skates	1.124	1.124	0.562	1.124	0
Other	1.306	0.673	0.678	0.462	0
Totals	**296.082**	**241.699**	**154.161**	**191.303**	**0**

Table F-30 Projected GOA CP 2007 First Wholesale Gross Revenue (millions of dollars)

Species Group	First Wholesale Value by Alternative (millions of dollars)				
	A1	A2	A3	A4	A5
Pollock	0.320	0.292	0.194	0.248	0
Sablefish	12.079	12.079	6.708	10.280	0
Pacific cod	10.656	9.441	6.807	8.934	0
Arrowtooth	10.887	2.037	5.889	0.945	0
Flathead sole	1.676	0.453	1.054	0.299	0
Rex sole	6.876	6.876	3.438	1.661	0
Flats deep	0.045	0.045	0.022	0.006	0
Flats shallow	0.405	0.161	0.202	0.041	0
Rockfish	8.176	7.271	4.378	5.692	0
Atka	0.662	0.085	0.331	0.033	0
Skates	0.343	0.343	0.171	0.343	0
Other	0.173	0.092	0.097	0.066	0
Totals	**52.297**	**39.173**	**29.293**	**28.546**	**0**

Table F-31 Projected GOA CV 2007 EX-Vessel Gross Revenue (millions of dollars)

Species Group	Ex-Vessel Value by Alternative (millions of dollars)				
	A1	A2	A3	A4	A5
Pollock	13.435	12.278	8.138	10.412	0
Sablefish	52.754	52.754	29.299	44.897	0
Pacific cod	24.528	21.730	15.668	20.564	0
Arrowtooth	0.904	0.169	0.489	0.078	0
Flathead sole	0.598	0.162	0.376	0.107	0
Rex sole	0.096	0.096	0.048	0.023	0
Flats deep	0.166	0.166	0.080	0.022	0
Flats shallow	2.564	1.021	1.282	0.260	0
Rockfish	2.405	2.138	1.288	1.674	0
Atka	0.006	0.001	0.003	0.000	0
Skates	0.304	0.304	0.152	0.304	0
Other	0.820	0.437	0.461	0.312	0
Totals	**98.580**	**91.256**	**57.285**	**78.654**	**0**

Table F-32 Projected GOA Shoreside 2007 Value Added Revenue (millions of dollars)

Species Group	Shoreside Value Added by Alternative (millions of dollars)				
	A1	A2	A3	A4	A5
Pollock	55.958	51.140	33.895	43.368	0
Sablefish	8.378	8.378	4.653	7.130	0
Pacific cod	22.929	20.314	14.647	19.224	0
Arrowtooth	4.195	0.785	2.269	0.364	0
Flathead sole	2.162	0.584	1.360	0.385	0
Rex sole	0.461	0.461	0.231	0.111	0
Flats deep	0.424	0.424	0.204	0.056	0
Flats shallow	5.940	2.366	2.970	0.601	0
Rockfish	5.039	4.481	2.698	3.508	0
Atka	0.141	0.018	0.070	0.007	0
Skates	0.477	0.477	0.239	0.477	0
Other	0.183	0.097	0.103	0.070	0
Totals	**106.287**	**89.526**	**63.339**	**75.302**	**0**

Table F-33 Projected GOA Combined 2007 Revenue (millions of dollars)

Species Group	First Wholesale Value by Alternative (millions of dollars)				
	A1	A2	A3	A4	A5
Pollock	69.713	63.710	42.227	54.028	0
Sablefish	73.210	73.210	40.661	62.308	0
Pacific cod	58.114	51.485	37.122	48.723	0
Arrowtooth	15.986	2.991	8.647	1.387	0
Flathead sole	4.436	1.199	2.791	0.791	0
Rex sole	7.434	7.434	3.717	1.795	0
Flats deep	0.636	0.636	0.306	0.084	0
Flats shallow	8.909	3.548	4.454	0.902	0
Rockfish	15.620	13.890	8.364	10.873	0
Atka	0.809	0.103	0.405	0.040	0
Skates	1.124	1.124	0.562	1.124	0
Other	1.175	0.626	0.662	0.447	0
Totals	**257.164**	**219.955**	**149.917**	**182.502**	**0**

Comparative Analysis of Gross Revenue Model Outputs with 2004 Economic SAFE.

As a means of comparing model output with tabulated values, Table F-34 provides a comparison between 2003 model output and 2003 Revenue Estimates by species group from Table 36 of the 2004 Economic SAFE document. A species by species comparison shows that the model appears to underestimate revenue for all but the Atka mackerel species group. However, it is important to understand that the Economic SAFE data includes State of Alaska Managed Fishery data that is not included in the model.

The totals presented in Table F-34 are the sum of the species totals and this appears to indicate that the model is within 2 percent of the SAFE document total. However, the grand total in Table 36 in the Economic Safe is increased to $1,519 million with the inclusion of State Managed Fisheries, Confidential data, and data not included in these species groups. Thus it is difficult to make exact comparisons, as the methods used to derive these two sets of numbers are inherently different and serve different purposes. The SAFE document is an overall accounting of catch and value from reported data, while the model uses catch and retention data by sector to attempt to predict sector specific revenue associated with future TAC specifications.

Table F-34 Comparison of 2003 Model and Economic SAFE Total First Wholesale Revenue Estimates for the North Pacific Groundfish Fishery.

Species Group	Model	SAFE	Difference	Percent
Pollock	981	987	6	1%
Sablefish	93	95	2	2%
Pacific cod	272	278	5	2%
Flatfish	68	86	18	21%
Rockfish	23	25	2	7%
Atka Mackerel	23	23	0	0%
Total	**1,461**	**1,493**	**33**	**2%**

Sources: NMFS-AKR Gross Revenue Model and 2004 Economic SAFE, table 36, page 87.
Note, the SAFE document adds in state managed fisheries data and confidential data to get a grand total of $1,519 million.

A further comparison of model versus 2004 Economic SAFE revenue estimates by processing mode is presented in table F-35. There are several fundamental difficulties with attempting to make comparisons by processing mode. First, the model does not include State Managed Fishery values and the Economic SAFE does include that data. Thus, the Economic SAFE should, and does, report larger revenue values than the model. Second, the model calculates shoreside value added, while the Economic SAFE tabulates shoreside first wholesale value. Thus, for Table F-35, shoreside value added and CV values from the model are added together to represent a shoreside first wholesale value from the model. Finally, the model treats mothership landings as Catcher Vessel Landings at all times, whereas the Economic SAFE Table 56 treats CPs that act as motherships at some time during the year as CPs for the entire year.

Given these differences, it is difficult to directly compare the model output with Economic SAFE values. What can be compared are the subtotals, which indicate that the SAFE document reports total revenue that is about 13% larger than the model prediction in the GOA but only about 2% larger than model prediction in the BSAI. Overall, the Economic SAFE reports total revenue that is about 4% larger than model output.

Table F-35 Comparison of 2003 Model and SAFE North Pacific Groundfish Fishery Revenue Estimates by Processing Mode

Sector	Model*	SAFE**	Difference	Percent
GOA at sea	37	40	2	5.20%
GOA shoreside	152	180	27	15.25%
Subtotal	**190**	**219**	**29**	**13.44%**
BSAI mothership	-	78	-	-
BSAI CP	667	751	83	11.09%
BSAI shoreside	604	472	-132	-28.02%
Subtotal	**1,271**	**1,300**	**29**	**2.21%**
Total	**1,461**	**1,519**	**58**	**3.83%**

Sources: NMFS-AKR Gross Revenue Model and 2004 Economic SAFE table 23, page 56.
*The model does not include catch and landings in State of Alaska Managed Groundfish fisheries. The model calculates shoreside value added not shoreside gross revenue. Thus, model shoreside values in this chart are the sum of CV and shoreside values for the region. The model treats all mothership landings as catcher vessel landings.

**The SAFE document includes State of Alaska Managed Groundfish fisheries data. The SAFE document calculates shoreside first wholesale gross revenue. The SAFE document treats CPs that act as motherships at some time during the year as CPs for the entire year.

One further comparison is warranted. Table F-36 presents model estimated versus Economic SAFE reported ex-vessel revenue by region. Once again, however, the values are difficult to compare due to structural differences in the way they are calculated and reported. The fundamental difference is that the model treats all mothership landings as ex-vessel landings; thereby including those landing in CV revenue estimates and shoreside value added estimates derived from the CV estimates. This is because the catch and retention data collected by NMFS-AKR In Season Management Staff is reported in this way. In contrast, the Economic SAFE reports (table 20), the ex-vessel value that is actually delivered to shoreside processors, which does not include the mothership deliveries. The Economic SAFE reports the mothership values as first wholesale values in Table 23. As shown in Table F-35 above, mothership first wholesale revenue is reported as $78 million in 2003.

As shown in Table F-36, The model under predicts GOA 2003 ex-vessel revenue by about $10 million, or by about 10%. Since the values reported in table 20 of the Economic SAFE only include harvests counting against federal TACs (i.e. does not include State Managed Fishery data), this discrepancy is unexplained. For the BSAI, the model estimates ex-vessel revenue that is about $37 million (27%) more than reported in the Economic SAFE document. Overall, the model estimates about $28 million (12%) greater ex-vessel revenue in the North Pacific Groundfish Fishery than reported in the Economic SAFE Document. This is likely due to the differing way the model and the Economic SAFE treat mothership data.

Table F-36 Comparison of 2003 Model and SAFE Ex-Vessel Revenue Estimates

Sector	Model*	SAFE**	Difference	Percent
GOA	87	97	10	10.21%
BSAI	176	139	-37	-27.01%
Total	**263**	**235**	**-28**	-11.72%

Source: NMFS-AKR Gross Revenue Model and 2004 Economic Safe Table 20, page 52.
*The model treats all mothership landings as catcher vessel landings.
**The SAFE document reports only deliveries to shoreside processors in table 20.

Appendix G: Detailed Summary of Gross Revenue Model Results[53]

Information on gross revenue changes is summarized here. The approach used to estimate gross revenues for each alternative is discussed in detail in Appendix F. This section merely summarizes the impacts. The detailed results presented here go beyond those used in Section 4.10 of the analytical chapter of the EA, and are a status report on work in progress.

Gross revenue, under each alternative, has been estimated separately for the fisheries harvesting (a) the BSAI TAC and unspecified reserves, (b) the BSAI CDQ reserve, and (c) the GOA TACs. Within each of those allocations, gross revenues have been estimated separately by sector for Catcher Processors (CPs), Catcher Vessels (CVs) and Shoreside processing plants. These separate sector estimates are also presented as a combined revenue estimate consisting of the sum of the three sector estimates. Revenue is projected for each alternative separately for 2006 and 2007, and estimated for the TACs adopted by the Council in the years 2003, 2004, and 2005. The gross revenues impacts of the alternatives are defined with respect to the change between the alternative and the year 2005 estimates. The 2003 through 2005 estimates were generated through the same estimation process used to produce the projections for the alternatives - in other words, the 2003 through 2005 gross revenues estimates were produced, treating the ABCs and TACs for those years in the same manner as the ABCs and TACs for the alternatives. All the alternatives, and the 2005 baseline gross revenues, were estimated using average 2003 prices.

The method used to prepare these first wholesale gross revenue estimates is described in detail in Appendix F. The model makes a large number of simplifying assumptions.[54] These results must be treated as a rough approximation, with a large margin of error. Note that 2003 through 2005 revenue estimates are not historical revenue estimates, but estimates developed from the model, based on the TAC levels in those years, using the same assumptions that were used for the 2005 and 2006 estimates.

The impacts of the preferred alternatives on revenues in the BSAI and the GOA are summarized in Tables G-1 through G-14. These tables present estimated and projected revenue broken out by sectors within three regional allocations. The sectors include Catcher Processors (CPs), Catcher Vessels (CVs), Shorside processing plants, and an aggregate combined sector. The regional allocations include the non-CDQ BSAI TAC allocation, the BSAI CDQ TAC allocation, and the GOA TAC allocation. Estimated revenue is based on past actual catch and retention, while projected revenue is based on proposed alternative 2 (preferred alternative) TAC allocations for both 2006 and 2007. (See Appendix F)

[53] As noted at the start of Section 4.10, NMFS AKR is in the process of developing the gross revenues model to differentiate between revenues flowing to the CP sector, and revenues flowing to the CV and shoreside processing sectors. When this work is completed, it may be combined with regional impact models to provide a more complete picture of the interaction of the fisheries and onshore communities. This will address the needs of an ecosystem approach to management for a more complete view of the fishery-human community interactions. Appendices F and G provide a status report on the state of this project.

[54] An important assumption is that the first wholesale and ex-vessel prices received for fish products do not vary as the level of output varies. Economists refer to this as the perfectly elastic demand. To the extent that prices vary inversely with output levels, and that demand is less elastic, changes in gross revenues associated with the alternatives would be reduced.

Table G-1 Estimated and Projected BSAI Catcher Processor First Wholesale Gross Revenues, 2003-2007.

BSAI CP	Estimated Earned Revenue			Projected Revenue	
	2003	2004	2005	2006 Alt. 2	2007 Alt. 2
Pollock	348,378,509	348,434,518	349,475,352	351,635,434	289,895,745
Sablefish	5,802,236	5,967,204	4,893,129	4,632,048	4,739,740
Pacific cod	148,341,533	154,060,724	147,269,184	139,405,296	123,105,600
Arrowtooth	479,161	479,161	479,161	479,161	1,525,329
Flathead sole	5,621,214	5,340,153	5,480,684	5,621,214	14,221,672
Rock sole	8,568,851	7,984,611	8,081,984	8,179,358	22,610,082
Turbot	3,770,369	3,299,073	3,299,073	3,299,073	9,897,219
Yellowfin	16,730,434	17,194,891	18,116,014	17,978,974	21,894,395
Flats (other)	560,785	560,785	496,079	560,785	3,430,753
Rockfish	7,327,929	6,271,797	6,295,726	6,295,726	8,252,126
Atka	20,851,327	21,893,894	21,893,894	21,893,894	31,555,009
Other	2,808,659	2,333,516	2,480,590	2,496,977	4,903,006
Column total	569,241,007	573,820,326	568,260,870	562,477,939	536,030,674

As shown in Table G-1, total first wholesale gross revenue for BSAI CPs is estimated to have been near or above $570 million during the 2003, 2004 and 2005 seasons. Pollock, Pacific cod, Atka mackerel, and yellowfin sole, in that order, are the largest shares of estimated first wholesale gross revenue for BSAI CPs.

First wholesale gross revenues for this sector are projected to decline to approximately $562 million and $536 million 2006 and 2007 respectively. The projected decline in 2006 is primarily the result of reduced Pacific cod revenue, while the projected decline in 2007 comes from additional Pacific cod revenue declines and substantial declines in pollock revenue. Revenues from all other species groups are projected to increase in 2007, however, these increases are not sufficient to overcome projected revenue declines for pollock and Pacific cod.

Table G-2 Estimated and Projected BSAI Catcher Vessel Revenue, 2003-2007.

BSAI CV	Estimated Earned Revenue			Projected Revenue	
	2003	2004	2005	2006 Alt. 2	2007 Alt. 2
Pollock	127,610,437	127,630,953	128,012,209	128,803,443	117,987,004
Sablefish	5,692,950	5,854,810	4,800,966	4,544,802	5,493,394
Pacific cod	36,782,384	38,200,500	36,516,487	34,566,577	32,999,942
Arrowtooth	1,778	1,778	1,778	1,778	6,119
Flathead sole	9,672	9,188	9,430	9,672	26,454
Rock sole	19,102	17,800	18,017	18,234	54,491
Turbot	23,385	20,462	20,462	20,462	66,363
Yellowfin	707,033	726,661	765,588	759,796	1,000,285
Flats (other)	2,466	2,466	2,182	2,466	16,312
Rockfish	83,600	71,551	71,824	71,824	101,777
Atka	7,575	7,954	7,954	7,954	12,393
Other	80,880	67,198	71,433	71,905	152,638
Column total	171,021,263	172,611,321	170,298,330	168,878,915	157,917,173

Table G-2 shows that total ex-vessel gross revenue for BSAI CVs is estimated to have been near or above $170 million during the 2003, 2004 and 2005 seasons. Note that these are ex-vessel values and do not include processing "value added," which is presented in the shoreside sector table below. Pollock, Pacific cod, and sablefish, in that order, are the largest shares of estimated ex-vessel revenue for BSAI CVs.

Ex-vessel revenues for this sector are projected to decline to approximately $169 million and $158 million 2006 and 2007 respectively. The projected decline in 2006 is primarily the result of reduced Pacific Cod revenue, while the projected decline in 2007 comes from additional reduction in Pacific Cod revenue and decreased pollock revenue. Revenues from all other species groups are projected to increase in 2007, however, these increases are not sufficient to overcome projected revenue declines for pollock and Pacific cod

Table G-3 shows that shoreside processing of BSAI CV catch is estimated to have generated "value added" revenue of between $415 and $417.5 million in 2003, 2004, and 2005. A slight increase is projected for 2006. However, declining pollock revenue is projected to push BSAI shoreside value added down to approximately $391 million in 2007.

Table G-3 Estimated and Projected BSAI Shoreside Value Added, 2003-2007.

BSAI	Estimated Earned Revenue			Projected Revenue	
Shoreside	2003	2004	2005	2006 Alt. 2	2007 Alt. 2
Pollock	375,040,265	375,100,560	376,221,051	378,546,446	346,757,508
Sablefish	1,688,784	1,736,799	1,424,182	1,348,192	1,629,587
Pacific cod	26,181,221	27,190,617	25,991,959	24,604,039	23,488,928
Arrowtooth	20,250	20,250	20,250	20,250	69,688
Flathead sole	233,402	221,732	227,567	233,402	638,387
Rock sole	152,254	141,873	143,603	145,333	434,316
Turbot	74,935	65,568	65,568	65,568	212,652
Yellowfin	11,930,347	12,261,547	12,918,393	12,820,671	16,878,625
Flats (other)	96,722	96,722	85,562	96,722	639,700
Rockfish	65,094	55,712	55,925	55,925	79,247
Atka	102,607	107,737	107,737	107,737	167,868
Other	89,937	74,722	79,431	79,956	169,730
Column total	415,675,817	417,073,840	417,341,228	418,124,241	391,166,238

Estimated and projected revenues for the CP, CV, and shoreside sectors combined are shown in Table G-4. Total 2003 revenues for these sectors are estimated to have been approximately $1.156 billion. Total estimated revenue rose to $1.164 billion in 2004 before declining back to the 2003 estimate of $1.156 billion in 2005. Consistent with revenue declines projected for the sectors themselves, combined revenue is projected to decrease to $1.150 billion and then $1.085 billion in 2006 and 2007 respectively. Similar to the CP and shoreside sectors, the largest share of total revenue is estimated to be from pollock, Pacific cod, yellowfin sole, and Atka mackerel.

Table G-4 Estimated and Projected BSAI Combined Revenue, 2003-2007.

BSAI Combined	Estimated Earned Revenue			Projected Revenue	
	2003	2004	2005	2006 Alt. 2	2007 Alt. 2
Pollock	851,029,211	851,166,032	853,708,613	858,985,323	754,640,257
Sablefish	13,183,970	13,558,813	11,118,278	10,525,043	11,862,721
Pacific cod	211,305,137	219,451,841	209,777,630	198,575,912	179,594,470
Arrowtooth	501,188	501,188	501,188	501,188	1,601,135
Flathead sole	5,864,289	5,571,074	5,717,681	5,864,289	14,886,513
Rock sole	8,740,207	8,144,284	8,243,605	8,342,925	23,098,889
Turbot	3,868,689	3,385,103	3,385,103	3,385,103	10,176,234
Yellowfin	29,367,814	30,183,099	31,799,995	31,559,442	39,773,305
Flats (other)	659,973	659,973	583,822	659,973	4,086,765
Rockfish	7,476,623	6,399,060	6,423,476	6,423,476	8,433,150
Atka	20,961,509	22,009,585	22,009,585	22,009,585	31,735,270
Other	2,979,476	2,475,436	2,631,454	2,648,838	5,225,374
Column total	1,155,938,086	1,163,505,488	1,155,900,429	1,149,481,096	1,085,114,084

Tables G-5 through G-9 present sector level estimated and projected revenues for the CDQ reserve allocation of the BSAI TAC[55]. As Table G-5 shows, BSAI CDQ CP estimated total first wholesale gross revenue has been consistently near $98 million in the past three years. The largest shares of total first wholesale gross revenue for this sector have come from pollock, Pacific cod, Atka mackerel and yellowfin sole. Total first wholesale gross revenue for this sector is projected to remain near $98 million in 2006 before declining to approximately $84 million in 2007. The 2007 decline is primarily due to reduced pollock and Pacific cod revenue that is not offset by increases in revenue from several species groups.

[55] It is important to note that these figures report the value of the CDQ reserves, not the receipts received by the CDQ groups. CDQ receipts will be considerably lower than revenue values, since CDQ groups lease out large parts of their allotments in return for royalty payments. For example, pollock royalties were estimated at about $43 million in 2003, while the model projections suggest that the CDQ CP pollock allocations had a first wholesale value of about $98 million. (http://www.commerce.state.ak.us/bsc/CDQ/pub/CDQa_pollock.pdf accessed on Jan 4, 2004 and Table 4.11-5 above)

Table G-5 Estimated and Projected BSAI CDQ Catcher Processor First Wholesale Gross Revenues, 2003-2007.

BSAI CDQ	Estimated Earned Revenue			Projected Revenue	
CP	2003	2004	2005	2006 Alt. 2	2007 Alt. 2
Pollock	78,355,870	78,368,468	78,602,568	79,088,405	65,202,166
Sablefish	229,864	229,864	193,870	183,524	187,450
Pacific cod	15,878,577	16,490,763	15,763,792	14,922,036	13,177,306
Arrowtooth	16,895	16,895	16,895	16,895	53,781
Flathead sole	144,109	136,904	140,506	144,109	364,596
Rock sole	108,196	100,819	102,049	103,278	285,490
Turbot	106,037	92,783	92,783	92,783	278,348
Yellowfin	861,433	885,348	932,775	925,719	1,127,321
Flats (other)	11,557	11,557	10,223	11,557	70,702
Rockfish	467,282	399,935	401,461	401,461	526,215
Atka	1,667,402	1,750,772	1,750,772	1,750,772	2,523,335
Other	236,117	196,173	208,537	209,914	412,183
Column total	98,083,339	98,680,279	98,216,231	97,850,453	84,208,893

Estimated and Projected revenue for BSAI CDQ CVs is shown in Table G-6 and paints a somewhat different picture than for CPs. Pollock contributes the greatest share of total ex-vessel revenue, however, sablefish is of second most importance with Pacific cod a distant third. BSAI CDQ CV total ex-vessel revenue estimates are consistently near $5 million over the past three years, are projected to decrease only slightly in 2006, but are projected to decrease to just over $4 million in 2007.

Table G-6 Estimated and Projected BSAI CDQ Catcher Vessel Revenue, 2003-2007.

BSAI CDQ	Estimated Earned Revenue			Projected Revenue	
CV	2003	2004	2005	2006 Alt. 2	2007 Alt. 2
Pollock	3,941,025	3,941,659	3,953,433	3,977,869	3,279,440
Sablefish	936,988	936,988	790,265	748,091	764,097
Pacific cod	135,998	141,242	135,015	127,806	112,862
Arrowtooth	52	52	52	52	166
Flathead sole	210	199	204	210	530
Rock sole	224	209	211	214	592
Turbot	1,437	1,257	1,257	1,257	3,771
Yellowfin	172	177	186	185	225
Flats (other)	15	15	14	15	94
Rockfish	18,100	15,491	15,550	15,550	20,383
Atka	116	122	122	122	175
Other	683	568	603	607	1,192
Column total	5,035,020	5,037,978	4,896,914	4,871,979	4,183,528

Table G-7 presents BSAI CDQ shoreside value added estimates and projections and shows that total estimated value added has consistently been about $12 million for this sector over the past three years. Pollock is the dominant contributor with estimated value added revenue of about $11.5 million or more in each of the past three years. Sablefish is a very distant second followed by Pacific cod. Similar to overall BSAI shoreside value added, CDQ shoreside value added is projected to have a slight increase in 2006 before declining considerably to around $10 million in 2007.

Table G-7 Estimated and Projected BSAI CDQ Shoreside Value Added, 2003-2007.

BSAI CDQ Shoreside	Estimated Earned Revenue			Projected Revenue	
	2003	2004	2005	2006 Alt. 2	2007 Alt. 2
Pollock	11,582,462	11,584,324	11,618,929	11,690,744	9,638,099
Sablefish	277,953	277,953	234,428	221,917	226,666
Pacific cod	96,802	100,534	96,102	90,970	80,334
Arrowtooth	594	594	594	594	1,889
Flathead sole	5,056	4,803	4,930	5,056	12,792
Rock sole	1,787	1,665	1,685	1,706	4,715
Turbot	4,604	4,028	4,028	4,028	12,084
Yellowfin	2,904	2,984	3,144	3,121	3,800
Flats (other)	604	604	534	604	3,694
Rockfish	14,093	12,062	12,108	12,108	15,871
Atka	1,571	1,649	1,649	1,649	2,377
Other	760	631	671	675	1,326
Column total	11,989,188	11,991,832	11,978,802	12,033,173	10,003,646

BSAI CDQ combined revenue is estimated to have been between $115 million and $116 million over the past three years and is projected to be just below $115 million in 2006 before falling to $98 million in 2007. Note that the scale of the CP sector revenues have made Pacific cod and Atka mackerel the second and third largest components behind pollock. Sablefish is the fourth largest component of BSAI CDQ combined total revenue.

Table G-8 Estimated and Projected BSAI CDQ Combined Revenue, 2003-2007.

BSAI CDQ Combined	Estimated Earned Revenue			Projected Revenue	
	2003	2004	2005	2006 Alt. 2	2007 Alt. 2
Pollock	93,879,357	93,894,450	94,174,930	94,757,018	78,119,705
Sablefish	1,444,805	1,444,805	1,218,563	1,153,533	1,178,213
Pacific cod	16,111,377	16,732,539	15,994,909	15,140,812	13,370,502
Arrowtooth	17,540	17,540	17,540	17,540	55,836
Flathead sole	149,375	141,906	145,640	149,375	377,918
Rock sole	110,207	102,693	103,946	105,198	290,797
Turbot	112,077	98,068	98,068	98,068	294,203
Yellowfin	864,509	888,509	936,106	929,025	1,131,346
Flats (other)	12,176	12,176	10,771	12,176	74,490
Rockfish	499,475	427,489	429,120	429,120	562,469
Atka	1,669,089	1,752,543	1,752,543	1,752,543	2,525,887
Other	237,559	197,371	209,811	211,197	414,701
Column total	115,107,547	115,710,089	115,091,946	114,755,604	98,396,068

Table G-9 Estimated and Projected GOA Catcher Processor First Wholesale Gross Revenues, 2003-2007.

GOA CP	Estimated Earned Revenue			Projected Revenue	
	2003	2004	2005	2006 Alt. 2	2007 Alt. 2
Pollock	166,199	217,908	280,443	321,756	292,094
Sablefish	12,938,912	14,381,396	13,851,326	12,930,222	12,078,635
Pacific cod	8,213,194	9,731,237	9,001,896	11,223,753	9,440,919
Arrowtooth	2,036,745	2,036,745	2,036,745	2,036,745	2,036,745
Flathead sole	523,710	511,028	488,013	495,857	452,974
Rex sole	5,147,454	6,875,955	6,875,955	6,875,955	6,875,955
Flat (deep)	32,190	40,040	44,987	44,987	44,987
Flat (shallow)	168,085	161,244	161,244	161,244	161,244
Rockfish	8,059,370	7,347,387	7,602,908	7,390,834	7,270,541
Atka	84,522	84,522	84,522	84,522	84,522
Skates	0	294,186	342,649	342,607	342,607
Other	74,215	82,994	91,424	98,938	92,077
Column total	37,444,596	41,764,642	40,862,112	42,007,419	39,173,298

Notes: The skate fishery was in transition during this period. A targeted fishery emerged in 2003, and skates were moved from the “other fisheries” to the “target” category by FMP amendment in 2004.

Turning attention to the Gulf of Alaska (GOA), Table G-9 through 4.10-12 presents estimated and projected revenue, by sector, for the GOA. Table G-9 provides data on first wholesale gross revenue estimates and projections for GOA CPs. Total first wholesale gross revenue is estimated to have been approximately $37.5 million, $42 million, and $41 million in 2003, 2004, and 2005 respectively. Sablefish contributes the largest share of GOA CP total first wholesale gross revenue. Pacific cod, rockfish, and rex sole are respectively the next most important species groups for GOA CPs.

An increase in total first wholesale gross revenue to about $42 million is projected for GOA CPs in 2006. A decline to just over $39 million is projected for this sector in 2007. Most of the projected decline is due to projected declines in pacific cod first wholesale gross revenues.

As shown in Table G-10, CVs operating in the GOA are estimated to have earned ex-vessel revenues of about $87 million, $99 million, and $98 million in 2003, 2004, and 2005 respectively. Similar to GOA CPs, sablefish and Pacific cod are respectively the first and second largest contributors to total ex-vessel revenue for GOA CVs. In contrast to GAO CPs, pollock is the third most important species in terms of contribution to total ex-vessel revenue. Total GOA CV ex-vessel revenues are projected to increase to just over $100 million in 2006 before declining to $91 million in 2007. These declines are primarily the result of projected declines in sablefish and Pacific cod revenue for this sector.

Table G-11 provides estimated and projected shoreside value added revenue in the GOA. Estimated total GOA shoreside value added revenue increased from about $65 million in 2003, to nearly $79 million in 2004, and rose to about $88 million in 2005. Pollock is the dominant revenue generator for the GOA shoreside processing sector. Pacific cod, sablefish, and rockfish are respectively the next important revenue generators for this sector.

Table G-10 Estimated and Projected GOA Catcher Vessel Revenue, 2003-2007.

GOA CV	Estimated Earned Revenue			Projected Revenue	
	2003	2004	2005	2006 Alt. 2	2007 Alt. 2
Pollock	6,986,086	9,159,678	11,788,298	13,524,857	12,278,031
Sablefish	56,510,793	62,810,854	60,495,771	56,472,841	52,753,527
Pacific cod	18,904,011	22,398,036	20,719,337	25,833,306	21,729,821
Arrowtooth	169,032	169,032	169,032	169,032	169,032
Flathead sole	186,960	182,433	174,216	177,017	161,708
Rex sole	72,197	96,441	96,441	96,441	96,441
Flat (deep)	118,869	147,856	166,125	166,125	166,125
Flat (shallow)	1,064,746	1,021,407	1,021,407	1,021,407	1,021,407
Rockfish	2,370,437	2,161,027	2,236,181	2,173,805	2,138,424
Atka	811	811	811	811	811
Skates	0	261,076	304,085	304,048	304,048
Other	352,063	393,710	433,700	469,344	436,795
Column total	86,736,005	98,802,361	97,605,405	100,409,033	91,256,169

Notes: The skate fishery was in transition during this period. A targeted fishery emerged in 2003, and skates were moved from the "other fisheries" to the "target" category by FMP amendment in 2004.

Total GOA shoreside value added revenue is projected to increase to about $99 million in 2006 before declining to just over $89.5 million in 2007. The projected increase for 2006 is primarily due to increased Pollock and Pacific cod revenues, while the 2007 decline is primarily due to decreases in those two categories.

Table G-11 Estimated and Projected GOA Shoreside Value Added, 2003-2007.

GOA Shoreside	Estimated Earned Revenue			Projected Revenue	
	2003	2004	2005	2006 Alt. 2	2007 Alt. 2
Pollock	29,098,204	38,151,574	49,100,208	56,333,267	51,140,027
Sablefish	8,974,767	9,975,312	9,607,642	8,968,740	8,378,057
Pacific cod	17,672,206	20,938,556	19,369,243	24,149,980	20,313,882
Arrowtooth	784,787	784,787	784,787	784,787	784,787
Flathead sole	675,534	659,176	629,489	639,607	584,292
Rex sole	345,281	461,225	461,225	461,225	461,225
Flat (deep)	303,740	377,807	424,489	424,489	424,489
Flat (shallow)	2,466,143	2,365,764	2,365,764	2,365,764	2,365,764
Rockfish	4,967,168	4,528,357	4,685,840	4,555,134	4,480,994
Atka	17,944	17,944	17,944	17,944	17,944
Skates	0	409,534	477,000	476,941	476,941
Other	78,510	87,798	96,716	104,664	97,406
Column total	65,384,284	78,757,834	88,020,346	99,282,541	89,525,808

Notes: The skate fishery was in transition during this period. A targeted fishery emerged in 2003, and skates were moved from the "other fisheries" to the "target" category by FMP amendment in 2004.

Table G-12 provides estimated and projected revenue for all GOA sectors combined. Combined total revenue is estimated to have been $189.5 million, $219.3 million and $226.5 million in 2003, 2004, and 2005 respectively. Sablefish contributes the largest share to these estimates.

Pacific cod was the second largest contributor, followed by pollock, in 2003 and 2004. However, in 2005, pollock revenue is estimated to have been larger than Pacific cod revenue. Rockfish is consistently the fourth largest contributor to combined total revenue in the GOA.

Table G-12 Estimated and Projected GOA Combined Revenue, 2003-2007.

GOA	Estimated Earned Revenue			Projected Revenue	
Combined	2003	2004	2005	2006 Alt. 2	2007 Alt. 2
Pollock	36,250,489	47,529,160	61,168,949	70,179,880	63,710,152
Sablefish	78,424,472	87,167,563	83,954,740	78,371,802	73,210,219
Pacific cod	44,789,411	53,067,829	49,090,476	61,207,039	51,484,622
Arrowtooth	2,990,563	2,990,563	2,990,563	2,990,563	2,990,563
Flathead sole	1,386,204	1,352,636	1,291,718	1,312,480	1,198,973
Rex sole	5,564,932	7,433,621	7,433,621	7,433,621	7,433,621
Flat (deep)	454,799	565,703	635,600	635,600	635,600
Flat (shallow)	3,698,974	3,548,415	3,548,415	3,548,415	3,548,415
Rockfish	15,396,975	14,036,770	14,524,929	14,119,773	13,889,959
Atka	103,278	103,278	103,278	103,278	103,278
Skates	0	964,797	1,123,734	1,123,596	1,123,596
Other	504,788	564,502	621,840	672,946	626,278
Column total	189,564,885	219,324,837	226,487,863	241,698,994	219,955,275

Notes: The skate fishery was in transition during this period. A targeted fishery emerged in 2003, and skates were moved from the “other fisheries” to the “target” category by FMP amendment in 2004.

Total GOA combined revenue is projected to increase to $242 million in 2006 before declining to about $220 million in 2007. The projected 2007 decline is primarily due to decreased pollock, sablefish, and Pacific cod revenue.

The 2003 estimates from the model projections can be compared to the estimates for those years from the annual Economic SAFE. The total estimated 2003 first wholesale revenues from the combined revenue Tables G-4, G-8, and G-12 were about $1.46 billion; the total from the SAFE was $1.519 billion. The 2003 estimates in this EA were thus about 4% less than those in the SAFE. (SAFE estimates from the 2004 Economic SAFE, Table 36 on pages 86-87).

Table G-13 presents model projections of gross revenue by alternative, sector, and region for 2006 and 2007. This table provides a comprehensive overview of how differing TAC specifications of the alternatives result in differing revenue projections. The alternative 2 projections are the same 2006 and 2007 total revenue projections presented above in tables G-1 through G-12.

It is important to note that model projections of revenue by alternative vary only due to changes in TAC. Within each sector and region, catch rates, retention rates, and prices for each species group are all held constant across TAC alternatives. Thus, the revenue projections shown in Table G-13 simply show the effect on total revenue of changes in TAC by alternative. Alternative 1 TACs are generally the least restrictive in terms of total biomass harvested, while alternative 2 TACs are set close to the current year TAC levels. Alternative 3 is set as the most restrictive harvest level that still allows a fishery to continue. Alternative 4 is generally less restrictive than alternative 3, but more restrictive than alternative 2. Finally, alternative 5 does not allow harvest and results in zero revenue in all sectors and regions.

Given the relative level of harvest constraint set by each alternative, it is reasonable to expect that total revenue would be greatest for alternative 1, somewhat less for alternative 2, lowest for alternative 3, and that alternative 4 would revenue would be somewhere in between that projected for alternative 2 and alternative 3. A review of Table G-13 shows this to be generally true. However, there is a notable exception. Combined 2007 non-CDQ BSAI total revenue is projected to be greater for alternative 2 ($1.085 billion) as compared to alternative 1 ($1.070 billion).

The results of this analysis are further summarized in Table G-14 as well as graphically in Figures G-1, G-2, and G-3. Table G-14 provides numeric estimates of the projected change in revenue versus the 2005 level. Note that these numbers are rounded to millions of dollars and that alternative 5 values (i.e. no fishery) are equivalent to the negative of 2005 estimated revenue.

In addition, figures 4.10-1, 4.10-2, and 4.10-3 shows the difference between 2005 revenue estimates, and the revenue estimates for each of the alternatives in 2006 and 2007. If the revenues associated with the alternative are greater than the 2005 estimated revenue, the appropriate bar in the figure is positive, if they are less than the 2005 estimated revenue, the bar is negative.

Table G-13 Model Projections of Revenue by Alternative, Sector, and Region: 2006 and 2007 (millions of dollars)

BSAI	CP		CV		Shoreside		Combined	
Alternative	2006	2007	2006	2007	2006	2007	2006	2007
Alt 1	$692	$530	$189	$157	$472	$383	$1,353	$1,070
Alt 2 (proposed)	$562	$536	$169	$158	$418	$391	$1,149	$1,085
Alt 3	$374	$348	$103	$106	$259	$262	$735	$716
Alt 4	$459	$408	$138	$135	$333	$319	$930	$861
Alt 5	$0	$0	$0	$0	$0	$0	$0	$0
BSAI CDQ	**CP**		**CV**		**Shoreside**		**Combined**	
Alternative	2006	2007	2006	2007	2006	2007	2006	2007
Alt 1	$112	$83	$5	$4	$13	$10	$131	$97
Alt 2 (proposed)	$98	$84	$5	$4	$12	$10	$115	$98
Alt 3	$61	$56	$3	$3	$7	$7	$71	$66
Alt 4	$80	$70	$4	$3	$10	$8	$94	$82
Alt 5	$0	$0	$0	$0	$0	$0	$0	$0
GOA	**CP**		**CV**		**Shoreside**		**Combined**	
Alternative	2006	2007	2006	2007	2006	2007	2006	2007
Alt 1	$58	$52	$113	$99	$125	$106	$296	$257
Alt 2 (proposed)	$42	$39	$100	$91	$99	$90	$242	$220
Alt 3	$30	$29	$59	$57	$65	$63	$154	$150
Alt 4	$30	$29	$83	$79	$78	$75	$191	$183
Alt 5	$0	$0	$0	$0	$0	$0	$0	$0

Perhaps the most obvious result depicted in Table G-14 is the projection that 2007 revenues in the BSAI will be considerably lower than 2005 levels across all alternatives and sectors. This is also true for many sectors in the GOA. Further, 2006 alternative 2 combined BSAI revenues are projected to decline while 2006 combined BSAI CDQ revenue has no projected change.

Table G-14 Model Projections of Change in Revenue from 2005 Levels by Alternative, Sector, and Region: 2006 and 2007 (millions of dollars)

Sector	Year	Alternative 1	2	3	4	5
BSAI CP	2006	$124	-$6	-$194	-$110	-$568
	2007	-$38	-$32	-$220	-$161	-$568
BSAI CV	2006	$18	-$1	-$68	-$32	-$170
	2007	-$14	-$12	-$64	-$36	-$170
BSAI Shoreside	2006	$55	$1	-$159	-$84	-$417
	2007	-$34	-$26	-$156	-$98	-$417
BSAI Combined	2006	$197	-$6	-$421	-$226	-$1,156
	2007	-$86	-$71	-$440	-$295	-$1,156
BSAI CDQ CP	2006	$13	$0	-$37	-$18	-$98
	2007	-$15	-$14	-$42	-$29	-$98
BSAI CDQ CV	2006	$1	$0	-$2	-$1	-$5
	2007	-$1	-$1	-$2	-$1	-$5
BSAI CDQ Shoreside	2006	$2	$0	-$5	-$2	-$12
	2007	-$2	-$2	-$5	-$4	-$12
BSAI CDQ Combined	2006	$16	$0	-$44	-$22	-$115
	2007	-$18	-$17	-$49	-$34	-$115
GOA CP	2006	$17	$1	-$11	-$11	-$41
	2007	$11	-$2	-$12	-$12	-$41
GOA CV	2006	$15	$3	-$39	-$15	-$98
	2007	$1	-$6	-$40	-$19	-$98
GOA Shoreside	2006	$37	$11	-$23	-$10	-$88
	2007	$18	$2	-$25	-$13	-$88
GOA Combined	2006	$70	$15	-$72	-$35	-$226
	2007	$31	-$7	-$77	-$44	-$226

The numeric findings presented above are also presented graphically in figures 4.10-1 through 4.10-3.

Figure G-1 Difference Between Model Estimates of BSAI 2005 Revenues and Model Projections of BSAI 2006 and 2007 Revenues for Each Alternative, Sector, and for all Sectors Combined (in millions of dollars)

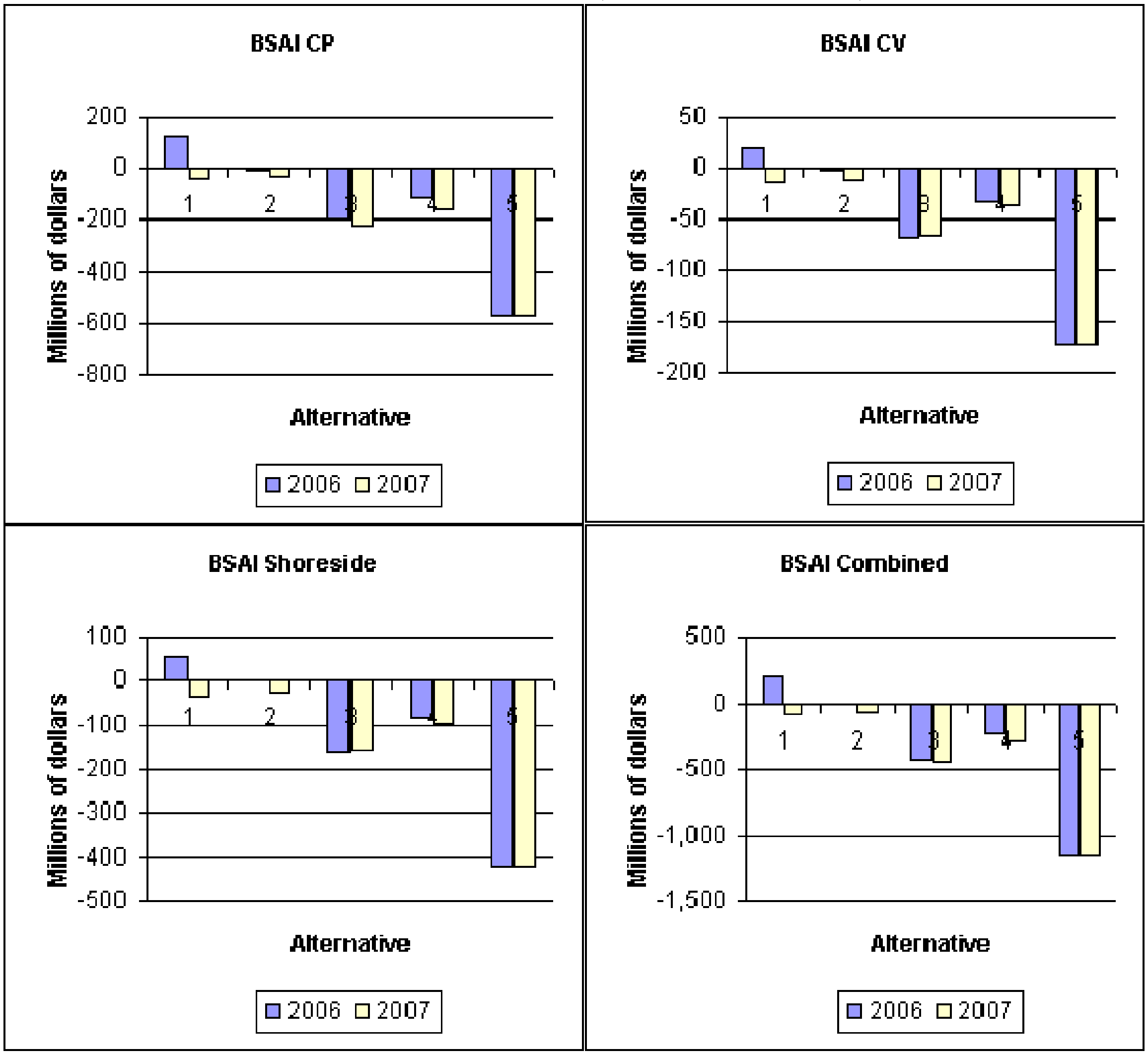


Figure G-2 Difference Between Model Estimates of BSAI CDQ 2005 Revenues and Model Projections of BSAI CDQ 2006 and 2007 Revenues for Each Alternative, Sector, and for all Sectors Combined (in millions of dollars)

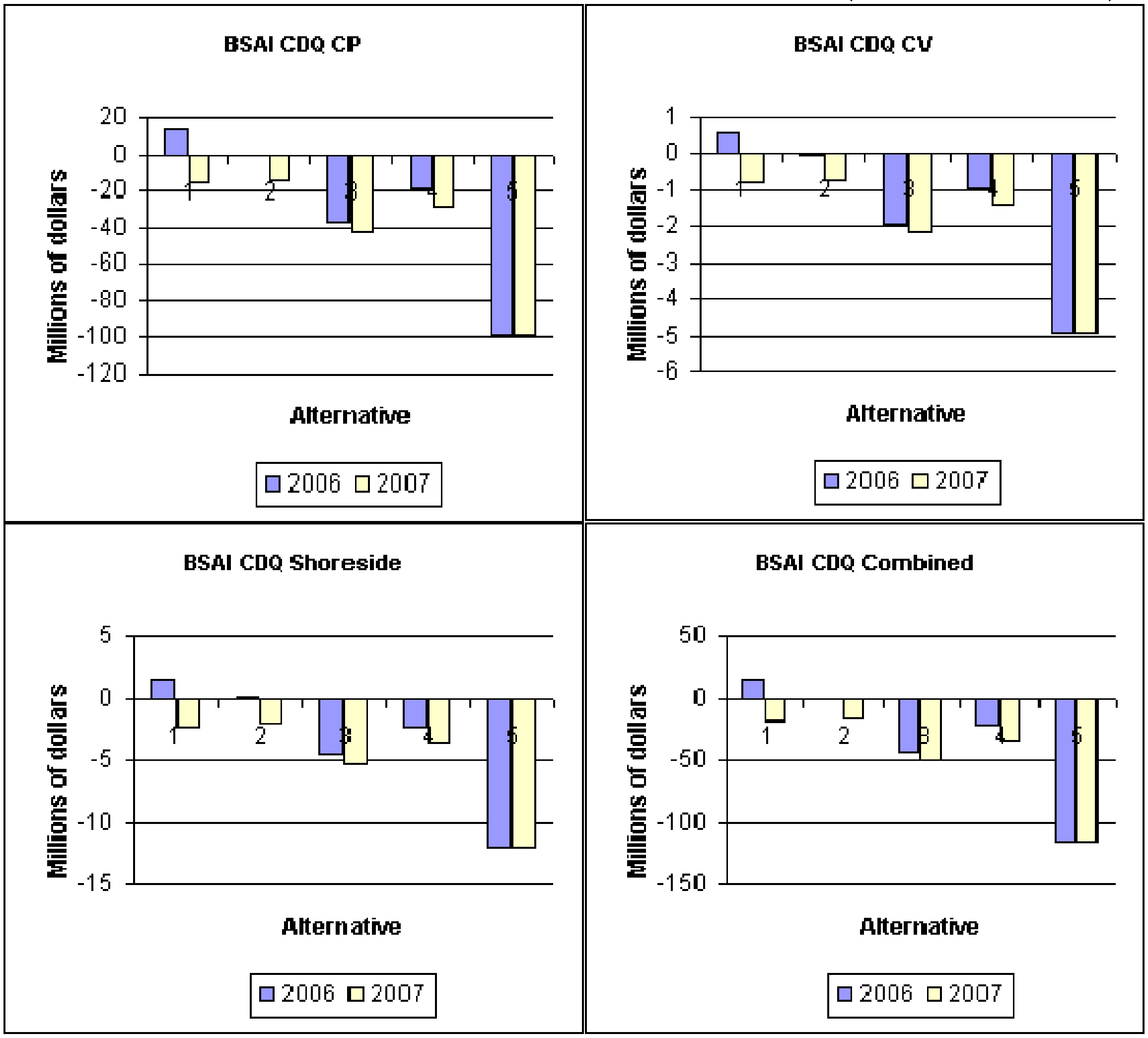
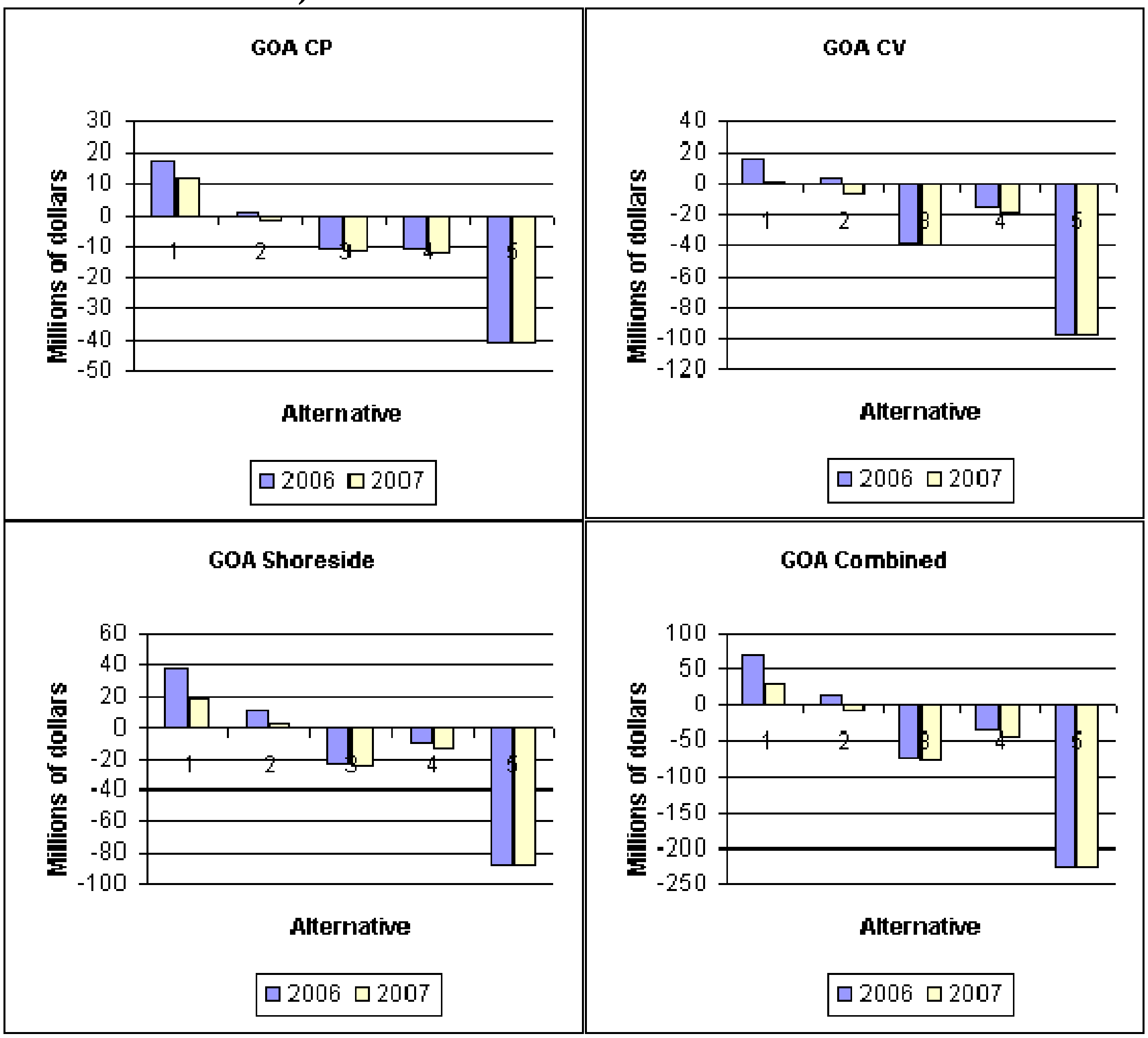


Figure G-3 Difference Between Model Estimates of GOA 2005 Revenues and Model Projections of GOA 2006 and 2007 Revenues for Each Alternative, Sector, and for all Sectors Combined (in millions of dollars)



Appendix H: Text of PSEIS Amendments 81 to BSAI FMP and 74 to GOA FMP

The policy, goals and objective texts for Amendments 81 and 74 are identical. Therefore, the text for Amendment 81 only is shown below.

AMENDMENT 81to the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area

In Section 2.0, Executive Summary, revise the first heading and following text to read as follows:

Management Goal to be Attained

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

Ecological, Economic and Social Impacts

(continue as written)

Revise Section 3.2 to read as follows:

3.2 Goals and Objectives for Management Plan

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

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

minimize human-caused threats to protected species; maintain a healthy marine resource habitat; and incorporate ecosystem-based considerations into management decisions.

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

Adaptive management requires regular and periodic review. Objectives identified in this policy statement will be reviewed annually by the Council. The Council will also review, modify, eliminate, or consider new issues, as appropriate to best carry out the goals and objectives of this management policy.

To meet the goals of this overall management approach, the Council and NMFS will use the PSEIS as a planning document. To help focus its consideration of potential management measures, it will use the following objectives as guideposts to be re-evaluated, as amendments to the FMP are considered over the life of the PSEIS.

Prevent Overfishing:

1. Adopt conservative harvest levels for multi-species and single species fisheries and specify optimum yield.
2. Continue to use the existing optimum yield cap for the BSAI (as stated in current law) groundfish fisheries.
3. Provide for adaptive management by continuing to specify optimum yield as a range.
4. Initiate a scientific review of the adequacy of F_{40} and adopt improvements, as appropriate.
5. Continue to improve the management of species through species categories.

Promote Sustainable Fisheries and Communities:

6. Promote conservation while providing for optimum yield in terms of providing 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.
7. Promote management measures that, while meeting conservation objectives, are also designed to avoid significant disruption of existing social and economic structures.
8. 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.
9. Promote increased safety at sea.

Preserve Food Web:

10. Develop indices of ecosystem health as targets for management.
11. Improve the procedure to adjust ABCs as necessary to account for uncertainty and ecosystem factors.
12. Continue to protect the integrity of the food web through limits on harvest of forage species.
13. Incorporate ecosystem-based considerations into fishery management decisions, as appropriate.

Manage Incidental Catch and Reduce Bycatch and Waste:

14. Continue and improve current incidental catch and bycatch management program.

15. 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.
16. Encourage research programs to evaluate current population estimates for non-target species with a view to setting appropriate bycatch limits, as information becomes available.
17. 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.
18. Continue to manage incidental catch and bycatch through seasonal distribution of TAC and geographical gear restrictions.
19. Continue to account for bycatch mortality in TAC accounting and improve the accuracy of mortality assessments for target, PSC bycatch, and non-commercial species.
20. Control the bycatch of prohibited species through PSC limits or other appropriate measures.
21. Reduce waste to biologically and socially acceptable levels.

Avoid Impacts to Seabirds and Marine Mammals:

22. Continue to cooperate with USFWS to protect ESA-listed seabird species, and if appropriate and practicable, other seabird species.
23. 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.
24. Encourage programs to review status of endangered or threatened marine mammal stocks and fishing interactions and develop fishery management measures as appropriate.
25. Continue to cooperate with NMFS and USFWS to protect ESA-listed marine mammal species, and if appropriate and practicable, other marine mammal species.

Reduce and Avoid Impacts to Habitat:

26. Review and evaluate efficacy of existing habitat protection measures for managed species.
27. Identify and designate EFH and HAPC pursuant to Magnuson-Stevens Act rules, and mitigate fishery impacts as necessary and practicable to continue the sustainability of managed species.
28. Develop a Marine Protected Area policy in coordination with national and state policies.
29. Encourage development of a research program to identify regional baseline habitat information and mapping, subject to funding and staff availability.
30. Develop goals, objectives and criteria to evaluate the efficacy and suitable design of marine protected areas and no-take marine reserves as tools to maintain abundance, diversity, and productivity. Implement marine protected areas if and where appropriate.

Promote Equitable and Efficient Use of Fishery Resources:

31. Provide economic and community stability to harvesting and processing sectors through fair allocation of fishery resources.
32. Maintain LLP program and modify as necessary, and further decrease excess fishing capacity and overcapitalization by eliminating latent licences and extending programs such as community or rights-based management to some or all groundfish fisheries.
33. Provide for adaptive management by periodically evaluating the effectiveness of rationalization programs and the allocation of access rights based on performance.

34. Develop management measures that, when practicable, consider the efficient use of fishery resources taking into account the interest of harvesters, processors, and communities.

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.

Improve Data Quality, Monitoring and Enforcement:

38. Increase the utility of groundfish fishery observer data for the conservation and management of living marine resources.
39. Improve the North Pacific Groundfish Observer Program, and consider ways to address the disproportionate costs associated with the current funding mechanism.
40. Improve community and regional economic impact costs and benefits through increased data reporting requirements.
41. Increase the quality of monitoring and enforcement data through improved technological means.
42. 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.
43. Cooperate with research institutions such as the North Pacific Research Board (NPRB) in identifying research needs to address pressing fishery issues.
44. Promote enhanced enforceability.
45. Continue to cooperate and coordinate management and enforcement programs with the Alaska Board of Fish, Department of Fish and Game, and Alaska Fish and Wildlife Protection, the U.S. Coast Guard, NMFS Enforcement, IPHC, 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.

Appendix I: SSC Comments from the December 2004 meeting

The December 2004 SSC comments on the analysis for the 2005-06 Specifications were summarized in the SSC minutes and are shown below. The underlined text describes the changes made to this year's EA that address these comments:

1. Changes to the categories of social and economic impacts listed on Page 97 are not fully encompass the suite of impacts included in the original categories. Specifically, *subsistence* does not encompass the full suite of *non-market use values*. Non-market use values include recreational, subsistence and other cultural harvests, values associated with observing fish in nature, harvest values of ecologically related species, the value of ecosystem services contributed by a sustainable fishery, and values associated with preserving the opportunity to use a fishery resource at some future time, as well as the value of preserving the opportunity to use other resources that are dependent on the resource. The sections in the economic and social analysis have been organized to address: (1) recreational, (2) subsistence, and (3) changes in the value of other ecosystem services, including values associated with observing fish in nature, harvest values of ecologically related species, the value of ecosystem services contributed by a sustainable fishery, and values associated with preserving the opportunity to use a fishery resource at some future time, as well as the value of preserving the opportunity to use other resources that are dependent on the resource.

2. Pages 98 & 99 of the EA provided estimated and projected revenues. Table 4.11 and the accompanying discussion should be augmented to include actual revenues where estimates of actual revenues are available. Including actual revenues will help to convey information about the coherence between model-based estimates of revenue and observed revenues. The text should be carefully edited to specify whether statements such as "From 2002 though 2004, an increasing trend in overall revenue is evident" (Page 99) refer to trends in actual revenues or merely trends in model projections. A comparison of model estimates and estimated actual revenues from the Economic SAFE documents has been added to the gross revenues discussion of Section 4.10, and in Appendix F, which describes the methods used in the model.

The brief discussion included as Appendix F was uninformative about model structure, assumptions, and statistical properties. The description of the model in Appendix F has been expanded to address these issues more fully.

3. The discussion on Page 103 on Operating Cost Impacts should be modified to recognize that the classification of costs into variable costs and fixed costs is not exact, but is instead dependent on the timeframe considered and expectations. It is important to recognize that fishers may incur loans to pay for capital goods over extended periods and that the associated costs may not be avoidable over the length of the loan. Similarly, operators may incur maintenance costs for fishing and processing gear even if that gear is unemployed in a particular year. Consequently, it is inappropriate to assert that variable costs are avoidable under Alternative 5. This recognition has been incorporated into that section. The discussion of Alternative 5 has been modified to reflect the costs that would continue to be incurred.

4. The discussion page 104 suggests conclusions about changes in net revenue associated with the proposed Alternatives. However, because the Alternatives are likely to result in different costs and different revenues, it is not possible to determine whether net revenues will increase or decrease without additional information on the structure of the cost and revenue functions. The discussion has been modified to add this point.

5. It is surprising that the estimates of excess capacity reported on page 108 are similar across fisheries that have been “rationalized” and those that have not. For example, despite being “rationalized” in 1998 and despite a persistence of near-record pollock stock biomass, the pollock fishery is estimated to have a higher level of excess capacity than any other fishery discussed. Moreover, there is some inconsistency between the implicit invocation of the Gordon-Schaefer bioeconomic model in the discussion of net returns (page 104) and the suggestion (page 108) that a fleet unconstrained by TAC “would” catch more than that level. Although little can be done to address these puzzles before the document is finalized, further consideration is warranted in future drafts. <u>The excess capacity section has been revised and includes less detail from the 2002 study. A short Pollock discussion has been added, based on more recent work. The newer study still suggests the presence of excess capacity. Section 4.10 contains a short discussion of the comments by the study’s authors on this issue.</u>

6. The EA assumes that demand for fish from the BSAI/GOA is perfectly elastic, but some of the conclusions are not consistent with the assumption of perfectly elastic prices. For example, the discussion about consumer effects (pages 106 and 107) is incorrect if demand is perfectly elastic. Under the assumption of perfect elasticity, changes in the quantity of fish landed from the BSAI/GOA are too small to affect price, thus consumer surplus is invariant with respect to landings from the BSAI/GOA. Clearly, the problem here is with the assumption of perfectly elastic demand. <u>Elasticity discussions have been expanded in both sections; potential implications of the assumptions have been brought out and contrasted between the two sections.</u>

7. The discussion on subsistence (page 109) should be expanded to note that commercial fishing often provides the employment/income needed to support the purchase of inputs used in the pursuit of subsistence activities. Consequently, alternatives that affect employment and wages in the commercial fishery can be expected to have indirect impacts on subsistence activities. <u>The discussion has been expanded to add this point.</u>

8. Passive use values (page 110) should not be treated as synonymous with non-consumptive benefits from ecosystems. Passive use values can also arise from activities such as commercial fishing. Just as some people (even those living in distant urban centers) receive value knowing that cowboys still exist, some people find value in the sheer existence of commercial fishing. <u>These are no longer treated as synonomous.</u>

9. The section on communities (page 111) should be broadened to recognize that communities may derive value from fishing activities that are not solely dependent on gross and net revenues derived from fishing. For example, there seems to be potential to inform the discussion of both community impacts and impacts on subsistence by considering the on-going debate in the Pribilofs over closed areas designed to protect marine mammals. This debate clearly illustrates the breadth of nonmonetary concerns that can be associated with the linkages between communities and marine resources. <u>The discussion of impacts on communities has been broadened to these potentially more complex interactions between commercial fisheries and communities.</u>

10. Footnote 8 (page 101) may be incorrect regarding the magnitude of CDQ program-wide royalties. For example, at the recent “Managing Our Nation’s Fisheries” conference, a presentation by a representative of a CDQ group indicated that annual royalties to the CDQ groups, collectively, were on the order of $50 million. While this figure presumably included royalties from CDQ crab allocations in addition to CDQ finfish allocations, it would be prudent to review information used to derive the estimate of aggregate CDQ royalties reported in the EA and

to reference those sources. The footnote has been replaced, and the discussion of community impacts of CDQ operations has been considerably expanded in the text..

Current Version	Which version is this?	What is the new information?	What is the decision?
X	September EA/IRFA	$_{Max}F_{ABC}$ and TACs for different F rates updated by rerunning models based on projected 2004 and 2005 harvests, or by rolling over 2004 ABCs and TACs for species for which this was not possible.	October AP, SSC, and Council deliberations on recommendations for proposed harvest specifications.
	October EA/IRFA	Council October recommendations on ABCs and TACs for Alternative 2.	Publication of proposed specifications.
	November EA/IRFA	SAFE reports finalized; November Plan Team recommendations.	December AP, SSC, and Council deliberations on recommended specifications.
	January EA/FRFA	Council December recommendations. Public comment on proposed specifications and IRFA.	Secretarial decision on final specifications.

G:\FMGROUP\06specs\TAC Spec Combined EA\2006 TAC Spec combined EA.doc