ENVIRONMENTAL ASSESSMENT/FINAL REGULATORY FLEXIBILITY ANALYSIS
for the Total Allowable Catch Specifications for the Year 2003
Alaska Groundfish Fisheries

Implemented Under the Authority of the
Fishery Management Plans for the
Groundfish Fishery of the Bering Sea and Aleutian Islands Area and
Groundfish of the Gulf of Alaska

January 2003

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 Tamra Faris or Ben Muse
National Marine Fisheries Service
P.O. Box 21668
Juneau, AK 99802
(907) 586-7228

Abstract: This Environmental Assessment analyzes the impacts of establishing the 2003 harvest specifications for groundfish target species in the groundfish fisheries of the Bering Sea, Aleutian Islands, and Gulf of Alaska fishery management areas. The federal action consists of specifying groundfish total allowable catch limits for fishing year 2003 in the exclusive economic zones of the Bering Sea and Aleutian Islands management area and the Gulf of Alaska management area. Three notices are published in the *Federal Register* to make this rulemaking: Proposed, Interim, and Final. Impacts are considered to target species stocks, higher and lower trophic level species, and the physical and socioeconomic environment for five alternative TAC specifications. The preferred alternative is to set harvest within the range recommended by the Plan Teams as modified by the North Pacific Fisheries Management Council (Council) (Alternative 2). Analysis predicts no significant impacts will accrue to marine resources from harvest of target species at levels being contemplated. Preparation of an Environmental Impact Statement will not be required. Informal ESA consultation on the 2003 interim and final harvest specifications was concluded November 26, 2002.

(This page is blank)

Total Allowable Catch Specifications for the Year 2003
Environmental Assessment

Table of Contents

List of Tables

List of Figures

Total Allowable Catch Specifications for the Year 2003
Environmental Assessment

1.0 Purpose and Need

The purpose of this environmental assessment (EA) is to predict whether the impacts to the human environment resulting from setting the 2003 total allowable catch (TAC) specifications will be significant. If impacts predicted to result from the preferred alternative are insignificant, and that alternative is the chosen one, no further analysis is necessary to comply with the requirements of the National Environmental Policy Act.

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.

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 of the SAFE reports (Appendices A, B, C, and D) by the North Pacific Fishery Management Council (Council), its Advisory Panel, and 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.

1.1 Related NEPA Documents

TAC-Setting EIS The original EISs for the BSAI and GOA FMPs were completed in 1981 and 1979, respectively. The TAC setting process was not revisited in an EIS until 1998, when an SEIS on the process of TAC setting was completed 1998 (NMFS1998). In that document the impacts of groundfish fishing over a range of TAC levels was analyzed. The five alternatives were very similar to the alternatives considered in this 2003 TAC specifications EA. The Record of Decision in that action was affirmation of the status quo alternative for TAC-setting which were regulations and fishery management plans as they stood in 1997. Impacts to the human environment from the federal groundfish fisheries were displayed in that EIS. Setting TAC under the status quo procedures was not found to be having significant impacts on the issues evaluated.

Annual TAC-Specification EAs In addition to the TAC-setting EIS analysis, environmental assessments have been written to accompany each new year's TAC specifications since 1991. One exception was the 2001 harvest specifications were promulgated by emergency rule published in January 2001 without an accompanying NEPA analysis. That was done because the TAC specifications were set by Congressional action at the 2000 levels (Public Law 106-554). An EA was prepared on the 2001 TAC specifications in July 2001 (NMFS 2001b). The 2002 TAC specifications were also promulgated by emergency rule, however, an EA was completed and FONSI determination made prior to publication of the rule (NMFS 2001d).

Steller Sea Lion Protection Measures SEIS A supplemental environmental impact statement was completed in 2001 (NMFS 2001c) to evaluate modifications of fishery management measures being made to mitigate 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 have been promulgated through proposed and final rulemakings in accordance with Magnuson-Stevens Act procedures.

American Fisheries Act Amendments 61/61/13/8 EIS This EIS (NMFS 2002a) was prepared to evaluate sweeping changes to the conservation and management program for the pollock fishery of the Bering Sea and Aleutian Islands (BSAI) and to a lesser extent, the management programs for the other groundfish fisheries of the BSAI and Gulf of Alaska, 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.

Groundfish Programmatic EIS A programmatic SEIS is being prepared to evaluates the fishery management policies embedded in the BSAI and GOA groundfish FMPs against policy level alternatives. A draft

Programmatic SEIS was circulated for public review and comment from January 25 through July 25, 2001 (NMFS 2001a). Revision of that analysis and publication of a second public review draft is expected in 2003. For more information see the www.fakr.noaa.gov/sustainablefisheries/seis/default.htm website.

Gulf of Alaska Groundfish Rationalization SEIS In this new analysis just begun in May 2002, the Council is considering alternative management approaches to "rationalize" the Gulf of Alaska (GOA) groundfish fisheries. Rationalization may improve the economic stability to the various participants in the fishery. These participants may include harvesters, processors, and residents of fishing communities. The Council is considering these new management policies at the request of the GOA groundfish industry to address its increasing concerns about the economic stability of the fisheries. Some of these concerns include changing market opportunities and stock abundance, increasing concern about the long-term economic health of fishing dependent communities, and the limited ability of the fishing industry to respond to environmental concerns under the existing management regime. The Council may consider rationalizing the fishery through individual fishing quotas, allocations to communities or processors, or cooperatives. Alternatively, the Council may choose to modify the License Limitation Program or maintain the existing management system. As yet, specific alternatives have not been selected, and the SEIS will guide the Council in its decision making process. For more information see the www.fakr.noaa.gov/sustainablefisheries/goa_seis/default.htm website.

1.2 Description of the Fisheries

Detailed descriptions of the fishery may be found in the following reports. All of these are public documents and are readily available in printed form or over the Internet at links given in the references:

"Economic Status of the Groundfish Fisheries off Alaska, 2001" (Hiatt *et al.* 2002), also known as the "2002 Economic SAFE Report." This document is produced by NMFS and updated annually. The 2002 edition contains 49 historical tables summarizing a wide range of fishery information through the year 2001.

Steller Sea Lion Protection Measures Supplemental Environmental Impact Statement (NMFS 2001c. Referred to as "SSL SEIS" in the remainder of this section) contains several sections with useful background information on the groundfish fishery (although the majority of information provided is focused on three important species - pollock, Pacific cod, and Atka mackerel). Section 3.12.2 provides extensive background information on existing social institutions, patterns, and conditions in these fisheries and associated communities, Appendix C provides extensive information on fishery economics, and Appendix D provides extensive background information on groundfish markets.

American Fisheries Act Amendments 61/61/13/8 Environmental Impact Statement (NMFS 2002a) provides a survey of the Bering Sea and Aleutian Islands groundfish fishery paying particular attention to the pollock fishery and the management changes introduced into it following the American Fisheries Act. The information is contained in Section 3.3, "Features of the human environment."

Alaska Groundfish Fisheries. Draft Programmatic Supplemental Environmental Impact Statement (NMFS 2001a). This report contains detailed fishery descriptions and statistics in Section 3.10, "Social and Economic Conditions," and in Appendix I, "Sector and Regional Profiles of the North Pacific Groundfish

Fisheries." The sector and regional profiles in Appendix I have been updated, and are available through the NPFMC website.[1]

Assessment of Changes in IRIU Flatfish Requirements. Public Review Draft. (Northern Economics 2002). Appendix A, "Detailed Analysis of Existing Conditions of Groundfish Processors Affected by IRIU Flatfish Regulations," has information on groundfish catcher-processor and shoreside processor sectors.

2.0 Descriptions of Alternatives

The alternatives to be evaluated in this analysis are variations of amounts of total allowable catch that could be set for managed species and species groups for fishing year 2003. The combined TAC will still have to be within overall conservation limits established by the fishery management plans. Setting TAC above the overfishing level determined for a particular target species or target species group for the upcoming fishing year is an alternative that will be considered, but ruled out as unlikely, therefore not analyzed in detail. Differences between alternatives are the TAC levels set by species and species group within the two groundfish complexes. Alternative TAC levels are evaluated to display a wide range of viable alternatives and their impacts to the environment.

So that fishing may begin January 1, interim TAC specifications are set based upon the proposed specifications. The interim specification authorize the release of one-fourth of each proposed TAC and apportionment thereof, one-fourth of each PSC and apportionment thereof and the first seasonal allowance of pollock, Atka mackerel, and Pacific cod. Interim specifications are published in the *Federal Register* in December and are superceded by the final specifications. The proposed and interim specification ABCs for fishing year 2003 are detailed in Tables 2.0-1 and 2.0-2 of this document. The Council's October 2002 motion on these specifications constitutes their final recommendation on interim specifications.

The measurable impacts of an alternative TAC specification (harvest quota) accrue to the target resources themselves, other species in the ecosystem, the state fisheries that occur in adjacent marine waters, and those that benefit both from consumptive and non-consumptive users of living marine resources. The harvest levels contemplated by species by alternative are in Tables 2.0-3 and 2.0-4. Fishing mortality (retained and discarded) is indicated as *F*. TAC specifications are harvest quotas that include both retained catch and discarded catch.

2.1 TAC Alternative 1: Set *F* equal to $maxF_{ABC}$, "$maxF_{ABC}$" refers to the maximum permissible value of F_{ABC} under Amendment 56. Historically, TAC has been constrained by ABC, so this alternative provides a likely upper limit for setting TAC within the limits established by the fishery management plan. (Column 1 of Tables 2.0-3 and 2.0-4).

2.2 TAC Alternative 2: Preferred Alternative. Set *F* within the range of ABCs recommended by the Plan Team's and TACs recommended by the Council. Under this scenario, *F* is set equal to a constant fraction of $maxF_{ABC}$, where this fraction is equal to the ratio of the F_{ABC} value recommended in the assessment to the $maxF_{ABC}$. The recommended fractions of $maxF_{ABC}$ may vary among species or stocks, based on other considerations unique to individual species or stocks. (Column 2 of Tables 2.0-3 and 2.0-4). At its December 2001 meeting, the Council selected Alternative 2 as its preferred alternative.

[1] http://www.fakr.noaa.gov/npfmc/NorthernEconomics/NorthernEconomics.htm (posted 1-28-02; accessed 11-08-02)

2.3 TAC Alternative 3: Set *F* equal to 50% of $maxF_{ABC}$. 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. (Column 3 of Tables 2.0-3 and 2.0-4).

2.4 TAC Alternative 4: Set *F* equal to the most recent five year average actual *F*. This alternative recognizes that for some stocks, TAC may be set well below ABC, and recent average *F* may provide a better indicator of F_{TAC} than F_{ABC}. (Column 4 of Tables 2.0-3 and 2.0-4).

2.5 TAC Alternative 5: Set *F* equal to zero. This alternative recognizes that, in extreme cases, TAC may be set at a level close to zero. This is the no action alternative. Alternative 5, effectively, "set all TACs equal to zero," has been chosen as the baseline alternative, against which the impacts of the other alternatives have been measured. This has been done to simplify the comparison of the alternatives and does not imply any preference among them. (Column 5 of Tables 2.0-3 and 2.0-4).

Regulations at 50 CFR §679.20(a) specify that the annual optimal yield (OY) for groundfish in the BSAI is 1.4 million to 2.0 million metric tons. The optimal yield in the GOA is 116,000 to 800,000 metric tons. The sum of the annual TACs in each year cannot be greater than the optimal yield in that area. While the sum of TACs in the GOA implied by the different alternatives does not approach the upper end of the OY range in 2003, in the BSAI Alternatives 1 and 2, as constituted, both totals exceed the OY. Before a decision on TAC specifications is made, however, individual target species or species groups TACs will be reduced to bring the overall total within bounds specified by the FMPs.

Table 2.0-1 Overfishing Level (OFL), Acceptable Biological Catch (ABC), Total Allowable Catch (TAC), Initial Tac (ITAC), and Community Development Quota (CDQ) Reserve Allocation of Groundfish in the BSAI[1] [Amounts are in mt]

Species	Area	OFL	ABC	TAC	ITAC[2]	CDQ reserve[3]
Pollock[4]	Bering Sea (BS)	3,530,000	2,330,000	1,491,760	1,342,584	149,176
	Aleutian Islands (AI)	52,600	39,400	1,000	1,000	.....
	Bogoslof District	45,300	4,070	50	50	.....
Pacific cod	BSAI	324,000	223,000	207,500	176,375	15,563
Sablefish[5]	BS	4,290	2,900	2,900	1,233	399
	AI	4,590	3,100	3,100	659	523
Atka mackerel	Total	99,700	63,000	60,000	51,000	4,500
	Western AI	.....	22,990	19,990	16,992	1,499
	Central AI	.....	29,360	29,360	24,956	2,202
	Eastern AI/BS	.....	10,650	10,650	9,053	799
Yellowfin sole	BSAI	136,000	114,000	83,750	71,188	6,281
Rock sole	BSAI	132,000	110,000	44,000	37,400	3,300
Greenland turbot	Total	17,800	5,880	4,000	3,400	300
	BS	.....	3,920	2,680	2278	201
	AI	.....	1,960	1,320	1,122	99
Arrowtooth flounder	BSAI	139,000	112,000	12,000	10,200	900
Flathead sole	BSAI	81,000	66,000	20,000	17,000	1,500
Other flatfish[6]	BSAI	21,400	16,000	3,000	2,550	225
Alaska plaice	BSAI	165,000	137,000	10,000	8,500	750
Pacific ocean perch	BSAI	18,000	.....	.....	.....	.....

Species	Area	OFL	ABC	TAC	ITAC[2]	CDQ reserve[3]
	BS		2,410	1,410	1,199	106
	AI Total	.....	12,690	12,690	10,787	952
	Western AI	.....	5,850	5,850	4,973	439
	Central AI	.....	3,340	3,340	2,839	251
	Eastern AI	.....	3,500	3,500	2,975	263
Northern rockfish	BS	161	121	121	103	9
	AI	9,332	6,980	5,879	4,997	441
Shortraker/rougheye	BSAI	1,289	967	.....	.....	.....
	BS	.....	.....	137	116	10
	AI	.....	.....	830	706	62
Other rockfish[7]	BS	1,280	960	960	816	72
	AI	846	634	634	539	48
Squid	BSAI	2,620	1,970	1,970	1,675	.....
Other species[8]	BSAI	81,100	43,300	32,309	27,463	2,423
TOTAL		4,867,308	3,296,382	2,000,000	1,771,540	187,540

[1] These amounts apply to the entire BSAI management area unless otherwise specified. With the exception of pollock, and for the purpose of these specifications, the Bering Sea subarea includes the Bogoslof District.

[2] Except for pollock and the portion of the sablefish TAC allocated to hook-and-line and pot gear, 15 percent of each TAC is put into a reserve. The ITAC for each species is the remainder of the TAC after the subtraction of these reserves.

[3] Except for pollock and the hook-and-line or pot gear allocation of sablefish, one half of the amount of the TACs placed in reserve, or 7.5 percent of the TACs, is designated as a CDQ reserve for use by CDQ participants (see §§ 679.20(b)(1)(iii) and 679.31).

[4] The American Fisheries Act (AFA) requires that 10 percent of the annual Bering Sea pollock TAC be allocated as a CDQ reserve and the entire Aleutian Islands and Bogoslof District pollock ITAC be allocated as an incidental catch allowance. NMFS then subtracts 3.5 percent of the remaining Bering Sea pollock as an incidental catch allowance, which is not apportioned by season or area. The remainder of the ITAC is further allocated by sector as directed fishing allocations as follows: inshore, 50 percent; catcher/processor, 40 percent; and motherships, 10 percent.

[5] The ITAC for sablefish reflected in Table 1 is for trawl gear only. Regulations at § 679.20(b)(1) do not provide for the establishment of an ITAC for the hook-and-line and pot gear allocation for sablefish. Twenty percent of the sablefish TAC allocated to hook-and-line gear or pot gear and 7.5 percent of the sablefish TAC allocated to trawl gear is reserved for use by CDQ participants (see § 679.20(b)(1)(iii)).

[6] "Other flatfish" includes all flatfish species, except for Pacific halibut (a prohibited species), flathead sole, Greenland turbot, rock sole, yellowfin sole, arrowtooth flounder and Alaska plaice.

[7] "Other rockfish" includes all Sebastes and Sebastolobus species except for Pacific ocean perch, northern, shortraker, and rougheye rockfish.

[8] "Other species" includes sculpins, sharks, skates and octopus. Forage fish, as defined at § 679.2, are not included in the "other species" category.

Table 2.0-2 Final 2003 ABCs, TACs, and OFLs of Groundfish for the Western/Central/West Yakutat (W/C/WYK), Western (W), Central (C), Eastern (E) Regulatory Areas, and in the West Yakutat (WYK), Southeast Outside (SEO), and Gulf-Wide (GW) Districts of the GOA. [Amounts are in mt]

Species		Area[1]	ABC	TAC	OFL
Pollock[2]					
	Shumagin	(610)	16,788	16,788	
	Chirikof	(620)	19,685	19,685	
	Kodiak	(630)	10,339	10,339	
	WYK	(640)	1,078	1,078	
Subtotal	W/C/WYK	47,890	47,890	69,410	
	SEO	(650)	6,460	6,460	8,610
	Total		54,350	54,350	78,020
Pacific cod[3]					
		W	20,600	15,450	
		C	29,000	22,690	
		E	3,200	2,400	
	Total		52,800	40,540	70,100
Flatfish[4]		W	180	180	
(deep-water)		C	2,220	2,220	
		WYK	1,330	1,330	
		SEO	1,150	1,150	
	Total		4,880	4,880	6,430
Rex sole		W	1,280	1,280	
		C	5,540	5,540	
		WYK	1,600	1,600	
		SEO	1,050	1,050	
	Total		9,470	9,470	12,320
Flathead sole		W	16,420	2,000	
		C	20,820	5,000	
		WYK	2,900	2,900	
		SEO	1,250	1,250	
	Total		41,390	11,150	51,560
Flatfish[5]		W	23,480	4,500	
(shallow-water)		C	21,740	13,000	
		WYK	1,160	1,160	
		SEO	2,960	2,960	
	Total		49,340	21,620	61,810

Table 2.0-2 (continued)

Species		Area[1]	ABC	TAC	OFL
Arrowtooth		W	17,990	8,000	
flounder		C	113,050	25,000	
		WYK	18,190	2,500	
		SEO	5,910	2,500	
	Total		155,140	38,000	181,390
Sablefish[6]		W	2,570	2,570	
		C	6,440	6,440	
		WYK	2,320	2,320	
		SEO	3,560	3,560	
Subtotal		E	5,880	5,880	
	Total		14,890	14,890	20,020
Pacific[7]		W	2,700	2,700	3,220
ocean		C	8,510	8,510	10,120
perch		WYK	810	810	
		SEO	1,640	1,640	
	Subtotal	E		2,900	
	Total		13,660	13,660	16,240
Shortraker/		W	220	220	
rougheye[8]		C	840	840	
		E	560	560	
	Total		1,620	1,620	2,340
Other		W	90	90	
rockfish		C	550	550	
[9,10]		WYK	270	150	
		SEO	4,140	200	
	Total		5,050	990	6,610
Northern		W	890	890	
Rockfish[10,12,15]	C		4,640	4,640	
		E	N/A	N/A	
	Total		5,530	5,530	6,560
Pelagic		W	510	510	
shelf		C	3,480	3,480	
rockfish[13]		WYK	640	640	
		SEO	860	860	
	Total		5,490	5,490	8,220
Thornyhead rockfish		W	360	360	
		C	840	840	
		E	800	800	
	Total		2,000	2,000	3,050

Table 2.0-2 (continued)

Species	Area[1]	ABC	TAC	OFL
Demersal shelf rockfish[11]	SEO	390	390	540
Atka mackerel	GW	600	600	6,200
Other[14,15] species	GW	N/A	11,260	N/A
TOTAL[16]		416,600	236,440	531,410

1. Regulatory areas and districts are defined at § 679.2.
2. Pollock is apportioned in the Western/Central Regulatory areas among three statistical areas. During the A season, the apportionment is based upon an adjusted estimate of relative distribution of pollock biomass at 25 percent, 56 percent, and 19 percent in Statistical Areas 610, 620, and 630, respectively. During the B season, the apportionment is based on the relative distribution of pollock biomass at 25 percent, 66 percent, and 9 percent in Statistical Areas 610, 620, and 630, respectively. During the C and D seasons, the apportionment is based on the relative distribution of pollock biomass at 47 percent, 23 percent, and 30 percent in Statistical Areas 610, 620, and 630, respectively. These seasonal apportionments are shown in Table 3. In the West Yakutat and Southeast Outside Districts of the Eastern Regulatory Area, pollock is not divided into seasonal allowances.
3. The annual Pacific cod TAC is apportioned 60 percent to an A season and 40 percent to a B season in the Western and Central Regulatory Areas of the GOA. Pacific cod is allocated 90 percent for processing by the inshore component and 10 percent for processing by the offshore component. Seasonal apportionments and component allocations of TAC are shown in Table 4.
4. "Deep water flatfish" means Dover sole, Greenland turbot, and deepsea sole.
5. "Shallow water flatfish" means flatfish not including "deep water flatfish," flathead sole, rex sole, or arrowtooth flounder.
6. Sablefish is allocated to trawl and hook-and-line gears (Table 2).
7. "Pacific ocean perch" means Sebastes alutus.
8. "Shortraker/rougheye rockfish" means Sebastes borealis (shortraker) and S. aleutianus (rougheye).
9. "Other rockfish" in the Western and Central Regulatory Areas and in the West Yakutat District means slope rockfish and demersal shelf rockfish. The category "other rockfish" in the Southeast Outside District means slope rockfish.
10. "Slope rockfish" means Sebastes aurora (aurora), S. melanostomus (blackgill), S. paucispinis (bocaccio), S. goodei (chilipepper), S. crameri (darkblotch), S. elongatus (greenstriped), S. variegatus (harlequin), S. wilsoni (pygmy), S. babcocki (redbanded), S. proriger (redstripe), S. zacentrus (sharpchin), S. jordani (shortbelly), S. brevispinis (silvergrey), S. diploproa (splitnose), S. saxicola (stripetail), S. miniatus (vermilion), and S. reedi (yellowmouth). In the Eastern GOA only, “slope rockfish” also includes northern rockfish, S. polyspinous.
11. "Demersal shelf rockfish" means Sebastes pinniger (canary), S. nebulosus (china), S. caurinus (copper), S. maliger (quillback), S. helvomaculatus (rosethorn), S. nigrocinctus (tiger), and S. ruberrimus (yelloweye).
12. "Northern rockfish" means Sebastes polyspinis.
13. "Pelagic shelf rockfish" means Sebastes ciliatus (dusky), S. entomelas (widow), and S. flavidus (yellowtail).
14. "Other species" means sculpins, sharks, skates, squid, and octopus. The TAC for "other species" equals 5 percent of the TACs of assessed target species.
15. N/A means not applicable.
16. The total ABC is the sum of the ABCs for assessed target species.

Table 2.0-3 2003 BSAI Specification for Alternatives 1 through 5

Species	Area	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Pollock	EBS	2,330,000	2,330,000	1,258,000	1,123,000	0
	Aleutian Islands	39,400	39,400			0
	Bogoslof District	4,000	4,070			0
Pacific cod	BSAI	278,000	223,000	147,000	168,200	0
Sablefish	BS	3,500	2,900	1,750	2,200	0
	AI	3,800	3,100	1,900	2,300	0
Atka mackerel	Total	82,800	63,000	45,400	51,000	0
	WAI	30,300	22,990	16,600	18,600	0
	EAI/BS	13,900	10,650	7,600	8,600	0
	CAI	38,600	29,360	21,200	23,800	0
Yellowfin sole	BSAI	114,000	114,000	58,200	92,600	0
Rock sole	BSAI	110,000	110,000	57,300	34,800	0
Greenland turbot	Total	14,700	5,880	7,700	5,880	0
	BS	9,849	3,920	5,159	3,940	0
	AI	4,851	1,960	2,541	1,940	0
Arrowtooth flounder	BSAI	112,000	112,000	59,800	7,300	0
Flathead sole	BSAI	66,000	66,000	34,800	14,700	0
Alaska Plaice	BSAI	137,000	137,000	72,600	14,200	0
Other flatfish	BSAI	23,700	16,000	12,600		0
Pacific ocean perch	BSAI	15,100	15,100	7,600	10,800	0
	BS	1,042	2,410	521	745	0
	AI total	14,043	12,690	7,022	10,044	0
	WAI	6,474	5,850	3,237	4,630	0
	CAI	3,693	3,340	1,847	2,642	0
	EAI	3,876	3,500	1,938	2,772	0
Northern rockfish	BSAI	6,998				0
	BS	18	121			0
	AI	6,980	6,980			0
Shortraker/Rougheye	BSAI	967	967			0
	BS	137				0
	AI	830				0
Other rockfish	BS	960	960			0
	AI	634	634			0
Squid	BSAI	1,970	1,970			0
Other species	BSAI	19,320	43,300			0
Total		3,364,849	3,296,382	1,764,650	1,526,980	0

Estimates of ABC according to alternatives 3 and 4 definitions are not available for species classified as Tier 4, 5 or 6 because of not being able to make long-term biomass projections for those categories, therefore no estimates can be made.

Table 2.0-4 2003 GOA Specifications for Alternatives 1 through 5.

Species	Area	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Pollock (1)	610	20,756	16,788	10,655	27,201	0
	620	24,337	19,685	12,494	31,895	0
	630	12,782	10,339	6,562	16,752	0
	640	1,333	1,078	684	1,747	0
Subtotal WYK/C/W		59,208	47,890	30,395	77,595	0
	650	6,460	6,460	3,230	10	0
Total GOA		65,668	54,350	33,625	77,605	0
Pacific cod (2)	GOA	59,900	52,800	31,600	45,000	0
	W	23,360	20,600	12,320	17,550	0
	C	32,945	29,000	17,380	24,750	0
	E	3,595	3,200	1,900	2,700	0
Flatfish	GOA	53,263	49,340	27,668	6,220	0
Shallow water	W	25,347	23,480	13,167	2,960	0
	C	23,469	21,740	12,191	2,741	0
	WYK	1,252	1,160	650	146	0
	SEO	3,195	2,960	1,660	373	0
Rex sole	GOA	9,470	9,470	4,774	3,691	0
	W	1,280	1,280	645	499	0
	C	5,540	5,540	2,793	2,159	0
	WYK	1,600	1,600	807	624	0
	SEO	1,050	1,050	529	409	0
Flathead sole	GOA	41,402	41,390	22,464	2,103	0
	W	16,425	16,420	8,912	834	0
	C	20,825	20,820	11,300	1,058	0
	WYK	2,902	2,900	1,574	147	0
	SEO	1,250	1,250	678	64	0
Flatfish	GOA	4,880	4,880	2,149	1,970	0
Deep water	W	180	180	79	73	0
	C	2,220	2,220	978	896	0
	WYK	1,330	1,330	586	537	0
	SEO	1,150	1,150	506	464	0
Arrowtooth flounder	GOA	155,140	155,140	79,719	12,820	0
	W	17,990	17,990	9,244	1,487	0
	C	113,050	113,050	58,091	9,342	0
	WYK	18,190	18,190	9,347	1,503	0
	SEO	5,910	5,910	3,037	488	0
Sablefish (3)	GOA	18,034	14,890	9,301	11,148	0
	W	3,109	2,570	1,603	1,922	0
	C	7,800	6,440	4,023	4,821	0
	WYK	2,813	2,320	1,451	1,739	0
	SEO	4,312	3,560	2,224	2,666	0
Pacific ocean perch	GOA	13,663	13,660	6,913	8,188	0
	W	2,701	2,700	1,366	1,618	0
	C	8,512	8,510	4,307	5,101	0
	WYK	810	810	410	486	0
	SEO	1,640	1,640	830	983	0

Species	Area	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Shortraker/rougheye	GOA	1,895	1,620	949	1,671	0
	W	257	220	129	227	0
	C	983	840	492	866	0
	E	655	560	328	578	0
Other rockfish	GOA	5,158	5,050	2,618	1,012	0
	W	92	90	47	18	0
	C	562	550	285	110	0
	WYK	276	270	140	54	0
	SEO	4,229	4,140	2,146	830	0
Northern rockfish	GOA	5,530	5,530	2,673	2,264	0
	W	890	890	430	364	0
	C	4,640	4,640	2,243	1,900	0
	E	0	0	0	0	0
Pelagic shelf rockfish	GOA	6,612	5,490	3,306	3,481	0
	W	614	510	307	323	0
	C	4,191	3,480	2,096	2,207	0
	WYK	771	640	385	406	0
	SEO	1,036	860	518	545	0
Thornyhead rockfish	GOA	2,500	2,000	1,250	1,260	0
	W	450	360	225	230	0
	C	1,050	840	525	530	0
	E	1,000	800	500	500	0
Demersal shelf rockfish	SEO	473	390	236	347	0
Atka mackerel	GW	4,700	600	2,350	229	0
Subtotal		448,288	414,820	231,595	179,009	0
Other species (4)	GW	22,414	20,741	11,580	8,950	0
Total		470,702	435,561	243,175	187,959	0

Notes

1. WYK/C/W ABC is reduced by the GHL established for the PWS 2003 pollock fishery.
2. Pacific cod apportionments are reduced by the GHLs established for the 2003 state waters seasons Pacific cod fisheries in the GOA.
3. Sablefish ABCs in the Eastern GOA reflect a subtraction of 5% of the ABC apportionment from SEO District added to the WYK District so that 5 % of the combined ABC for the Eastern GOA may be allocated to trawl gear in the WYK District without affecting the 95% allocation to hook-and-line gear in the WYK and SEO Districts.
4. ABC for the other species assemblage is not specified, rather TAC is set at 5% of the combined total of other groundfish TACs.

3.0 Affected Environment

The other NEPA documents listed above contain extensive information on the fishery management areas, marine resources, ecosystem, social and economic parameters of these fisheries and the TAC setting process. Rather than duplicate an affected environment description here, readers are referred to those documents. Additionally, the Ecosystem Considerations section of the 2003 SAFE reports is included as Appendix C to this EA. It contains summaries and pointers to recent studies and information applicable to understanding and interpreting the criteria used to evaluate significance of impacts that will result from setting harvest quotas at levels contemplated under these five alternatives.

4.0 Environmental and Economic Consequences

This section forms the scientific and analytic basis for the issue comparisons across alternatives. As a starting point, each alternative under consideration is perceived as having the potential to significantly affect one or more components of the human environment. Significance is determined by considering the context

in which the action will occur and the intensity of the action. The context in which the action will occur includes the specific resources, ecosystem, and the human environment affected. The intensity of the action includes the type of impact (beneficial versus adverse), duration of impact (short versus long term), magnitude of impact (minor versus major), and degree of risk (high versus low level of probability of an impact occurring). Further tests of intensity include: (1) the potential for compromising the sustainability of any target or non-target species; (2) substantial damage to marine habitats and or essential fish habitat; (3) impacts on public health or safety; (4) impacts on endangered or threatened species or critical habitat of listed species; (5) cumulative adverse effects; (6) impacts on biodiversity and ecosystem function; (7) significant social or economic impacts; and (8) degree of controversy (NAO 216-6, Section 6.02).

Differences between direct and indirect effects are primarily linked to the time and place of impact. Direct effects are caused by the action and occur at the same time and place. Indirect effects occur later in time and/or further removed in distance from the direct effects (40 CFR 1508.27). For example, the direct effects of an alternative which lowers the harvest level of a target fish could include a beneficial impact to the targeted stock of fish, a neutral impact on the ecosystem, and an adverse impact on net revenues to fishermen, while the indirect effects of that same alternative could include beneficial impacts on the ability of Steller sea lions to forage for prey, neutral impacts on incidental levels of prohibited species catch, and adverse impacts in the form of multiplier effects reducing employment and tax revenues to coastal fishing communities.

The intent of TAC setting deliberations is to strike an informed balance between amounts of fish taken by these fisheries during fishing year 2003 and amounts left swimming in the water. The effects of the alternatives are evaluated for all resources, species, and issues that may directly or indirectly interact with these fisheries within the action area as result of TAC levels set. The direction of impact intensity applies to the particular resource, species, or issue being evaluated (as opposed to always applying to the target species).

Each section below contains an explanation of the criteria used to establish significance and a determination of significance, insignificance or unknown for each resource, species, or issue being treated. The criteria for significance are summarized in each section. The following ratings for significance are used; significant (beneficial or adverse), insignificant, and unknown. Where sufficient information on direct and indirect effects is available, rating criteria are quantitative in nature. In other instances, where less information is available, the discussions and rating criteria used are qualitative in nature. In instances where criteria to determine an aspect of significance (significant adverse, insignificant, or significant beneficial) do not logically exist, no criteria are noted. These situations are termed “not applicable” in the criteria tables. An example of an undescribable situation is evaluating the impact vector of incidental take on marine mammals. In that situation, criteria to determine significant adverse and insignificant are describable (though with less precision than perhaps desired by decision makers), however, within the band of effects known to be insignificant the point of no incidental take impact is reached, therefore, a criterion for significant beneficial is not applicable.

The rating terminology used to determine significance is the same for each resource, species, or issue being treated, however, the basic “perspective” or “reference point” differs depending on the resource, species or issue being treated. Table 4.0-1 summarizes the reference points for the topics addressed in this analysis. The first three reference points relate to the biological environment, while the latter two are associated with the human environment. For each resource or issue evaluated, specific questions were considered in the analysis. In each case, the questions are fundamentally tied to the respective reference point. The generic definitions for the assigned ratings are as follows:

S+ Significant beneficial effect in relation to the reference point; this determination is based on interpretations of available data and the judgement of the analysts who addressed the topic.

I Insignificant effect in relation to the reference point; this determination is based upon interpretations of data, along with the judgement of analysts, which suggests that the effects are small and within the "normal variability" surrounding the reference point. When evaluating an economic or management issue it is used when there is evidence the status quo does not positively or negatively affect the respective factor.

S- Significant adverse effect in relation to the reference point and based on interpretations of data and the judgement of the analysts who addressed the topic.

U Unknown effect in relation to the reference point; this determination is made in the absence of information or data suitable for interpretation with respect to the question of the impacts on the resource, species, or issue.

Table 4.0-1 Reference points for significance determinations

Reference Point	Application
Current population trajectory or harvest rate of subject species	(1) Marine mammals (2) Target commercial fish species (3) Incidental catch of non-specified species (4) Forage species (5) Prohibited species bycatch (6) ESA list Pacific salmon (7) Seabirds
Current size and quality of marine benthic habitat and other essential fish habitat	Marine benthic habitat and other essential fish habitat
Application of principles of ecosystem management	Ecosystem
Current management and enforcement activities	(1) State of Alaska managed fisheries (2) Management complexity and enforcement
Current rates of fishing accidents	Human safety and private property (vessels)

4.1 Effects on Target Species

The general impacts of fishing mortality within FMP Amendment 56/56 ABC/OFL definitions are discussed in Section 2.7.4 of the Draft Programmatic SEIS (NMFS 2001a), and apply to all fish species for which a TAC is specified. Beginning in 2003, a modified harvest control rule will apply to the directed fisheries for pollock, Pacific cod, and Atka mackerel that will result in no directed fisheries when the spawning biomass is estimated to be less than 20% of the projected unfished biomass. This new harvest control rule was evaluated in the Steller Sea Lion Protection Measures SEIS (NMFS 2001c).

Assessing the effects of each alternative on target commercial fish species was accomplished by asking the following questions of each of the five alternatives for each target species or species group for which a TAC amount is being specified:

1. How much effect does the alternative have on fishing mortality?
2. How much effect does the alternative have on spatial or temporal concentration of the species?
3. How much effect does the alternative have on the availability of prey for the target species?
4. How much effect does the alternative have on the target species' habitat?

The reference point against which each question is assessed is the current population trajectory or harvest rate of the subject target fish species (Table 4.1-1).

4.1.1 Effects of Alternatives 1 Through 5 on Target Species

Analyses are prepared for each stock, species or species group in the Bering Sea and Aleutian Islands and the Gulf of Alaska and are contained in the stock assessment and fishery evaluation reports (Appendix A and B). 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 Table 6.0-1. The ratings utilize a minimum stock size threshold (MSST) as a basis for positive or negative impacts of each alternative. 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). 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 target species stocks that have calculated MSSTs are currently above their MSSTs and the expected changes that would result from harvest at the levels proposed are not substantial enough to expect that the genetic diversity of 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.

Impacts to the target species stock, species or species group are predicted to be insignificant for all target fish evaluated because the following significance criteria are met: (1) they would not be expected to jeopardize the capacity of the stock to produce maximum sustainable yield on a continuing basis; (2) they would not 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; (3) they would not alter harvest levels such that it jeopardizes the ability of the stock to sustain itself at or above the minimum stock size threshold; (4) they would not 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; and (5) they would not 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. See the individual species and species groups stock assessments in the SAFE reports (Appendix A and B) for additional information and documentation of this year's assessment process.

Table 4.1-1 Criteria used to estimate the significance of effects on targeted groundfish stocks in the Bering Sea, Aleutian Islands, and Gulf of Alaska

Intensity of the Effects				
Direct Effects	Significant Adverse	Unknown	Insignificant Impact	Significant Beneficial
Fishing mortality	Reasonably expected to jeopardize the capacity of the stock to produce MSY on a continuing basis: mean F2001-2006>FOFL	Unknown fishing mortality rate	Reasonably *not* expected to jeopardize the capacity of the stock to produce MSY on a continuing basis: mean F2001-2006<=FOFL	NA
Spatial temporal distribution of catch				
Leads to change in genetic structure of population	Evidence of genetic sub-population structure and evidence that the distribution of harvest leads to a detectable reduction in genetic diversity such that it jeopardizes the ability of the stock to sustain itself at or above the MSST	MSST and genetic structure is unknown, therefore no information to evaluate whether 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	Evidence that the distribution of harvest is *not* sufficient to alter the genetic sub-population structure such that it jeopardizes the ability of the stock to sustain itself at or above the MSST	Evidence of genetic sub-population structure and evidence that the distribution of harvest leads to a detectable increase in genetic diversity such that it enhances the ability of the stock to sustain itself at or above the MSST
Change in reproduc-tive success	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	MSST is unknown therefore no information regarding the potential impact of the distribution 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	Evidence that the distribution of harvest will *not* change reproductive success such that it jeopardizes the ability of the stock to sustain itself at or above the MSST	Evidence that the distribution of harvest leads to a detectable increase in reproduc-tive success such that it enhances the ability of the stock to sustain itself at or above MSST

Intensity of the Effects				
Direct Effects	Significant Adverse	Unknown	Insignificant Impact	Significant Beneficial
Change in prey availability	Evidence that current harvest levels and distribution of harvest lead to a change prey availability such that it jeopardizes the ability of the stock to sustain itself at or above the MSST	MSST is unknown therefore no information that current harvest levels and distribution of 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	Evidence that current harvest levels and distribution of harvest do *not* lead to a change in prey availability such that it jeopardizes the ability of the stock to sustain itself at or above the MSST	Evidence that current harvest levels and distribution of harvest lead to a change prey availability such that it enhances the ability of the stock to sustain itself at or above the MSST
Habitat: Change in suitability of spawning, nursery, or settlement habitat, etc. due to fishing	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	MSST is unknown therefore no information that current levels of habitat disturbance are 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	Evidence that current levels of habitat disturbance are not sufficient to lead to a detectable change in spawning or rearing success such that it jeopardizes the ability of the stock to sustain itself at or above the MSST	Evidence that current levels of habitat disturbance are sufficient to lead to an increase in spawning or rearing success such that it enhances the ability of the stock to sustain itself at or above

4.2 Effects on Incidental Catch of Non-specified Species

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. Predictions of impacts from different levels of harvest are therefore qualitatively described. Management concerns, data limitations, research in progress, and planned research to address these concerns are discussed in Section 4.5 of the Draft Programmatic SEIS (NMFS 2001a). Direct effects include the removal of non-specified species from the environment as incidental catch in the groundfish fisheries. One question was asked: Would each alternative induce a different level of non-specified species bycatch as compared to average levels of bycatch between 1997 and 1999? In the Steller Sea Lion Protection Measures SEIS the reference point against which the question was assessed was the current population trajectory or harvest rate of the subject target fish species (Table 4.0-1 of NMFS 2001c). The criterion for

evaluating significance was whether a substantial difference in bycatch amount would occur (+>50% = adverse or - > 50%=beneficial). Indirect effects include habitat disturbance by fishing gear and disruption of food web interactions by disproportionate removal of one or more trophic levels. No attempt was made to evaluate the significance of indirect effects. Insufficient information exists to estimate the indirect effects of changes in the incidental catch of non-specified species. The indicators of ecosystem function included in this EA (Table 4.8-1) include two indicators that relate to non-specified species. These are the EBS jellyfish indicator with the observation that large increases in 2000 relative to 1999 and that biomass increased since 1990 which is interpreted to mean jelly fish biomass is high. The second non-specified species indicator is the bycatch indicator. The observation is that bycatch was higher in 2000 relative to 1999 but similar to the 1997 rate. Interpretation is that the dominant species in non specified bycatch were jellyfish, grenadier, and starfish.

4.3 Effects on Forage Fish Species

In this analysis the species referred to as forage fish species are limited to those species included in FMP Amendments 36 in the BSAI and 39 in the GOA. A great many other species occupy similar trophic levels in the food chain to forage fish as species preyed upon by higher trophic levels at some period during their life history, such as juvenile pollock and Pacific cod. Management concerns, data limitations, research in progress, and planned research to address these concerns are discussed in Section 4.5 of the Draft Programmatic SEIS (NMFS 2001a) and the Ecosystems Considerations for 2003 chapter in the November 2002 SAFE report. Estimates of biomass and seasonal distribution of biomass are unavailable for forage fish species, therefore the effects of different levels of target species harvest on forage fish species cannot be quantitatively described. Bottom trawl surveys of groundfish conducted by NMFS are not designed to assess the biomass of forage fish species, however forage fish are taken incidentally in the groundfish surveys and analysis of the incidental catch may lead to a relative abundance index which might be helpful in determining biomass abundance trends. Direct effects include the removal of forage fish species from the environment as incidental catch in the groundfish fisheries. Indirect effects include competition between groundfish (particularly juveniles) and forage fish for available prey.

In the Steller Sea Lion Protection Measures SEIS (NMFS 2001c) the reference point against which forage fish effects is assessed is the current population trajectory or harvest rate of the subject target fish species (Table 4.0-1). The criterion for evaluating significance was substantial difference in bycatch amount (+>50% = adverse or -> 50%= beneficial). 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. Even though the amount of biomass and seasonal distribution is unknown for the individual forage fish groups, the small amount of average incidental catch in the BSAI of 48 mt and in the GOA of 77 mt (1997 to 2000) is not likely to affect stocks (abundance) of forage fish species by more than 20%. In both the BSAI and the GOA more than 90% of the incidental catch by weight of all forage fish species are smelt which are taken in pollock fisheries.

In section 4.8 below are ecosystem function indicators for forage species that are useful in determining if the proposed fishery harvest quotas will have impacts on forage fish (Table 4.8-1). These observations include: Higher smelt catch rates were observed in the year 2000 in the eastern Bering Sea than in the years 1997-1999, and in the Gulf of Alaska than in 1999; age-0 Walleye pollock (a forage fish not classified as such in the forage fish category) were observed to be higher in abundance around the Pribilof Islands in 2001; and the potential for competitive interaction between age -0 pollock in the Western GOA.

4.4 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 6.0-2), steelhead trout, Pacific halibut, Pacific herring, and Alaska king, Tanner, and snow crab. The most recent review of the status of crab stocks may be found in the 2002 Crab SAFE report (NPFMC 2002). Based this most recent survey NMFS has determined that the Pribilof Islands stock of blue king crab is below the MSST for this stock of 2,994 mt of total mature biomass and is thus overfished. NMFS, as required by section 304(e), notified the Council by letter September 23, 2002, that the Pribilof Islands blue king crab stock is overfished and that the Council must develop a rebuilding plan within one year (67 FR 62212, October 4, 2002). The most recent review of the status for the other prohibited species in Section 3.5 of the Steller Sea Lion Protection Measures SEIS (NMFS 2001c). 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 part 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 Section 3.5 of the Steller Sea Lion SEIS (NMFS 2001c) and in a review paper by Witherell and Pautzke (1997).

This analysis focuses on the effects of the alternatives on three aspects of prohibited species management measures; 1) effects of PSC limitations and other management measures in the groundfish fisheries on the stocks of prohibited species; 2) effects of PSC limitations and other management measures in the groundfish fisheries on harvest levels in the directed fisheries for salmon, halibut, herring, and crab managed by the state; and 3) effects of PSC limitations and other management measures on recent levels of incidental catch of prohibited species in the groundfish fisheries.

1) Criteria used to estimate effects of Alternatives 1 through 5 on stocks of prohibited species in the BSAI and GOA.

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 benchmark used to determine the significance of effects under each alternative on salmon stocks was whether or not salmon minimum escapement needs would reasonably expected to be met. If the alternative was reasonably not expected to jeopardize the capacity of the salmon stocks to produce long term sustainable yields it was deemed insignificant, if the alternative was reasonably expected to jeopardize the capacity of the salmon stocks to produce long term sustainable yields it was deemed significantly adverse, it is rated unknown where insufficient information exists to make such conclusions the alternative's effects are unknown.

The impact of the groundfish fisheries on 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 2001c). No new information is available on the effects of the groundfish fisheries on listed salmon beyond that used for the FMP level Biop. (NMFS 2000). The incidental take statement for listed salmon is 55,000 chinook salmon in the BSAI and 40,000 Chinook salmon in the GOA. Chinook salmon incidental catch through November 2, 2002 in the BSAI was 37,605 fish. Chinook salmon incidental catch in the GOA fisheries through

November 2, 2002 was 12,759 fish. Incidental catch in both areas are well below the amounts authorized. Similar levels of incidental take of salmon during the groundfish fisheries is expected for the 2003 groundfish fisheries. Informal consultation for ESA listed salmon was completed on November 26, 2002 (see appendix E).

The International Pacific Halibut Commission (IPHC) is responsible for the conservation of Pacific halibut resource. The IPHC uses a policy of harvest management based on a 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 personal 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. To compensate the halibut stock for these removals over the short term, halibut mortality in the groundfish fisheries is deducted on a pound for pound basis each year from the directed hook-and-line quota. Halibut incidentally taken in the groundfish fisheries are of smaller average size than those taken in the directed fishery, this results in further impacts on the long term reproductive potential of the halibut stock, this impact on average is estimated to reduce the reproductive potential of the halibut stock by 1.7 pounds for each 1 pound of halibut mortality in the groundfish fisheries. These impacts are discussed by Sullivan *et. al.* (1994). The benchmark used to determine the significance of effects under each alternative on the halibut stock was whether or not incidental catch of halibut in the groundfish fisheries would reasonably expected to lower the total CEY of the halibut stock below the long term estimated yield of 80 million pounds. If the alternative was reasonably not expected to decrease the total CEY of the halibut stock below the long term estimated yield of 80 million pounds it was rated insignificant, if the alternative was reasonably expected to lower the total CEY of the halibut stock below the long term estimated yield of 80 million pounds it was rated significantly adverse, where insufficient information exists to make such conclusions the alternative's effects are rated unknown.

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 inseason based on additional survey information to insure long term sustainable yields. The ADF&G have established minimum spawning biomass thresholds for herring stocks which must be met before a commercial fishery may occur. The benchmark used to determine the significance of effects under each alternative on herring stocks was whether minimum spawning biomass threshold levels would reasonably expected to be met. If the alternative was reasonably not expected to jeopardize the capacity of the herring stocks to reach minimum spawning biomass, threshold levels it was deemed insignificant, if the alternative was reasonably expected to jeopardize the capacity of the herring stocks to reach minimum spawning biomass threshold levels it was rated significantly adverse, where insufficient information exists to make such conclusions the alternative's effects are rated unknown.

Alaska king, Tanner, and snow crab stocks in the BSAI are protected by area trawl closures and PSC limitations. Minimum stock size thresholds (MSST) have been established for these crab species stocks to help prevent overfishing. The benchmark used to determine the significance of effects under each alternative on crab stocks was whether MSST levels would reasonably expected to occur. If the alternative was reasonably not expected to jeopardize the capacity of the crab stocks to maintain MSST levels it was rated insignificant, if the alternative was reasonably expected to jeopardize the capacity of the crab stocks to reach or maintain MSST levels it was rated significantly negative, where insufficient information exists to make such conclusions the alternative's effects are rated unknown. These criteria are summarized in Table 4.4-1.

2) Criteria used to estimate effects of Alternatives 1 through 5 on harvest levels of prohibited species in their respective state managed directed fisheries in the BSAI and GOA.

For all prohibited species, if under the alternative considered the catch in the directed fisheries for those species was expected to increase or decrease by more than 20 % from 2001 levels the effect was rated significantly beneficial or adverse respectively. 2001 was chosen as the benchmark year for purpose of comparison as it is the most recent year for which total catch amounts are available and because management measures in 2001 are similar to those for 2003. If under the alternative considered, the catch in the directed fisheries for those species was not expected to increase or decrease by more than 20 % from 2001 levels (Table 4.4-4), the effect was rated insignificant as harvest levels based on stock conditions often vary over this range from year to year. If under the alternative considered, insufficient information exists to estimate changes in harvest levels, the effect was rated as unknown. The authors acknowledge that individual fishing operations with substantial reliance upon participation in these state fisheries may experience adverse or beneficial effects at changes in harvest levels below the 20% level. These criteria are summarized in Table 4.4-2.

3) Criteria used to estimate effects of Alternatives 1 through 5 on bycatch levels of prohibited species in the directed groundfish fisheries in the BSAI and GOA.

The establishment by the Council of annual halibut PSC limits in the directed fisheries of the GOA and the annual and seasonal apportionments thereof of all PSC limits to gear types and targets in the BSAI and GOA is of critical importance each year in both minimizing the incidental catch of prohibited species and in maximizing the optimum yield from the groundfish resources to the fishing industry. In section 4.5 of the Steller Sea Lion Protection Measures SEIS (NMFS 2001c) the effects of alternatives to provide protection to the endangered western population Steller sea lions on prohibited species incidental catch levels in the pollock, Pacific cod, and Atka mackerel fisheries were examined using average catch for the period 1997 through 1999. The authors however noted that in the BSAI pollock fishery the 1997 and 1999 average catch of halibut and crab was not expected to continue due to additional management measures to protect prohibited species became effective in 1999. For this reason in this analysis 2001 prohibited species incidental catch and directed groundfish catch is presented for comparison to the groundfish TAC alternatives in Table 4.4-4.

Under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) National Standard 9 directs that when a regional council prepares and FMP they shall to the extent practicable minimize bycatch and to the extent bycatch cannot be avoided, minimize the mortality of such bycatch. Over the years since the enactment of the MSFCMA in 1976, over 30 FMP amendments designed to help minimize the incidental catch and mortality of prohibited species have been implemented. Levels of incidental catch of prohibited species in each fishery in 2001 (Table 4.4-4) were used to estimate the effects TAC levels set for each fishery on incidental catch levels of prohibited species under each alternative. It was assumed for each fishery that an increase or decrease in TAC would result in a proportional increase or decrease in incidental catch, increases were not assumed to exceed PSC limitations where applicable. For all prohibited species if under the alternative considered the incidental catch of prohibited species in the directed fisheries for groundfish was expected to increase or decrease by more than 50% from 2001 levels (chosen as the benchmark year for purpose of comparison) the effect was rated significantly beneficial or adverse respectively. If under the alternative considered the incidental catch in the directed fisheries for groundfish was not expected to increase or decrease by more than 50% from 2001 levels the effect was rated insignificant as incidental catch of prohibited species in the directed groundfish fisheries often vary over this range from year to year. If under the alternative considered insufficient information exists to estimate changes in harvest levels the effect was rated as unknown. These criteria are summarized in Table 4.4-3.

4.4.1 Effects of Alternative 1 on Prohibited Species and Directed Fisheries

Under Alternative 1 catch quotas would be set at the $maxF_{abc}$ level, in the GOA this would amount to 470,702 mt which falls within the optimum yield range of 116,000 mt to 800,000 however in the BSAI this would amount to 3,327,249 mt which would be constrained by the upper limit established for optimum yield of 2,000,000 mt for the BSAI (CFR § 679.20(a)). Alternative 1 sets catch quotas at the highest levels considered, even so PSC limits established for the BSAI by regulation and halibut PSC limitations recommended by the Council for the GOA in 2003 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 previous years. In the worst case the entire PSC limit for each prohibited species would be reached in both the BSAI and GOA, and that in the GOA for prohibited species without PSC limits, incidental catch rates would be similar to those in 2001. For Pacific salmon these PSC numerical limits are very low compared to recent average returns and would not be expected to prevent salmon returns from reaching escapement goals. There are concerns for several chinook and chum stocks in the Bering Sea. In an analysis on the effects on salmon returns in the EA prepared for BSAI FMP Amendment 21b to reduce chinook salmon bycatch it was estimated that with the elimination of all incidental catch in the groundfish fisheries chinook salmon returns on average would increase by 4.4% in the Nushagak and by 1.7% in the Yukon Rivers, similar estimates of increases in chum salmon runs are not available. For these reasons the effect of Alternative 1 on salmon stocks is rated insignificant. Because incidental catch of halibut in the groundfish fisheries, as well as all other removals, is accounted for in setting the directed hook-and-line fishery CEY for halibut and the total CEY for the fishery is above the estimated long term CEY of 80 million pounds, the effect of incidental catch of halibut on the halibut stock under Alternative 1 is rated insignificant. The PSC limitation for herring of 1% current biomass estimates in the BSAI and the low volume of herring bycatch in the GOA (1997 through 1999 average 15 mt (NMFS 2001c)) would not be expected to reduce herring stocks below minimum spawning biomass thresholds under Alternative 1 and the effects are rated insignificant. In the BSAI PSC limits for crab are set at a proportion of the estimated number of animals with upper limits approximately 0.5% for red king crab, 1.2% for Tanner crab, and 0.1 % for snow crab. Given these low levels, even if crab PSC limits were reached it is unlikely that any effects on crab stocks could be detected. Incidental catch of crab in the GOA is very low, in 2001 a total of 46 red king crab and194,986 Tanner crab (Table 4.4-4). Because incidental catch is small relative to other sources of mortality, time and area closures for trawl gear in the BSAI and GOA are thought to be more effective in reducing effects on crab stocks (Witherell and Harrington 1996) and the effect of Alternative 1 on all crab stocks in the BSAI and GOA is rated insignificant.

Due to the low numbers of salmon incidental take in the GOA and salmon PSC limitations for chum and chinook salmon in the BSAI, present levels of salmon incidental catch are not likely to affect escapement totals. For those western stocks of chinook salmon of concern in the EA prepared for Amendment 21b to the BSAI FMP, a reduction in incidental catch of 40,000 chinook was estimated to increase commercial catches on average by 2,700 chinook in the Nushagak and 2,200 chinook in the Yukon Rivers. This amount represents 2.5% of the average commercial catch of 194,000 chinook in these drainages. Similar estimates on effects on chum salmon are not available. As an increase or decrease of less than 20% to the commercial salmon fisheries would not be expected given the reduced chinook PSC cap of 33,000 fish for 2003 in the BSAI, the current PSC limit of 42,000 chum in the BSAI, and current incidental catch rates in the GOA the effect of incidental catch on the commercial catch of salmon under Alternative 1 is rated insignificant. In the 2001 assessment of Pacific halibut for the 2002 fishing year the total CEY for Alaska was 50,585 mt. If the combined halibut PSC limits in Alaska totaling 6,825 mt were reached (6,568 mt in 2001 Table 4.4-4) this would represent a reduction in the amount of the total CEY available to the directed fishery of about 13% and as such is rated insignificant. 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 in the future. Due the herring PSC limit of 1% of estimated biomass in the BSAI and the present low volume of incidental catch in the GOA and increase or decrease in the commercial catches herring would not be likely to increase or decrease by more than 20% under Alternative 1 and the effect on the commercial herring fisheries is rated insignificant. For these same reasons floating PSC limits based on stock abundance in the BSAI and the present low numbers of animals taken in the GOA the effect of incidental catch in the groundfish fisheries along with seasonal and area closures to trawl gear on all crab stocks the effect on commercial crab fisheries is rated insignificant.

The apportionment of annual and seasonal PSC limits to the groundfish targets by gear type is of critical importance in order to optimize the harvest of groundfish within PSC limitations. Although average incidental catch of prohibited species by gear type, season, and target are extremely useful in anticipating incidental catch needs to support the harvest of the different groundfish targets the complex interactions between the distribution of fishing effort and variation in incidental catch rates of prohibited species invariably result in grounding fishing closures due to reaching PSC limits each year. Where PSC limits can be expected to constrain the groundfish fisheries, apportionments are based primarily on socioeconomic concerns. One such example is in the trawl fisheries in the GOA. During the first quarter of the year when incidental catch of halibut in the Pacific cod fishery is at its lowest a greater proportion of the annual halibut allowance is apportioned to the shallow water targets (which include Pacific cod) than at other times of the year and during the summer months when the incidental catch of halibut in the rockfish fisheries is at its lowest a greater proportion of the annual halibut allowance is apportioned to the deep water targets (which include rockfish). With such apportionments the intent is to maximize, up to TAC levels, the harvest of the most valuable species.

Assuming incidental catch rates of prohibited species in 2003 similar to 2001 levels in the BSAI and GOA (Table 4.4-4) TAC levels under Alternative 1 in combination with seasonal and fishery specific PSC apportionments, the total incidental catch of each prohibited species group would not be expected to increase or decrease by more than 50%. The effect of Alternative 1 on levels of incidental catch of prohibited species in the groundfish fisheries is therefore rated insignificant in the BSAI and GOA.

4.4.2 Effects of Alternative 2 on Prohibited Species and Directed Fisheries

Under Alternative 2 catch quotas (TACs) would be set at levels recommended by the Council at its December 2001 meeting. It the BSAI this would amount to 2,000,000 mt and in the GOA 435,561 mt. For the reasons discussed under Alternative 1, the effect of Alternative 2 on stocks of prohibited species is rated insignificant (Table 6.0-1) because PSC limits, even if reached, would not have a significant impact on stocks of prohibited species. Additionally for the reasons discussed under Alternative 1 the effects of Alternative 2 on the directed fisheries for prohibited species is rated insignificant (Table 6.0-1) because PSC limits, even if reached, would not significantly reduce the amount harvested by the directed fisheries which are permitted to target prohibited species.

In section 4.5.1.4 the Steller sea lion Protection Measures SEIS (NMFS 2001c) the effects of the preferred alternative on the incidental catch levels of prohibited species were estimated to result in an increase of herring and other salmon incidental catch in the pollock fisheries of 16% and 7% respectively while the incidental catch of chinook salmon was estimated to result in a reduction of 9%. In the Pacific cod fisheries reductions of incidental catch of halibut (11%), Tanner crab (30%), chinook (25%) and other salmon (8%)

were expected. Assuming incidental catch rates of prohibited species in 2003 similar to 2001 levels in the BSAI (Table 4.4-4) TAC levels under Alternative 2 in combination with seasonal and fishery specific PSC apportionments, the total incidental catch of each prohibited species group would not be expected to increase or decrease by more than 50%. The effect of Alternative 2 on levels of incidental catch of prohibited species in the groundfish fisheries is therefore rated insignificant in the BSAI (Table 6.0-1). In section 4.5.2.4 the Steller sea lion Protection Measures SEIS (NMFS 2001c) the effects of the preferred alternative on the incidental catch levels of prohibited species in the GOA were estimated to range from an increase of up 15% (Tanner crab in the pollock fishery) to a decease of 11% (other salmon in the pollock fishery) for TACs set at 2000 levels. Assuming incidental catch rates of prohibited species in 2003 similar to 2001 levels in the GOA (Table 4.4-4) TAC levels under Alternative 2 in combination with seasonal and fishery specific PSC apportionments, the total incidental catch of each prohibited species group would not be expected to increase or decrease by more than 50%. The effect of Alternative 2 on levels of incidental catch of prohibited species in the groundfish fisheries is therefore rated insignificant in the GOA (Table 6.0-1).

4.4.3 Effects of Alternative 3 on Prohibited Species and Directed Fisheries

Under Alternative 3 catch quotas would be set at 50% of the $maxF_{abc}$ level in the BSAI this would amount to 1,764,650 mt and in the GOA 243,175 mt. For the reasons discussed under Alternative 1 the effect of Alternative 3 on stocks of prohibited species is rated insignificant (Table 6.0-1) because PSC limits, even if reached, would not have a significant impact on stocks of prohibited species. Additionally for the reasons discussed under Alternative 1 the effects of Alternative 3 on the directed fisheries for prohibited species is rated insignificant (Table 6.0-1) because PSC limits, even if reached, would not significantly reduce the amount harvested by the directed fisheries which are permitted to target prohibited species.

Assuming incidental catch rates of prohibited species in 2003 similar to 2001 levels in the BSAI (Table 4.4-4) TAC levels under Alternative 3 in combination with seasonal and fishery specific PSC apportionments, the total incidental catch of each prohibited species group would not be expected to increase or decrease by more than 50%. In section 4.5.2.4 of the Steller sea lion Protection Measures SEIS (NMFS 2001c) the effects of the preferred alternative on the incidental catch levels of prohibited species in the GOA was estimated to range from an increase of up 15% (Tanner crab in the pollock fishery) to a decease of 11% (other salmon in the pollock fishery) for TACs set at 2000 levels.

In combination with TAC recommendations, annual halibut PSC limits and seasonal and fishery specific PSC apportionments, and incidental catch rates in the different fisheries unchanged from 2001 (Table 4.4-4), the total incidental catch of each prohibited species group would not be expected to increase or decrease by more than 50%. The effect of Alternative 3 on incidental catch levels of prohibited species in the groundfish fisheries is therefore rated insignificant in the BSAI and GOA (Table 6.0-1).

4.4.4 Effects of Alternative 4 on Prohibited Species and Directed Fisheries

Under Alternative 4 catch quotas would be set at levels equal the most recent 5 year average *F*, in the BSAI this would amount to 1,526,980 mt and in the GOA 187,959 mt. 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. For the reasons discussed under Alternative 1 the effect of Alternative 4 on stocks of prohibited species is rated insignificant (Table 6.0-1) because PSC limits, even if reached, would not have a significant impact on stocks of prohibited species. Additionally for the reasons discussed under Alternative 1 the effects of Alternative 4 on the directed fisheries for prohibited species is rated insignificant (Table 6.0-1) because PSC limits, even if reached, would not significantly reduce the amount harvested by the directed fisheries which are permitted to target prohibited species.

In combination with TAC recommendations and seasonal and fishery specific PSC apportionments and incidental catch rates in the different fisheries unchanged from 2001 (Table 4.4-4), the total incidental catch of each prohibited species group would not be expected to increase or decrease by more than 50%. In section 4.5.2.4 of the Steller sea lion Protection Measures SEIS (NMFS 2001c) the effects of the preferred alternative on the incidental catch levels of prohibited species in the GOA was estimated to range from an increase of up 15% (Tanner crab in the pollock fishery) to a decease of 11% (other salmon in the pollock fishery) for TACs set at 2000 levels. The effect of the preferred alternative on levels of incidental catch of prohibited species in the groundfish fisheries is therefore rated insignificant (Table 6.0-1) in the BSAI and GOA.

4.4.5 Effects of Alternative 5 on Prohibited Species and Directed Fisheries

Under Alternative 5 catch quotas would be set at zero, and if adopted the effect of this alternative would be to close directed fishing for groundfish for the 2003 year. The adoption of this alternative is considered unlikely as 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. Another effect of Alternative 5 would be to reduce incidental catch of prohibited species in the groundfish fisheries to zero. However for the reasons discussed under Alternative 1, even if incidental catch were reduced to zero, the effect on stocks of prohibited species and harvest levels in the directed fisheries for these prohibited species would be insignificant (Table 6.0-1). A 100% reduction in harvest levels of groundfish (to zero) would reduce the incidental catch level of prohibited species in the groundfish fisheries also to zero (>50%) and is rated significantly positive (Table 5.0-1).

Table 4.4-1 Criteria used to estimate the significance of effects on stocks of prohibited species in the BSAI and GOA

Effect	Significant Adverse	Insignificant	Significant Beneficial	Unknown
Incidental catch of prohibited species	Reasonably expected to jeopardize the capacity of the stock to maintain benchmark population levels	Reasonably not expected to jeopardize the capacity of the stock to maintain benchmark population levels	NA	Insufficient information available

Benchmarks: Salmon - minimum escapement goals, Pacific halibut - estimated long term CEY level, Pacific herring - minimum spawning biomass threshold, crab - minimum stock size threshold. NA: not applicable.

Table 4.4-2 Criteria used to estimate the significance of effects on of harvest levels in state managed directed fisheries targeting stocks of prohibited species in the BSAI and GOA

Effect	Significant Adverse	Insignificant	Significant Beneficial	Unknown
Harvest levels in directed fisheries targeting catch of prohibited species	Substantial decrease in harvest levels in directed fisheries targeting prohibited species (>20%)	No substantial increase or decrease (<20%) in harvest levels in directed fisheries targeting prohibited species	Substantial increase in harvest levels in directed fisheries targeting prohibited species (>20%)	Insufficient information available

Table 4.4-3 Criteria used to estimate the significance of effects on bycatch levels of prohibited species in directed groundfish fisheries in the BSAI and GOA

Effect	Significantly Adverse	Insignificant	Significant Beneficial	Unknown
Harvest levels of prohibited species in directed fisheries targeting groundfish species	Substantial increase in harvest levels of prohibited species in directed fisheries targeting groundfish species (>50%)	No substantial increase or decrease (<50%) in harvest levels of prohibited species in directed fisheries targeting groundfish species	Substantial decrease in harvest levels of prohibited species in directed fisheries targeting groundfish species (>50%)	Insufficient information available

Table 4.4-4 Catch of Groundfish and Prohibited Species in the Groundfish Fisheries in the BSAI and GOA in 2001 by Target, Area, and Gear Type

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	64,424	60	672	0	565	347
Pacific cod	50,875	672	80,569	2,442	3,529	1,835
Other flatfish	975	10	6,646	130	0	1
Flathead sole	30,217	394	295,361	547	1,304	67
Rock sole	30,535	731	270,388	26,406	823	356
Greenland turbot	816	11	497	0	0	0
Arrowtooth	3,264	62	18,552	79	236	46
Yellowfin sole	99,213	1046	321,666	32,462	575	620
Rockfish	9,713	55	0	0	1	171
Sablefish	153	4	706	0	0	2
Other species	233	0	0	0	0	0
Pollock (bottom)	23,824	36	4,974	67	0	0
Pollock (midwater)	1,197,394	164	87	38	30,122	52,860
Non-retained Groundfish	21	0	40	0	0	39
Total	1,511,639	3,245	1,000,333	62,171	37,155	56,344

Target	Total Catch[1] (mt)	Numbers of Snow crab[2]	Herring (mt)
Rock sole, flathead sole, and other flatfish	61,709	483,235	13
Pacific cod	50,875	8,330	5
Pollock, Atka mackerel, and other species	1,285,896	1,932	225
Yellowfin sole	99,213	799,649	26
Rockfish	9,713	0	0
Greenland turbot, sablefish, and arrowtooth	4,233	0	0
Total	1,511639	1,293,146	269

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	118,954	776	14,797	17,742	17	33
Greenland turbot	3,133	54	1	21	0	7
Sablefish	1,903	Not Available	2	11	0	5
Rockfish	15	1	0	0	0	0
Other species	141	2	1	0	0	0
Arrowtooth	1	0	0	0	0	0
Non-retained groundfish	10	0	0	0	0	0
Total	124,157	833	14,801	17,774	17	45

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	17,127	2	65,370	1,069	0	0
Sablefish	148	4	9	0	0	7
Total	17,275	6	65,370	1,069	0	7

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	1,653,071	4,084	1,080,513	81,014	37,172	56,396

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	29,713	790	46,821	0	2,830	719
Deep water flatfish	1,170	43	2,533	0	0	62
Rex sole	7,711	249	2,145	0	1,811	357
Flathead sole	1,535	62	45,269	0	27	19
Shallow water flatfish	8,214	484	13,146	46	82	158
Arrowtooth	5,536	157	2,194	0	347	249
Rockfish	18,783	328	2,394	0	445	671
Other species	71	1	0	0	3	0
Sablefish	160	1	0	0	1	0
Pollock (bottom)	30,680	70	5,932	0	6,676	1,301
Pollock (midwater)	44,295	11	5,430	0	2,855	1,515
Total	147,868	2,196	125,864	46	15,077	5,051

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	11,275	268	14	0	0	0
Rockfish	1,451	8	0	0	0	0
Other species	120	8	17	0	0	0
Deep water flatfish	1	0	0	0	0	0
Total[4]	12,847	284	31	0	0	0

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	7,367	4	69,091	0	0	0
Other species	19	0	0	0	0	0
Total	7,386	4	69,091	0	0	0

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	168,101	2,484	194,986	46	15,077	5,051

Source: NMFS 2001 Blend Data

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.

4 The total catch for hook-and-line gear in the GOA does not include catch in the sablefish fishery as estimates of prohibited species catch are not available.

4.5 Effects on Marine Mammals and ESA Listed Marine Mammals

Marine mammals were considered in groups that include: ESA listed Steller sea lions, ESA listed great whales, other cetaceans, northern fur seals, harbor seals, other pinnipeds, and sea otters. Direct and indirect interactions between marine mammals and groundfish harvest 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 foraging and commercial fishing activities.

Impacts of the various proposed 2003 harvest levels are analyzed by addressing four core questions modified from Lowry (1982):

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 that could compromise foraging success of marine mammals (harvest of prey species)?
3. Do the proposed harvest levels result in temporal or spatial concentration of fishing effort in areas used for foraging by marine mammals (spatial and temporal concentration of removals with some likelihood of localized depletion)?
4. Do the proposed harvest levels modify marine mammal foraging behavior to the extent that population level impacts could occur (disturbance)?

The reference point for determining significant impact to marine mammals is predicting whether the proposed harvest levels will impact the current population trajectory of any marine mammal species. Criteria for determining significance are contained in Table 4.0-1 Significance ratings for each question are summarized in Table 4.5-1.

For ESA listed marine mammals, Steller sea lions were the only species that were determined to potentially be adversely affected by the groundfish fisheries. (FMP BiOp, NMFS 2000). Steller sea lion protection measures are implemented as part of the harvest specifications so no adverse effects on ESA listed mammals are expected with the 2003 interim or final harvest specifications beyond those effects previously analyzed. Informal ESA consultation for the interim and final specifications was completed on November 26, 2002, see appendix E.

4.5.1 Effects of Alternatives 1 through 5 on Marine Mammals

Direct Effects - Incidental Take/Entanglement in Marine Debris

Annual levels of incidental mortality are estimated by comparing the ratio of observed incidental take of dead animals 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. It is, therefore, appropriate to estimate catch ratios based on estimated TAC. The projected level of take under all proposed TAC alternatives is below that which would have an effect on marine mammal population trajectories Therefore, incidental bycatch frequencies are determined to be insignificant under all alternatives proposed.

Indirect Effects - Spatial and Temporal Concentration of Fishery

Spatial and temporal concentration effects by these fisheries have just been analyzed and modified to comply with Endangered Species Act considerations for Steller sea lions (NMFS 2001c). The criteria for insignificant effect determination is based on the assumption of the Steller sea lion protection measures analysis and section 7 biological opinion that the fishery as modified by Steller Sea Lion Protection Measures mitigates the impacts (Table 6.0-1). That determination applies to all marine mammal species in these management areas.

Indirect Effects - Disturbance Effects

Vessel traffic, nets moving through the water column, or underwater sound production may all represent perturbations, which could affect marine mammal foraging behavior. Foraging could potentially be affected not only by interactions between vessel and species, but also by changes in fish schooling behavior, distributions, or densities in response to harvesting activities. In other words, disturbance to the prey base may be as relevant a consideration as disturbance to the predator itself. For the purposes of this analysis, we recognize that 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, we assume at least some protection is provided from these disturbance effects. The criterion set for insignificant impacts is a similar level of disturbance as that which was occurring in 2001. Thus, the effect under all alternatives is insignificant according to the criteria set for significance (Table 4.5-1).

Because of the recent change in Northern sea otter status it is being mentioned individually. Norther sea otters were designated by the US Fish and Wildlife Service (FWS) as candidate species under the ESA on August 22, 2000, in the Aleutian Islands (from Unimak Pass to Attu Island) (65 FR 67343). Funding has not

been available to develop proposed rule making for listing the sea otter under the ESA. On August 21, 2001, the FWS was petitioned under the Marine Mammal Protection Act (MMPA) for the Alaska stock of sea otters to be listed as depleted. On November 2, 2001 (66 FR 55693), the FWS determined that the current population of sea otters throughout Alaska exceeds the optimum sustainable population of 60,000 animals and, therefore, does not meet the criteria to be listed as depleted under the MMPA. The FWS is continuing to evaluate the sea otter under both the ESA and MMPA. As far as interaction with the groundfish fisheries, NMFS observers monitored incidental take in the 1990–1995 groundfish trawl, longline, and pot fisheries. No mortality or serious injuries to sea otters were observed. All alternatives for setting 2003 TAC specifications will have insignificant impacts northern sea otter. The significance determinations for analysis performed in this EA are summarized in Table 6.0-1.

Table 4.5-1 Criteria for determining significance of effects to marine mammals.

Effects	Significance Criteria			
	Significant Adverse	Insignificant	Significant Beneficial	Unknown
Incidental take/ entanglement in marine debris	Take rate increases by >25%	Level of take below that which would have an effect on population trajectories	Not Applicable	Insufficient information available on take rates
Spatial/ temporal concentration of fishery	More temporal and spatial concentration in key areas	Spatial concentration of fishery as modified by SSL Protection Measures	Much less temporal and spatial concentration of fishery in all key areas	Insufficient information as to what constitutes a key area
Disturbance	More disturbance (closed areas reopened)	Similar level of disturbance as that which was occurring in 2001	Not Applicable	Insufficient information as to what constitutes disturbance

Gulf of Alaska Pollock Additional discussion has occurred with respect to potential impacts of the Gulf of Alaska pollock fishery on Steller sea lions due to the magnitude of change in the Pacific cod population in the Gulf. Hydroacoustic surveys in 2002 indicate the lowest adult biomass of pollock in Shelikof Strait since these surveys have been regularly conducted. Results of the 2002 survey indicate that this is the second consecutive year of low abundance of pre-spawning pollock in the Shelikof Strait. An additional survey was conducted on the shelf break near the entrance to Shelikof Strait after indications that the fishing fleet was concentrated in that area. This additional survey showed a high adult biomass concentration near the shelf break (approximately twice the adult biomass in Shelikof Strait). The pollock size composition in shelf break aggregation was similar to Shelikof Strait adults, but it was noted that the age composition data available for November Plan Team meetings would help to resolve whether these two aggregations represent a single stock. The pollock index of spawning readiness was unusually low in Shelikof Strait, suggesting changes in the timing of spawning.

At September and November Plan Team meetings discussion occurred on the difficulties in apportioning between management areas 610, 620, and 630 for the four GOA pollock seasons. Current management areas are not thought to correspond well to the pollock biology: spawning grounds are bisected by management lines and summer distribution patterns by management area are highly variable and imprecisely estimates. Discussion focused on ideas for apportionment, specifically to use the ternary plot presented and assume a linear movement between summer and winter data points, and several suggestions were made by the team for further analysis and consideration. Additional data include age composition for the Shelikof Strait survey, 2001 bottom trawl age composition, and biomass estimates and length composition from the recently completed ADF&G crab/groundfish survey. Results indicated continuing decline of adult pollock, but also

additional support for a strong 1999 year class. The model fit to the 2002 Shelikof Strait survey was poor, with the model unable to match the steep decline indicated by the survey results.

The information contained in this analysis, including the SAFE reports which comprise Appendices A and B of this analysis, comprises the biological assessment the action agency is required to present to the consulting agency under section 7 of the Endangered Species Act. NMFS is both the action and the consulting agency for consultations on Steller sea lions.

4.6 Effects on Seabirds

The five alternatives in this EA set the catch quota, by target species and region, equal to variably defined levels of fishing mortality rates used to set the ABC. Alternative 5 sets harvest equal to zero, and is considered the no action alternative. Impacts of fishery management on seabirds are difficult to predict due to the lack of information for many aspects of seabird ecology. A summary of incomplete and unknown information was presented in the Draft Programmatic SEIS, (Section 4.3.1) and was followed by a description of the current management regime at that time (Section 4.3.2) and then by an analysis of the effects of the Draft Programmatic SEIS alternatives on seabirds (Section 4.3.3) (NMFS 2001a). The significance determinations of analysis performed in this EA is summarized in Table 6.0-1.

Seabird Groups and Effects to Consider: Given the sparse information, it is not likely that the fishery effects on most individual bird species are discernable. For reasons explained in the Steller Sea Lion Protection Measures SEIS (NMFS 2001c), the following species or species groups are considered: northern fulmar, short-tailed albatross, spectacled eider, and Steller's eiders, albatrosses and shearwaters, piscivorous seabird species, and all other seabird species not already listed. The fishery effects that may impact seabirds are direct effects of incidental take (in gear and vessel strikes), and indirect effects on prey (forage fish) abundance and availability, benthic habitat, processing waste and offal. ESA consultation between NMFS and the USFWS is ongoing for the short-tailed albatross, spectacled eider and Steller's eider (see appendix F).

Direct Effects - Incidental take The effects of incidental take of seabirds (from fishing gear and vessel strikes) are described in Section 4.3.3 of the Draft Programmatic SEIS (NMFS 2001a). Birds are taken incidentally in longline, trawl, and pot gear, although the vast majority of that take occurs in the longline fisheries and is comprised primarily of the following species or species groups: fulmars, gulls, shearwaters, and albatrosses. Therefore, this analysis of incidental take focuses primarily on the longline fisheries and those species.

As noted in Section 4.3.3.1 of the Draft Programmatic SEIS (NMFS 2001a), several factors are likely to affect the risk of seabird incidental catch. It is reasonable to assume that risk goes up or down, partly as a consequence of fishing effort (measured as total number of hooks) each year (NMFS 2001a). But, if seabird avoidance measures used to prevent birds from accessing baited hooks are effective, then effort levels would probably be less of a critical factor in the probability of a bird getting hooked. Seabird bycatch avoidance measures are outlined on page 4.3-8 of the Draft Programmatic SEIS (NMFS 2001a).

Indirect Effects - Prey (forage fish) abundance and availability A description of the effects of prey abundance and availability on seabirds is in Section 4.3.3 of the Draft Programmatic SEIS (NMFS 2001a). Detailed conclusions or predictions cannot be made, however, the present understanding is fisheries management measures affecting abundance and availability of forage fish or other prey species could affect seabird populations (NMFS 2001a; NMFS 2001c).

Indirect Effects - Benthic habitat The indirect fishery effect on benthic habitat as utilized by seabirds are described in Section 4.3.3.1 of the Draft Programmatic SEIS (NMFS 2001a). The seabird species most likely to be impacted by any indirect gear effects on the benthos would be diving sea ducks such as eiders and scoters as well as cormorants and guillemots (NMFS 2001c). Bottom trawl gear has the greatest potential to indirectly affect seabirds via their habitat. Thus, the remainder of this analysis will be limited to the impacts of bottom trawl gear on foraging habitat.

Indirect Effects - Processing waste and offal The volume of offal and processing wastes probably changes approximately in proportion to the total catch in the fishery. Whereas some bird populations may benefit from the food supply provided by offal and processing waste, the material also acts as an attractant that may lead to increased incidental take of some seabird species (NMFS 2001c). TAC level under various alternatives could reduce the amount of processing waste and offal that is available to scavenging seabirds, particularly in some areas near major breeding colonies. This impact would need to be considered in the balance of the beneficial and detrimental impacts of the disposal actions.

Criteria used to determine significance of effects on seabirds Significance of impacts is determined by considering the context in which the action will occur and the intensity of the action. When complete information is not available to reach a strong conclusion regarding impacts, the rating of 'unknown' is used. Table 4.6-1 outlines the qualitative significance criteria or thresholds that are used for determining if an effect has the potential to create a significant impact on seabirds.

4.6.1 Effects of Alternative 1 on Seabirds

Direct Effects - Incidental take In as much as Alternative 1 could increase fishing effort by setting the quota for harvest to $max F_{ABC}$, it has the potential to increase interactions with those seabird species prone to incidental bycatch. The Draft Programmatic SEIS (NMFS 2001a) concluded that northern fulmars were the only species showing a positive linear relationship between fishing effort and numbers of birds hooked. This relationship did not exist for other bird groups. The short-tailed albatross, because of its small population and endangered species status, and the black-footed albatross, because of concerns of a population decline and high incidental take in the GOA, might also be affected by greater fishing effort (NMFS 2001c). These three species, the northern fulmar, short-tailed albatross, and black-footed albatross, may demonstrate conditionally significant negative effects from incidental take resulting from this alternative. However, because there is insufficient information to document a link between colonies or population trends and incidental take of these species, the effect was rated 'unknown'. The Steller Sea Lion Protection Measures SEIS (NMFS 2001c) examines the population trends and potential for effects of groundfish fisheries on these potentially affected species. Effort should be made to gather data and conduct analysis and modeling necessary to make a determination in future EA on TAC alternatives on these three species.

Indirect Effects - Prey (forage fish) abundance and availability The Draft Programmatic SEIS concluded that fishery influences on the abundance and availability of forage fish was considered insignificant for populations of northern fulmars and most other seabird groups (NMFS 2001a). The prey base for some piscivorous seabirds, however, could be affected by localized increases in TAC level (NMFS 2001c). The effect at the population level of high TAC for these seabird species remains unknown.

Indirect Effects - Benthic habitat Increased disturbance of the benthic habitat could potentially affect those seabirds that are primarily benthic feeders, including the eiders. The eider's dependence on benthic crustacea, which could be affected by greater trawling effort, could result in a conditionally significant negative affect on eiders. However, spatial overlap between fisheries and eider forage areas are limited, and the population level effects are unknown. Other seabirds that also utilize demersal fish or small invertebrates

and crustacea include cormorants and guillemots. These latter seabird groups are generalists and can utilize a variety of other fish species, thus the application of Alternative 1 is not likely to affect populations greater than current standards.

Indirect Effects - Processing waste and offal It could be that the northern fulmar, a species known to benefit from fishery discards in the North Atlantic, experiences a benefit from North Pacific fisheries. Given the unknown effect of incidental take on northern fulmars in the BSAI and on the Pribilof Island colonies in particular, any benefit from a supplemental feeding source could be reduced by the bycatch effects associated with the fishery. Based on this information, the availability of fishery processing wastes could have a conditionally significant beneficial effect on northern fulmars under Alternative 1. It is not possible at this time to determine if this effect is significant, and thus the effect is unknown.

4.6.2 Effects of Alternative 2 on Seabirds

Direct Effects - Incidental take TAC levels under Alternative 2 are identical to those of Alternative 1 in the BSAI. In the GOA, TAC levels under Alternative 2 are equivalent to those of Alternative 1 for most species, with the exceptions of a lower TAC on Pollock, Pacific cod, and Sablefish. The promulgation of Alternative 2 is thus seen as similar in effect on seabirds as those in Alternative 1. Because the primary fisheries potentially affecting seabirds in the GOA would have lower effort, it is possible that lower incidental take could occur for species such as fulmars, albatrosses and shearwaters. The population level differences are not likely to be different than those determined under Alternative 1.

Indirect Effects - Prey (forage fish) abundance and availability The effects on seabird prey from TAC levels under Alternative 2 are not likely different than those under Alternative 1, at the population level. It is possible that in the GOA, localized impacts on the seabird prey could be reduced, but the effect at the population level is considered insignificant, or for piscivorous birds, unknown.

Indirect Effects - Benthic habitat For benthic feeders, the impact of Alternative 2 on eiders is unknown, and for remaining seabirds, is considered insignificant.

Indirect Effects - Processing waste and offal TAC levels under Alternative 2 could have effects similar to those described under Alternative 1. In the GOA, processing waste and offal that is available to scavenging seabirds might be reduced. This indirect effect potentially has both beneficial and detrimental impacts and overall could be considered insignificant at the population level for all seabird species with high interaction levels with the fisheries, such as fulmars, albatrosses, shearwaters, and gulls.

4.6.3 Effects of Alternative 3 on Seabirds

Direct Effects - Incidental take Potentially, the overlap between longline vessels and fulmars foraging near colonies would be reduced under TAC levels of Alternative 3,and could result in reduced levels of interaction and incidental take of fulmars. Given the current levels of incidental take, the existing measures in place to reduce incidental take of seabirds, and all of the above considerations (see also NMFS 2001c), Alternative 3 is considered to have an unknown effect on fulmars at the BSAI colonies Black-footed albatrosses could be affected in the GOA by lower encounter rates under a $F_{50\%}$., thus the effect of this alternative on incidental take for albatrosses is considered unknown. Other seabird species are not likely to be affected significantly by this amount of change in fishing effort.

Indirect Effects - Prey (forage fish) abundance and availability For the reasons noted in the Draft Programmatic SEIS and summarized in NMFS 2001c, the potential indirect fishery effects on prey abundance

and availability of Alternative 3 are considered insignificant or unknown for all seabirds. For most piscivorous seabirds, the effects of fishing effort under this alternative would not likely be different than under current TAC levels. Those seabirds that feed closer to shore or include benthic prey in their diets, such as guillemots, cormorants, eiders and other seaducks, might benefit from lower fishing effort under this alternative. However, the potential for effects at the population or colony level are unknown, and thus effects for these groups of birds is considered unknown.

Indirect Effects - Benthic habitat A reduction of fishing effort could have a localized beneficial affect on some benthic habitats, but the level of reduction and areas affected are not likely to alter current population trends of seabirds. A possible exception are the exclusively benthic feeders, such as eiders and other seaducks, and thus the affect for this species group is unknown.

Indirect Effects - Processing waste and offal The availability of fishery processing wastes could decline under Alternative 3, which could reduce supplemental food available to fulmars, which are closely associated with fishing vessels. However, the change in fishing effort is not likely to be sufficiently different from current TAC levels to affect population-level changes in fulmars. Furthermore, reduced fishing could also have the effect of reducing interactions subjecting the birds to incidental take, thus the effects are considered unknown for fulmars.

4.6.4 Effects of Alternative 4 on Seabirds

Direct Effects - Incidental take Under Alternative 4, fishing effort varies among target species and regions, with respect to effort under Alternatives 1-3. It is thus difficult to make a determination about the potential effects of this alternative on seabirds. In general, using the 5-year average to set TAC levels is lower than other alternatives (with the exception of Alternative 5, no take). However, important exceptions are the pollock and Pacific cod fisheries in the GOA, which under Alternative 4 are equivalent to those of Alternative 1, the $max F_{ABC}$. Given the current levels of incidental take, the existing measures in place to reduce incidental take of seabirds, and all of the above considerations, Alternative 4 is considered to have an unknown effect on fulmars, albatrosses and shearwaters. See NMFS 2001c for the analysis of the effect of incidental take on these species.

Indirect Effects - Prey (forage fish) abundance and availability For the reasons noted in the Draft Programmatic SEIS and summarized in NMFS 2001c, the potential indirect fishery effects on prey abundance and availability resulting from Alternative 4 are considered insignificant or unknown at the population level for all seabirds.

Indirect Effects - Benthic habitat The promulgation of fisheries under Alternative 4 could result in high fishing pressure in the pollock fishery in the GOA, thus potentially affecting benthic habitats. The population level effects of this level of fishing effort are unknown for those birds most dependent on benthic habitats, such as eiders and other seaducks.

Indirect Effects - Processing waste and offal This alternative has the potential of increasing offal in the GOA, and thus could affect fulmars in particular. However, the population or colony effects of TAC levels under Alternative4 are unknown for fulmars, and are likely to be insignificant for other seabirds.

4.6.5 Effects of Alternative 5 on Seabirds

Direct Effects - Incidental take The effects of Alternative 5 with respect to incidental take are expected to benefit seabirds subject to incidental take in groundfish fisheries, since it eliminates or greatly reduces

fishing effort. Thus, this alternative could have a conditionally significant positive effect on populations of fulmars, albatrosses, shearwaters, and gulls. Northern fulmars have considerable overlap between longline fisheries and colony location and distribution at sea (Appendix C Ecosystem Considerations, p. 109). Fulmars also demonstrate a direct link between fishing effort and incidental take rates (NMFS 2001a). For these reasons, a complete absence of fishing has high potential to have a significant beneficial effect on specific colonies. Similarly, short-tailed albatrosses and black-footed albatrosses should derive significant benefits by reduced incidental take. Other species, though incidental catch rates would be reduced, are not likely to be affected at the population or colony level.

Indirect Effects - Prey (forage fish) abundance and availability For the reasons noted in the Draft Programmatic SEIS and summarized in NMFS 2001c, the potential indirect fishery effects on prey abundance and availability of Alternative 5 are considered insignificant at the population level for most seabirds, and unknown for eiders and other seaducks.

Indirect Effects - Benthic habitat Seabirds dependent on the benthic habitat, such as eiders and other seaducks, could potentially benefit from lack of fishing under Alternative 5. Because the population level effects of this action remain unknown, the effects of this alternative on eiders and seaducks is unknown.

Indirect Effects - Processing waste and offal Based on the assumptions noted in NMFS 2001c, the availability of fishery processing wastes could have a conditionally significant beneficial effect on northern fulmars, thus, a complete reduction of fishing could reduce offal availability to fulmars. Similar effects might occur for albatrosses, shearwaters, and gulls. The degree to which these populations are dependent on offal are not known, and thus the effect is considered unknown for fulmars, albatrosses, shearwaters, and gulls, and is insignificant for other seabird species.

Table 4.6-1 Criteria used to determine significance of effects on seabirds.

Effects	Rating		
	Significant	Insignificant	Unknown
Incidental take	Take number and/or rate increases or decreases substantially and impacts at the population or colony level.	Take number and/or rate is the same.	Take number and/or rate is not known.
Prey (forage fish) availability	Prey availability is substantially reduced or increased and causes impacts at the population or colony level.	Prey availability is the same.	Changes to prey availability are not known.
Benthic habitat	Impact to benthic habitat is substantially increased or decreased and impacts at the population or within critical habitat.	Impact to benthic habitat is the same.	Impact to benthic habitat is not known.
Processing waste and offal	Availability of processing wastes is substantially decreased or increased and impacts at the population or colony level.	Availability of processing wastes is the same.	Changes in availability of processing wastes is not known.

4.7 Effects on Marine Benthic Habitat and Essential Fish Habitat Assessment

This analysis focuses on the effects of fishing at the alternative TAC levels on benthic habitat important to commercial fish species and their prey. The analysis also provides the information necessary for an EFH (Essential Fish Habitat) assessment, which is required by the Magnuson-Stevens Act for any action that may adversely affect EFH. Two issues of concern with respect to EFH effects are the potential for damage or removal of fragile biota that are used by fish as habitat, the potential reduction of habitat complexity, which depends on the structural components of the living and nonliving substrate; and potential reduction in benthic diversity from long-lasting changes to the species mix.
Each alternative is rated as to whether it may have significant effects in three ways:

1. Removal of or damage to Habitat Areas of Particular Concern (HAPC) biota by fishing gear
2. Modification of nonliving substrate, and/or damage to small epifauna and infauna by fishing gear
3. Change in benthic biodiversity

The reference point against which the criteria are applied is the current size and quality of marine benthic habitat and other essential fish habitat. Habitat indicators of ecosystem function (Table 4.8-1) are used in the determination that for all alternatives, all three questions, the harvest specifications will have an insignificant impact on marine benthic habitat (Table 6.0-1).

Consultation on effects to Essential Fish Habitat: Except for setting TAC at zero (Alternative 5), all of the alternatives have the potential for benthic disturbances that could result in regional adverse effects on EFH, or to a component of EFH such as certain HAPC biota. Given that mitigation measures to minimize effects on EFH have been undertaken through ongoing fishery management measures whose principal goal was to protect and rebuild groundfish stocks, but whose results have also resulted in a benefit to habitat for all managed species, any potential significant adverse effects by this Federal action (groundfish fishing) have been minimized to the extent practicable. None of the TAC levels that would be specified under these alternatives would have impacts beyond those displayed in previous analyses of the effects of these groundfish fisheries on marine benthic habitat, therefore, findings of insignificant are made for 2003 TAC specifications. The significance determinations are summarized in Table 6.0-1.

4.8 Effects on the Ecosystem

To interpret and predict the effects of these fisheries on the ecosystem different indicators of ecosystem function were examined and are summarized in Table 4.8-1. The indicators were separated into categories related to physical oceanography, habitat, target groundfish, forage, other species, marine mammals, seabirds, and the aggregate indicators which relate to trophic levels of catch in the fishery management areas. Observations were made about each of the indicators followed by an interpretation of that observation with relation to ecosystem function (third column in Table 4.8-1). Background information specific to the North Pacific ecosystem is contained in the ecosystem consideration section of this document (Appendix C).

Table 4.8-1 Indicators of ecosystem function.

INDICATOR	OBSERVATION	INTERPRETATION
Physical Oceanography		
Arctic Oscillation Index	Shift to negative in last few years is not holding. Presently positive	When positive it supports a weak Aleutian low, helps drive a negative PDO pattern. Impending El Nino may not have much effect on N. Pacific and Bering Sea due to negative PDO and positive AO.
Pacific Decadal Oscillation	Cool coastal pattern in GOA from 1998 through May 2002	Indicates shift in PDO to negative phase. Enhanced coastal production in WA-OR and inhibited production in AK
EBS summer temperature	Bottom temperatures were generally warmer and surface temperatures were about average in 2002	Pollock shift more to middle shelf was noted
EBS sea ice extent	Strong southerly winds kept sea ice northward of 60N in 2001, early ice retreat in 2002	Low ice year in 2001, kept middle shelf bottom temperatures warmer last year
AI summer bottom temperature	One of the 3 coldest years thus far detected	Colder than average year
GOA summer temperature	Bottom temperatures in 2001 appeared above average	Bottom temperature at depths 50-150 did not track 2001 PDO trend
Papa Trajectory Index	Surface water circulation in the eastern Gulf of Alaska shows beginning of a southward shift	Southerly drift pattern of Subarctic current
Habitat		
Area closed to trawling BSAI and GOA	More area closed in 2000-2002 compared with 1999	Less trawling on bottom in certain areas though may concentrate trawling in other areas
Groundfish bottom trawling effort in GOA	Bottom trawl time in 2001 was similar to 1998-00 and lower than 1990-1997	Less trawling on bottom
Scallop tows in GOA	Number of tows decreased in 2001/2002 in EGOA but increased in Kodiak relative to 2000/01	Generally decreasing number of scallop tows by area since 1997/98
Longline effort in GOA	Effort levels were about the same in 2000 and 2001	Generally stable or decreasing levels of longline effort in 1990's to present

INDICATOR	OBSERVATION	INTERPRETATION
HAPC biota bycatch in GOA groundfish fisheries	Estimated at 32 t for GOA in 2000	About constant in GOA 1997-2000
HAPC biota biomass indices from GOA bottom trawl survey	Survey may provide biomass index for anemones and sponges. Possible increase or stable anemones observed in central and western GOA	More research needed to understand and interpret trends
Groundfish bottom trawling effort in EBS	Bottom trawl time in 2001 was similar to 1999 and lower than 1991-1997	Less trawling on bottom relative to 1991-97
Groundfish bottom trawling effort in AI	About the same in 2001 compared with 2000, generally decreasing trend since 1990	Less trawling on bottom
Scallop tows in EBS/AI	Number of tows decreased in 2001/02 in western AK	Generally decreasing number of scallop tows since 1997/98
Longline effort in BSAI	Higher in 2001 relative to 2000	Generally increasing levels of longline effort in 1990's to present
HAPC biota bycatch in EBS/AI groundfish fisheries	Estimated at 560t for BSAI in 2000	Lower in BSAI during 2000 relative to 1997-98
HAPC biota biomass indices in EBS bottom trawl survey	Survey may provide biomass index for seapens, anemones, and sponges. These groups have been better identified in the survey in the 1990's to present.	More research needed to understand trends.
HAPC biota biomass indices in AI bottom trawl survey	Survey may provide biomass index for seapens, anemones, and sponges.	More research needed to understand trends.
Target Groundfish		
Groundfish fleet	Total number of vessels actually fishing about the same in 2001 relative to 1999	Relatively stable number of vessels participating.
Groundfish discards	Slightly decreasing rates in 2001 relative to 2000, 1998-2002 amounts are lower than 1997	Fairly stable rates of discarding since 1998.
Total groundfish catch EBS	Total catch about same in 2001 as in 1990's, pollock dominant	Catch biomass about same from 1984-2001
Total groundfish catch AI	Total catch in 2001 shows decline since about 1996, Atka mackerel dominant	Total catch returning to lower levels
Total biomass EBS/AI	Total about same in 2000 as in 1999, pollock dominant	Relatively high total biomass since around 1981

INDICATOR	OBSERVATION	INTERPRETATION
EBS recruitment	Some above average recruitment in early 1990s, mostly below average	Groundfish recruitment is low in mid-late 1990's
BSAI groundfish stock status	In 2001, 0 stocks overfished, 13 not overfished, and 100 unknown	Many major stocks are not overfished, 10 major groundfish stocks have unknown status
Total groundfish catch GOA	Total catch lower in 2001 than 2000	Total catch similar from 1985-present
Total biomass GOA	Declining abundance since 1982, arrowtooth dominant	Relatively low total biomass compared to peak in 1982
GOA recruitment	Groundfish recruitment in 1990s is mostly below average for age structured stocks, except POP	Groundfish recruitment is low in 1990's
GOA groundfish stock status	In 2001, 0 stocks overfished, 9 not overfished, 93 unknown	Many major stocks are not overfished, 19 major stocks in GOA have unknown status
Forage		
Forage bycatch EBS	72 t in 2000,32-49t in 97-99, mostly smelts	Higher smelt catch rates in 2000
Age-0 walleye pollock EBS	Index area counts were high in 2001 but juveniles were smaller	Higher abundance around the Pribilofs, uncertain survival
Forage biomass indices from EBS bottom trawl survey	Survey may provide biomass index for some species	More research needed to interpret trends
Forage biomass indices from AI bottom trawl survey	Survey may not sample these well enough to provide biomass indices	
Forage bycatch GOA	Ranged from 20-120 t in 1997-2000, over 500t in 2001, mostly smelts	Higher smelt catch rates in 2001
Forage biomass indices from GOA bottom trawl survey	Survey may provide biomass index for sandfish and eulachon, eulachon index increased in 2001 in central and western GOA	More research needed to interpret trends
Forage biomass indices from ADF&G inshore small mesh survey in GOA	Osmerid biomass index increased in 2001	Increase due primarily to increase in eulachon abundance
Miscellaneous and other managed species		

INDICATOR	OBSERVATION	INTERPRETATION
EBS jellyfish	Large decreases in 2001 and 2002 relative to 2000	Possible return to 1980's low levels of jellyfish biomass
NMFS bottom trawl survey – EBS	2001 trends indicate poachers and echinoderms higher in 1990s, eelpouts lower in 1990s	More research on life history characteristics of species needed to interpret trends
NMFS bottom trawl survey – AI	2002 trends are unclear	More research needed to interpret trends
Crab stock status BSAI	2 stocks overfished (BS Tanner, St. Matt blue king), BS snow crab is rebuilding, 4 stocks not overfished, 14 stocks unknown status	Mixed crab stock status
Scallop stock status	1 stock – not overfished	
Salmon stock status	0 stocks overfished, 5 stocks not overfished, 0 stocks unknown	
Spiny dogfish	Observer bycatch rates in 2000 show mixed trends by area in GOA	Both increasing and decreasing catch rates observed over time by area
Spiny dogfish	IPHC bycatch rates 97 to 2000 show peaks in 1998 but declines since then	Possible distribution changes caused peaks in 1998
Sleeper shark	Mixed trends by area (Observer, IPHC, ADF&G)	Stable or slight increase in most areas in 2000, large increases noted in Kodiak region
Salmon shark	Highest bycatch rates in Kodiak region	Similar catch rates in recent years
ADF&G large mesh inshore-GOA	2001 catch rates of Tanner crab are increasing, flathead sole pollock and cod are higher than prior to the regime shift	Increasing Tanner crab, other species slightly increasing last 4-5 years
ADF&G small mesh inshore survey-GOA	Pandalid shrimp increased in 2001	Possible increase in Kodiak area pandalid shrimp
NMFS bottom trawl survey – GOA	2001 trends indicate possible increase in eelpouts, and starfish in 1990's, unclear trends for jellyfish	More research needed to interpret trends

INDICATOR	OBSERVATION	INTERPRETATION
Prohibited species bycatch	2001 bycatch rates show increase in halibut and chinook salmon, declines in other salmon, herring, other Tanner crab, and red king crab, and little change in bairdi and other king crab bycatch rates relative to 2000	Prohibited species bycatch rates are mixed
Other species bycatch	Other species bycatch was higher in 2000 relative to 1999 but similar to 1997-98 rates	Dominant species in catch were skates and sculpins
Non-specified species bycatch	Non specified species bycatch was higher in 2000 relative to 1999 but was similar to 1997 rate	Dominant species in non specified bycatch were jellyfish, grenadier, and starfish
Marine Mammals		
Alaskan sea lion western stock pup counts	Composite 2001/2002 count showed continuing decline (WGOA only area with an increase)	Kenai to Kiska areas has annual decrease averaging about 4%/yr since 1994
Alaskan sea lion western stock non-pup counts	2002 non-pup counts increased by 5.5% from 2000	First region-wide increase in 2 decades. Average long-term trend 1991-2002 shows decline of 4.2%/yr. Western Aleutians still showing strong decline
Alaskan eastern stock sea lion counts	Overall increase from 1991-2002 was 15.4%	Stable or slightly increasing at average of about 2%/yr
Northern fur seal pup counts	Annual rate of decline on both islands combined during 1998-2002 was 5.2%/yr	Pup production at low levels not seen since 1921 (St. Paul) and 1916 (St. George)
Seabirds		
Seabird breeding chronology	Overall seabird breeding chronology was earlier than average or unchanged in 2000	Earlier hatching times are associated with higher breeding success
Seabird productivity	Overall seabird productivity was average or above average in 2000	Average or above average chick production
Population trends	Mixed: 12 increased, 7 showed no change, 8 decreased	Variable depending on species and site

INDICATOR	OBSERVATION	INTERPRETATION
Seabird bycatch	2001 BSAI longline bycatch is lower than 2000, N. fulmars dominate the catch (GOA longline bycatch is small and relatively constant) Trawl bycatch rates are variable and perhaps increasing	Unclear relationship between bycatch and colony population trends
Aggregate Indicators		
Regime shift scores	Some evidence for regime shift after 1998 but 2001 shows weakening of that evidence	Possible regime shift but more time and biological series needed to see if trend continues
Trophic level catch EBS and AI	Constant, relatively high trophic level of catch since 1960s	Not fishing down the food web
Trophic level catch GOA	Constant, relatively high trophic level of catch since 1970s	Not fishing down the food web
Total catch EBS (excludes salmon)	Total catch about same in 2001 as in 1990's, pollock dominant	Catch biomass about same from 1984-2001
Total catch AI (excludes salmon)	Total catch in 2001 shows decline since about 1996, Atka mackerel dominant	Total catch returning to lower levels
Total catch GOA (excludes salmon)	Total catch lower in 2001 than 2000	Total catch similar from 1985-present

Beginning with this year's SAFE reports (Appendices A and B), individual groundfish stock assessment chapters included an ecosystem assessment. Within each section are three subsections: 1) Ecosystem effects on stock, 2) Fishery effects on the ecosystem and 3) Data gaps and research priorities. These provide information on how various ecosystem factors might be influencing the subject stock or how the specific stock fishery might be affecting the ecosystem and what data gaps might exist that prevent assessing certain effects. Ecosystem indicators coupled with these individual stock ecosystem evaluations effects are interpretations aggregated to effects of all groundfish fisheries on the ecosystem.

Determinations of significance of impacts on the ecosystem issues of predator-prey relationships, energy flow and balance, and diversity are made from these individual groundfish stock assessment chapters. The overall interpretations are insignificant impact determinations for the three questions comparing proposed action using application of principles of ecosystem management. Three questions are posed yielding three insignificant determinations: Predator prey relationships, energy flow and balance, and diversity (summarized in Table 6.0-1).

4.9 Effects on State of Alaska Managed State Waters Seasons and Parallel Fisheries for Groundfish Fisheries

The State of Alaska manages state water seasons for several species of groundfish in internal waters of the state; 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 and 630 (Chignik, Kodiak, and Cook Inlet Districts), and 649 (Prince William Sound). The state also manages

groundfish fisheries for which federal TACs are established within state waters. Unless specified otherwise by the state, open and closed seasons for directed fishing within state waters are concurrent with federal seasons. These fisheries have been referred to as parallel fisheries or parallel seasons in state waters. Harvests of groundfish in these state parallel fisheries accrue towards achieving the federal TACs established for these fisheries.

This analysis focuses on the effects of Alternatives 1 through 5 on harvest levels in these state managed fisheries. The criteria used in estimating the effects is outlined below in Table 4.9-1. If the alternative considered was deemed by NMFS to likely result in a decrease in harvest levels in the state waters seasons for groundfish or in the parallel seasons in the BSAI and GOA of more than 50% it was rated significantly adverse. If the alternative was deemed to likely result in an increase in harvest levels in the state waters seasons for groundfish or in the parallel seasons in the BSAI and GOA of more than 50% it was rated significant beneficial. If the alternative was not deemed likely to neither decrease nor increase harvest levels by more 50% it was rated insignificant. Where insufficient information was available to make such determinations, the effect was rated as unknown. The level of a 50% change in harvest levels is more of a qualitative than a quantitative assessment. The authors felt that a change of 50% in either direction was clearly a significant change and that a change of less than 20% in either direction was clearly insignificant as stocks of groundfish frequently change over the short term within this range. The authors acknowledge that individual fishing operations with greater reliance upon participation in these state fisheries may experience adverse or beneficial effects at changes in harvest levels below the 50% level. The year 2002 was used as a benchmark for comparison. These effects are discussed in Section 4.10 Social and Economic Consequences in this EA. The effects on other state managed fisheries (salmon, herring, and crab) are discussed in Section 4.4 Effects on Prohibited Species in this EA.

4.9.1 Effects of Alternatives 1 through 5 on harvest levels in state managed groundfish fisheries in the BSAI and GOA

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 from in the western GOA and includes this pollock in its assessment of the combined PWS/WYK/C/W (Areas 649, 640, 630, 620, and 610) pollock stock. The annual GHL established for PWS is subtracted from the ABC for the combined PWS/WYK/C/W stock in the WYK/C/W area. None of the alternatives considered would have an effect on the GHLs established by the state for these fisheries, therefore the effect on these fisheries under Alternatives 1 through 5 is rated insignificant.

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. Therefore alternatives which result in an ABC reduction or increase of more than 50% are rated significant. Alternative 5 would reduce Pacific cod ABCs in the GOA (and therefore the GHLs) by more than 50% and are rated significantly adverse. Alternatives 1, 2, 3, and 4 would not reduce or increase ABCs for Pacific cod in the GOA by more than 50% and are rated insignificant.

Alternatives which result in a decrease or increase in 2003 TAC levels in the BSAI and GOA from 2002 levels are assumed to have a proportionate effect on harvest levels in the state managed parallel seasons. Alternatives 1 through 4 do not increase or decrease TACs by more than 50% from 2002 levels in the BSAI and GOA and therefore the effect of these alternatives on harvest levels in the parallel seasons is rated

insignificant. Alternative 5 (which would set TACs at zero) would be expected to decrease harvest levels in the state managed parallel seasons by more than 50% and is rated significantly adverse. These effects are summarized in Table 6.0-1.

Table 4.9-1 Criteria used to estimate the significance of effects on harvest levels in state managed groundfish fisheries in the BSAI and GOA.

Effect	Significant Adverse	Insignificant	Significant Beneficial	Unknown
Harvest levels of groundfish in state waters seasons and parallel seasons	Substantial decrease in harvest levels (>50%)	No substantial decrease or increase in harvest levels (<50%)	Substantial increase in harvest levels (>50%)	Insufficient information available

4.10 Social and Economic Consequences

Section 4.10 describes the social and economic consequences of the alternatives. Sub-section 4.10.1 describes the fishery, Sub-section 4.10.2 analyses the significance of the alternatives for twelve economic criteria, and Sub-section 4.10.3 provides additional details on gross revenues associated with the five alternatives.

4.10.1 Description of the Fishery

As noted in section 1.2 of this EA, detailed descriptions of the groundfish fisheries may be found in the following reports:

Alaska Groundfish Fisheries. Draft Programmatic Supplemental Environmental Impact Statement (NMFS 2001a). This report contains detailed fishery descriptions and statistics in Section 3.10, "Social and Economic Conditions," and in Appendix I, "Sector and Regional Profiles of the North Pacific Groundfish Fisheries." The sector and regional profiles in Appendix I have been updated, and are available through the NPFMC website.[2]

"Economic Status of the Groundfish Fisheries off Alaska, 2001" (Hiatt *et al.* 2002), also known as the "2002 Economic SAFE Report." This document is produced by NMFS and updated annually. The 2002 edition contains 49 historical tables summarizing a wide range of fishery information through the year 2001.

Steller Sea Lion Protection Measures Supplemental Environmental Impact Statement (NMFS 2001c. Referred to as "SSL SEIS" in the remainder of this section) contains several sections with useful background information on the groundfish fishery (although the majority of information provided is focused on three important species - pollock, Pacific cod, and Atka mackerel). Section 3.12.2 provides information on existing social institutions, patterns, and conditions in these fisheries and associated communities, Appendix C provides information on fishery economics, and Appendix D provides information on groundfish markets.

[2] http://www.fakr.noaa.gov/npfmc/NorthernEconomics/NorthernEconomics.htm (posted 1-28-02; accessed 11-08-02)

Final Environmental Impact Statement for American Fisheries Act Amendments 61/61/13/8 (NMFS 2002a) provides a survey of the Bering Sea and Aleutian Islands groundfish fishery paying particular attention to the pollock fishery and the management changes introduced into it following the American Fisheries Act. The information is in Section 3.3, "Features of the human environment."

Assessment of Changes in IRIU Flatfish Requirements. Public Review Draft. (Northern Economics 2002). Appendix A, "Detailed Analysis of Existing Conditions of Groundfish Processors Affected by IRIU Flatfish Regulations," has information on groundfish catcher-processor and shoreside processor sectors.

Gross revenues from the groundfish fisheries off of Alaska[3]

In 2001, the fishing fleets off Alaska produced an estimated $542.8 million in ex-vessel gross revenues from the groundfish resources of the Bering Sea and Gulf of Alaska.[4] In 2001, groundfish accounted for about 56% of the $974.2 million in ex-vessel gross revenues generated off Alaska by all fisheries (Hiatt, *et al.*2002, Table 2.1, page 18).

The two most economically important groundfish species are pollock and Pacific cod. In 2001, pollock catches generated estimated ex-vessel revenues of $295.2 million and accounted for about 54 percent of all groundfish ex-vessel revenues.[5] Pacific cod was the next most important groundfish species, measured by the size of gross revenues. Pacific cod generated an estimated $124.7 million in ex-vessel gross revenues and accounted for about 23 percent of all groundfish ex-vessel gross revenues. (Hiatt, *et al.* 2002, Table 21, pg 53).

Other groundfish species were economically important as well. These included sablefish ($62.7 million in estimated ex-vessel gross revenues), flatfishes (as a group of species generated $31.4 million in estimated ex-vessel gross revenues), rockfishes (as a group generated $7.9 million), and Atka mackerel generating $21.1 million. (Hiatt, *et al*. 2002, Table 21, pg 53).

At the first wholesale level, the gross revenue generated by the groundfish fisheries off of Alaska was estimated to be in excess $1.39 billion. Over half of this, $755.3 million, came from catcher/processors and motherships operating in the Bering Sea and Aleutian Islands (BSAI). Another $432.6 million was generated by catcher vessels and shoreside processors operating in the BSAI. In the Gulf of Alaska (GOA) $26.9 million was generated by catcher/processors and $176.9 million was generated by catcher vessels and shoreside processors. (Hiatt, *et al*. 2002, Table 23, pg 55).

[3]Net returns cannot be estimated because there is little public information on fishing and processing costs.

[4]The ex-vessel revenue estimates from the Economic SAFE document reflect estimated catcher vessel gross revenues and ex-vessel revenues imputed to catcher-processors. See Hiatt, *et al.*, the footnote to Table 18 on page 48.

[5]As noted below, a large proportion of pollock is taken by catcher processors and ex-vessel prices are not generated. Ex-vessel prices have been inferred for these operations.

Catcher/Processors

Catcher/processors carry the equipment and personnel they need to process the fish that they catch. In some cases catcher/processors will also process fish harvested for them by catcher vessels and transferred to them at sea. There are many types of catcher/processors operating in the BSAI and GOA groundfish fisheries.

Pollock catcher/processors in the BSAI. These vessels (which use trawl gear) are referred to as the "AFA catcher/processors" because of the role played by the American Fisheries Act (AFA) of 1998 in structuring the fishing sector. The AFA: (1) recognized pollock trawl catcher/processors as a distinct industry segment, (2) limited access to the fleet, (3) modified the historical allocation of the overall pollock TAC that the fleet had received, and (4) created a legal structure that facilitated the formation of a catcher/processor cooperative. The pollock at-sea processing fleet has two fairly distinct components - the fillet fleet, which concentrates on fillet product, and the surimi fleet, which produces a combination of surimi products and fillets. Both of these sectors also produce pollock roe, mince, and to varying degrees fish meal.

Trawl Head And Gut (H&G) catcher/processors. These factory trawlers do not process more than an incidental amount of fillets. Generally they are limited to headed and gutted products or kirimi. In general, they focus their efforts on flatfish, Pacific cod, and Atka mackerel. Trawl H&G catcher/processors are generally smaller than AFA catcher/processors and operate for longer periods than the surimi and fillet catcher/processor vessels that focus on pollock. A fishing rotation in this sector might include Atka mackerel in January; rock sole in February; rock sole, Pacific cod, and flatfish in March; rex sole in April; yellowfin sole and turbot in May; yellowfin sole in June; rockfish in July; and yellowfin sole and some Atka mackerel from August to December. The target fisheries of this sector are usually limited by bycatch regulations or by market constraints and only rarely are they able to catch the entire TAC of the target fisheries available to them. Between 1992 and 2000, the number of vessels operating in this fleet ranged between 23 and 32. From 1998 to 2000 there were either 23 or 24 active vessels. In 2000, the most important species were Pacific cod (about 25% of gross revenues) and other flatfish (about 23% of gross revenues). Yellowfin sole (14%), Atka mackerel (13%), rock sole (10%), rockfish (7%) and pollock (5%) were also significant. These were the important species from 1992 to 2000, but their relative importance varied through time. Pacific cod was one of the less important species before 1998, while yellowfin sole was much more important prior to 1998. (Northern Economics 2002, pages 17-19).

Pot catcher/processors. These vessels have been used primarily in the crab fisheries of the North Pacific, and Bering Sea, but increasingly are participating in the Pacific cod fisheries. They generally use pot gear, but may also use longline gear. They produce whole or headed and gutted groundfish products, some of which may be frozen in brine rather than blast frozen. The number of vessels in this sector has ranged between two and 14 between 1992 and 2000; ten vessels were active in 2000. Almost all the groundfish revenues from the vessels in this sector come from Pacific cod. (Northern Economics 2002, pages 26-27).

Longline catcher/processor. These vessels, also known as freezer longliners, use longline gear to harvest groundfish. Most longline catcher/processors are limited to headed and gutted products, and in general are smaller than trawl H&G catcher/processors. Longline catcher/processor vessels are able to produce relatively high-value products that compensate for the relatively low catch volumes associated with longline gear. These vessels target Pacific cod, with sablefish and certain species of flatfish (especially Greenland turbot) as important secondary target species. In 2000, the 41 vessels operating in this sector grossed about $141 million. Most of this, about 86%, came from Pacific cod, about 7% came from sablefish, and about 5% from other flatfish. Gross revenues were derived from these species in similar proportions over the period from 1992 to 2000, although sablefish was somewhat more important, and Pacific cod somewhat less so, prior to

1998. (Northern Economics 2002, pages 30-31) Most harvesting activity has occurred in the Bering Sea, but longline catcher/processor vessels operate both the BSAI and GOA.

Motherships

Motherships are defined as vessels that process, but do not harvest, fish. The three motherships currently eligible to participate in the BSAI pollock fishery range in length from 305 feet to 688 feet LOA. Motherships contract with a fleet of catcher vessels that deliver raw fish to them. As of June 2000, 20 catcher vessels were permitted to make BSAI pollock deliveries to these motherships. Substantial harvesting and processing power exists in this sector, but is not as great as either the inshore or catcher/processor sectors.

Motherships are dependent on BSAI pollock for most of their income, though small amounts of income are also derived from the Pacific cod and flatfish fisheries in Alaska. In 1999, over 99 percent of the total groundfish delivered to motherships was pollock. About $30 million worth of surimi, $6 million of roe, and $3 million of meal and other products was produced from that fish. These figures exclude any additional income generated from the whiting fishery off the Oregon and Washington coasts in the summer. In 1996, whiting accounted for about 12 percent of the mothership's total revenue. Only one of the three motherships participated in the GOA during 1999, and GOA participation in previous years was also spotty. This is likely due to the Inshore/Offshore restriction that prohibits pollock from being delivered to at-sea processors in the GOA.

Catcher vessels

Catcher vessels harvest fish, but are not themselves equipped to process it. They deliver their fish to an inshore processor, or to a mothership or catcher/processor at sea. There are a wide variety of catcher vessels.

AFA-qualified trawl catcher vessels Vessels harvesting BSAI pollock deliver their catch to shore plants in western Alaska, large floating (mothership) processors, and to the offshore catcher/processor fleet. These vessels are relatively homogenous, most are long-time, consistent participants in a variety of BSAI fisheries, including pollock, Pacific cod, and crab, as well as GOA fisheries for pollock and Pacific cod. The AFA established, through minimum recent landings criteria, the list of trawl catcher vessels eligible to participate in the BSAI pollock fisheries. There is significant, and recently increasing, ownership of this fleet (about a third) by onshore processing plants.

Non-AFA trawl catcher vessel This category includes vessels that used trawl gear for the majority of their catch but are not qualified to fish for pollock under the AFA. An important distinction within this class is between vessels greater than and less than 60 feet. Vessels less than 60 feet are not required to have observer coverage, but more importantly, vessels 58 feet and under meet the length limit for participation in Alaska's salmon seine fisheries. Many of these smaller vessels have dual salmon seine - groundfish trawl capabilities. Many of them are also used to participate in halibut-sablefish longline fisheries, and harvest crab. Between 1992 and 2000, these smaller trawlers earned between about 38% and 77% of their gross revenues from groundfish fishing; the relative importance of groundfish fishing grew over time as salmon markets deteriorated. Non-AFA trawl catcher vessels greater than or equal to 60 feet tend to concentrate their efforts on groundfish. Harvests of pollock by these vessels are substantially lower than those of the AFA qualified vessels, because they have not participated in the BSAI fisheries in recent years. These vessels are too large to be active in the salmon fisheries, but do have some presence in crab and halibut longline fisheries. As noted, these larger trawlers are less diversified and more dependent on groundfish harvests; from 1992 to

2000, they earned between 79% and 96% of their gross revenues from groundfish harvests. (Northern Economics 2002 sector profiles, pages 103-106, 130-131)

Pot catcher vessel These vessels rely on pot gear for participation in both crab and groundfish fisheries. Some of these vessels use longline gear in groundfish fisheries. Pot catcher vessels traditionally have focused on crab fisheries, but several factors, including diminished king and Tanner crab stocks, led crabbers to begin to harvest Pacific cod with pots in the 1990s. Catcher vessels fishing Pacific cod with pots grossed $15.4 million in 2001; $8.4 million was earned in the GOA, and $6.9 million in the BSAI. (Hiatt *et al.* 2002, Table 19, page 49).

Longline catcher vessels These vessels fish groundfish and halibut and some may also enter other high-value fisheries such as the albacore fisheries on the high seas. Catcher vessels fishing with longline gear grossed $59.4 million in 2001. Most of this came from the GOA where longline operations harvested 53.9 million; $5.6 million came from the BSAI. Sablefish was the most important groundfish species for these vessels in both regions, it accounted for $46.9 million in the GOA, and $4.4 million in the BSAI. These operations also harvested significant amounts of Pacific cod and rockfish. These species generated $7 million in the GOA, and $1.1 million in the BSAI. (Hiatt, *et al.* 2002, Table 19, page 49).

Shoreside Processors

AFA inshore processors Six shoreside processors and two floating processors are eligible to participate in the inshore sector of the BSAI pollock fishery under the AFA. The shoreside plants are located in Dutch Harbor/Unalaska, Akutan, Sand Point, and King Cove. The two floating processors in the inshore sector are required to operate in a single BSAI location, within Alaska state waters, each year, and they usually anchor in Beaver Inlet in Unalaska. However, one floating processor has relocated to Akutan. Pollock is, by far, the most important groundfish species for these plants, followed by Pacific cod. Pollock accounted for between 79% and about 88% of the wholesale value of groundfish production between 1992 and 2000. Pacific cod accounted for most of the rest of the value, between 9.6% and abut 18% depending on the year, over the same period. These plants only processed small amounts of other species. (Northern Economics 2002, pages 36-39)

Groundfish products were extremely important for these plants. In 2001, groundfish with an ex-vessel value of $157.6 million were delivered to the processors in this sector. This groundfish accounted for about 85% of the ex-vessel value of all species delivered to this processing group. The group produced products with a gross first wholesale value of $421.8 million dollars. These groundfish products accounted for about 89% of the gross value of all products produced by this group. (Hiatt *et al.* 2002, Tables 22, 22.1, 25, and 25.1).

Non-AFA inshore processors Inshore plants include shore-based plants that process Alaska groundfish and several floating processors that moor nearshore in protected bays and harbors. Four groups of non-AFA inshore processors are described below. The groupings are primarily based on the regional location of the facilities: (1) Alaska Peninsula and Aleutian Islands, (2) Kodiak Island, (3) Southcentral Alaska, and (4) Southeast Alaska.

Alaska Peninsula and Aleutian Islands Inshore Plants. These plants receive product from the BSAI and the Western GOA. Between 1992 and 2000, from six to eight plants operated in this sector. In terms of value, their most important products appear to be Pacific cod, pollock, and sablefish. The median yearly percentage of wholesale revenues generated by Pacific cod was 52.6%. Information on the value of pollock production for these operations can't be published for most years due to confidentiality restrictions. It did account for

about 17% of wholesale revenues in 1992, and about 42% in 1994. Sablefish also contributed significant wholesale revenues, accounting for between 3.3% and 10% in the eight years for which the information is not confidential. (Northern Economics 2002, pages 43-46)

In 2001, groundfish with an ex-vessel value of $25.7 million were delivered to the processors in this sector. This groundfish accounted for about 22% of the ex-vessel value of all species delivered to this processing group. The group produced products with a gross first wholesale value of $49.6 million dollars. Groundfish products accounted for about 20% of the gross value of all products produced by this group. (Hiatt *et al.* 2002, Tables 22, 22.1, 25, and 25.1).

Kodiak Island inshore plants Between 11 and 14 plants processed groundfish in Kodiak between 1992 and 2000. The number of plants trended down over this period, falling in seven of the eight inter-year periods. These plants were somewhat more diversified than the Alaska-Peninsula plants, processing significant amounts of a wider range of species. The value of Pacific cod and pollock production has dominated that of other species in recent years. Between 1997 and 2000, Pacific cod accounted for between about 37% and about 53% of production value and pollock has accounted for between about 26% and 38% of production value. Sablefish has also been important, contributing between about 8% and about 14% of production value during those years. "Other flatfish," rockfish, rock sole, and shallow water flatfish, all contributed more than 3% of gross earnings in at least two of those years. (Northern Economics 2002, pages 52-55).

Groundfish products were very important for these firms. In 2001, groundfish with an ex-vessel value of $30.9 million were delivered to the processors in this sector. Groundfish accounted for about 45% of the ex-vessel value of all species delivered to this processing group. The group produced products with a gross first wholesale value of $69.1 million dollars. Groundfish products accounted for about 45% of the gross value of all products produced by this group. (Hiatt *et al.* 2002, Tables 22, 22.1, 25, and 25.1).

Southcentral Alaska inshore plants. This group includes plants that border the (east of Kodiak Island), Cook Inlet, and Prince William Sound. Between 1992 and 2000, there were between 15 and 21 plants participating in given year. These plants were somewhat less diversified that those in Kodiak. Sablefish and Pacific cod dominate the value of their groundfish production. Sablefish accounted for between about 54% and about 81% of the value of groundfish production output, depending on the year. Pacific cod accounted for between about 12% and about 21% depending on the year. Rockfish ranked third in importance, accounting for from 1.6% to 3.3% of the value of groundfish output, depending on the year. (Northern Economics 2002, pages 57 to 60)

Groundfish were a relatively less important product for these firms. In 2001, groundfish with an ex-vessel value of $18.1 million were delivered to the processors in this sector. Groundfish accounted for about 20% of the ex-vessel value of all species delivered to this processing group. The group produced products with a gross first wholesale value of $28.0 million dollars. Groundfish products accounted for about 15% of the gross value of all products produced by this group. (Hiatt *et al.* 2002, Tables 22, 22.1, 25, and 25.1).

Southeast Alaska inshore plants. This group includes all shore plants in Southeast Alaska, from Yakutat to Ketchikan. Between 12 and 16 plants processed groundfish in this region from 1992 to 2000, depending on the year. Sablefish was by far the most important of these groundfish species, measured in terms of the value of processed output. Sablefish gross revenues accounted for from about 95% to about 98.5% of the value of groundfish production, depending on the year. Most of the rest of the groundfish product revenues were generated with rockfish products; these accounted for between about 1.5% to about 4.4% of groundfish revenues, depending on the year. (Northern Economics 2002, pages 62 to 64)

Groundfish were a relatively less important product for these firms. In 2001, groundfish with an ex-vessel value of $30.9 million were delivered to the processors in this sector. Groundfish accounted for about 19% of the ex-vessel value of all species delivered to this processing group. The group produced products with a gross first wholesale value of $41.1 million dollars. Groundfish products accounted for about 13% of the gross value of all products produced by this group. (Hiatt *et al.* 2002, Tables 22, 22.1, 25, and 25.1).

Markets

Markets for three of the most important species, pollock, Pacific cod, and Atka mackerel, have been described in detail in Appendix D of the SSL SEIS (NMFS 2001c). The reader is referred to that document for a more detailed report on these markets. The following discussion abstracts Section 5.3.2 ("Prices") of that appendix. This discussion focuses on pollock, Pacific cod and Atka mackerel because (a) the recent research for Appendix D has made information on these species relatively more available than information for other species, and (b) these three species together account for about 89% of groundfish first wholesale revenues in 2001 (Hiatt *et al.* 2002, Table 36, pages 85-86).

The three most important pollock products are surimi, fillets, and roe. Alaska surimi is primarily consumed in Japan where it is considered to be a premium product; available substitutes for it are relatively limited. The prices received for pollock surimi will probably be relatively responsive to the quantity supplied to the market, so that there would be noticeable price increases if supply was reduced, and price decreases if supply was increased. These shifts should moderate or offset the revenue increases and decreases associated with changes in the numbers of metric tons of product supplied. Similar conditions exist in the Japanese market for pollock roe.

Conditions are different in the market for fillets. Fillets tend to be sold into the relatively competitive U.S. market where there are relatively closer substitutes. Prices received for pollock fillets in that market may be relatively less responsive to changes in the quantity supplied. In this market, price changes would not tend to offset the revenue impacts of quantity changes.[6]

Pacific cod has a relatively close substitute in Atlantic cod and its price is unlikely to be strongly responsive to quantity changes. Atka mackerel from Alaska is a popular product in Japan and South Korea where most of it is consumed, and has relatively few strong substitutes. Its price is likely to be responsive to quantity changes.

Safety

Commercial fishing is a dangerous occupation. Lincoln and Conway of the National Institute of Occupational Safety and Health (NIOSH) estimate that, from 1991 to 1998, the occupational fatality rate in commercial fishing off Alaska was 116/100,000 (persons/full time equivalent jobs), or about 26 times the national average of 4.4/100,000.[7] Fatality rates were highest for the Bering Sea crab fisheries. Groundfish

[6]Technically, the demands for surimi and roe are described as relatively "inelastic," while the demand for fillets is described as relatively "elastic."

[7]To make accident rates easier to read and to compare across industries, all rates have been standardized in terms of the hypothetical numbers of accidents per 100,000 full time equivalent jobs in the business. The numerator, 116, is not the number of actual deaths; the denominator, 100,000, is probably at least five times the total number of

fatality rates, at about 46/100,000 were the lowest for the major fisheries identified by Lincoln and Conway. Even this relatively lower rate was about ten times the national average.(Lincoln and Conway 1999, page 692-693).[8]

However, during most of the 1990s commercial fishing appeared to become safer. While annual vessel accident rates remained relatively stable, annual fatality per incident rates (case fatality rates) dropped. The result was an apparent decline in the annual occupational fatality rate.[9] From 1991 to 1994, the case fatality rate averaged 17.5% a year; from 1995 to 1998 the rate averaged 7.25% a year. Lincoln and Conway report that "The reduction of deaths related to fishing since 1991 has been associated primarily with events that involve a vessel operating in any type of fishery other than crab." (Lincoln and Conway 1999, page 693.) Lincoln and Conway described their view of the source of the improvement in the following quotation.

> The impressive progress made during the 1990s in reducing mortality from incidents related to fishing in Alaska has occurred largely by reducing deaths after an event has occurred, primarily by keeping fishermen who have evacuated capsized (sic.)or sinking vessels afloat and warm (using immersion suits and life rafts), and by being able to locate them readily, through electronic position indicating radio beacons. (Lincoln and Conway 1999, page 694).

There could be many causes for this improvement. Lincoln and Conway point to improvements in gear and training, flowing from provisions of the Commercial Fishing Industry Vessel Safety Act of 1988, that were implemented in the early 1990s. Other causes may be improvements in technology and in fisheries management. The Lincoln-Conway study implies that safety can be affected by management changes that affect the vulnerability of fishing boats, and thus the number of incidents, and by management changes that affect the case fatality rate. These may include changes that affect the speed of response by other vessels and the U.S. Coast Guard.

Nevertheless, despite these implications, the exact determinants of incident rates, fatality rates, and other measures of fishing risk, remain poorly understood. In the current instance, reductions in the TAC would reduce fishing operation profitability and could lead fishermen to skimp on safety expenditures and procedures. Conversely, reduced profitability may reduce the number of active fishing operations and the numbers of vessel and fishermen placed at risk. The net impacts are difficult to untangle with our existing state of knowledge.[10]

---

full time equivalent jobs each year. In decimal form, this is a rate of .00116.

[8]The NIOSH study does not cover 1999-2001. The rates are based on an estimate of 17,400 full time employees active in the fisheries. This estimate of the employment base was assumed constant over the time period. However, various factors may have affected this base, including reductions in the size of the halibut and sablefish fleets due to the introduction of individual quotas. These estimates must therefore be treated as rough guides.

[9]This result is based on an examination of the years from 1991-1998. It does not reflect the losses in the winter of 2001.

[10]A more detailed discussion of safety issues may be found in Section 1.3.3.4 of Appendix C to the SSL SEIS (NMFS 2001c).

CDQ Groups

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 fishery activities that will result in ongoing, regionally based, commercial fishery or related businesses. Revenues from the operations of the CDQ groups are used for fisheries-related economic development in the region.

The CDQ program began in 1992 with the allocation of 7.5% of the BSAI pollock TAC. The size of the pollock allocation, and the number of species CDQ allocations have increased through time. Currently, the CDQ program receives 10% of the pollock allocation, 20% of the sablefish TAC set aside hook-and-line and pot vessels, 7.5% of the sablefish TAC set aside for trawl operations, 7.5% of the remaining groundfish TACs, 7.5% of the prohibited species catch limits, and 7.5% of the crab guidelines harvest levels.

4.10.2 Direct and Indirect Impacts of the Alternatives

Impacts

This EA evaluates the significance of the same economic indicators used in the SSL SEIS with the addition of an indicator for "Net Returns to Industry" and the subtraction of an indicator for "Harvest Levels and Fish Prices."[11] The SSL SEIS indicators were relatively extensive, as the SSL SEIS (NMFS 2001c, page 4-342) attempted to describe the impact of the protection measures on all stakeholders. The significance of indicator changes is evaluated through a comparison with ABCs and TACs in 2002. The indicators are:

First Wholesale Groundfish Gross Values
Operating Cost Impacts
Net Returns to Industry
Safety and Health Impacts
Impacts on Related Fisheries
Consumer Effects
Management and Enforcement Costs
Excess Capacity
Bycatch and Discard Considerations
Passive Use Values
Non-market Use Value (e.g., subsistence)
Non-Consumptive Use Value (e.g., eco-tourism)

Each of these indicators was evaluated using the criteria described earlier in this EA.

[11]"Harvest Levels and Fish Prices" addressed changes in fish prices associated with the specifications. This was taken out due to the ambiguity of the indicator - an increase in prices might be bad for consumers and good for fishermen and processors. The impacts on these groups are covered under other headings.

First Wholesale Groundfish Gross Revenues

Information on gross revenue changes is summarized here. The approach used to estimate gross revenues for each alternative is discussed in detail in Section 4.10.3. This section merely summarizes the impacts and discusses significance.

First wholesale gross revenues under each alternative were estimated separately for the fisheries harvesting (a) the BSAI ITAC and unspecified reserves, (b) the BSAI CDQ reserve, and (c) the GOA TACs. In addition to estimating gross revenues for the alternatives, 2002 gross revenues were also estimated for the BSAI and GOA. The gross revenues impacts of the alternatives and their significance are defined with respect to the change between the alternative and the year 2002 estimates. The 2002 estimates were generated through the same estimation process used to produce the estimates for the alternatives - in other words the 2002 gross revenues estimates were produced, treating the 2002 ABCs and TACs in the same manner as the ABCs and TACs for the alternatives. Average 2001 prices were used for all alternatives and for 2002. These issues, and others, are discussed in more detail in Section 4.10.3.

The results of this analysis are summarized in Figures 4.10-1, 4.10-2, and 4.10-3. Each of these figures show the difference between 2002 first wholesale revenue estimates, and the first wholesale revenue estimates for one of the alternatives. If the revenues associated with the alternative are greater than the 2002 estimated revenues, the appropriate bar in the figure is positive, if they are less than the 2002 estimated revenues, the bar is negative.

In each case, the total of first wholesale revenues under Alternatives 1 and 2 are very similar to those in 2002. The significance rating for the gross revenues under these alternatives is “insignificant.” In each case Alternative 5, which sets all ABCs to zero, eliminates all revenues from the fishery. This alternative has been given a significance rating of “negatively significant.”

Alternatives 3 and 4 have a more negative impact on gross revenues. The gross revenue estimates in this analysis may have a downward bias (for the reasons discussed in Section 4.10.3), and they have a large, and unknown, error. A 20% threshold was adopted to determine significance (although it may be possible to justify a large threshold). In other words, only a decline in gross revenues of 20% from 2002 levels will be described as significant. Estimated BSAI ITAC 2002 revenues were about $1,117 million, BSAI CDQ revenues were about $113 million, and GOA revenues were about $161 million. The corresponding significance thresholds are changes of $223 million, $23 million, and $32 million, respectively. Alternative 3 triggered the threshold in the GOA, Alternative 4 triggered it in the BSAI. Both alternatives have been given a rating of “negatively significant.”

Figure 4.10-1 BSAI First Wholesale Value of the ITAC and Unspecified Reserves: Difference Between Estimated 2002 First Wholesale Value and First Wholesale Value of Each Alternative (in millions of dollars)

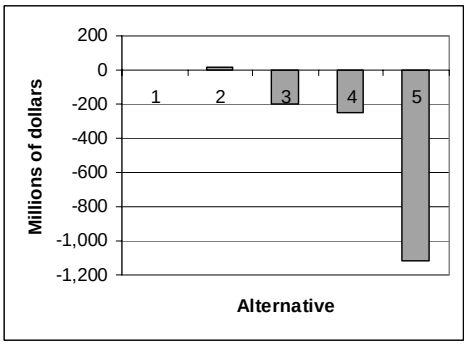


Figure 4.10-2 BSAI First Wholesale Value Estimates for CDQ reserve: Difference Between Estimated 2002 First Wholesale Value and First Wholesale Value of Each Alternative (in millions of dollars)[12]

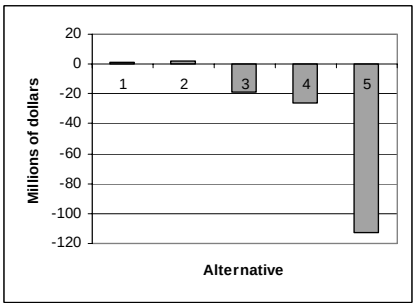
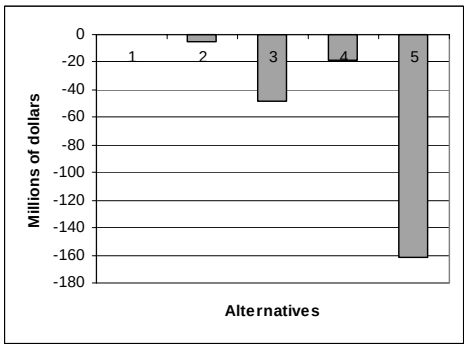


Figure 4.10-3 GOA Gross Revenue Estimates: Difference Between Estimated 2002 First Wholesale Value and First Wholesale Value of Alternatives (millions of dollars)



[12]It is important to note that this figure reports the first wholesale value of the CDQ reserve, not the receipts received by the CDQ groups. These receipts will be considerably lower than the first wholesale value since CDQ groups lease out large parts of their allotments in return for royalty payments.

Operating Cost Impacts

There is very little information on operating and capital costs in the BSAI and GOA groundfish fisheries. 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. It is therefore impossible to provide numerical estimates of the operating cost impacts associated with the proposed alternatives.

Harvest, delivery, and processing of larger volumes of fish would increase the variable costs of fishing and fish processing. Conversely, reductions in production imposed by reduced specifications would decrease variable costs. Since the Alternative 1 and 2 specifications are similar to the 2002 specifications, suggesting that there may be little change in variable costs, these alternatives have been given a cost impact significance rating of "insignificant." TACs are generally smaller under Alternatives 3 and 4. Thus variable costs are expected to be smaller. These alternatives have been given cost significance ratings which are the inverse of those applied to revenues: "positively significant" (since a decrease in costs is a good thing).

Under Alternative 5, no groundfish fishing would be allowed during 2002. In these circumstances, no variable costs would be incurred for active fishing operations. Fixed costs would continue to be incurred. Fishermen would experience transitional expenses as they move into their next best alternative employment. However, on balance, fishing costs would be expected to decline. For this reason, Alternative 5 has been given a rating of "positively significant" for this indicator.

Net Returns to Industry

Although it has been possible to make crude estimates of gross first wholesale revenues under the alternatives, without cost information, it is not possible to make corresponding estimates of net returns to industry. NMFS has little information on the value of capital investments or the operating costs in Alaska's groundfish fisheries. Voluntary surveys have been tried, but response rates have been very poor.

In general, net returns should be larger in parts of the fishery that have been subject to rationalization. This may be the case in the BSAI pollock fisheries, where the American Fisheries Act (AFA) allowed fishing operations to rationalize through the medium of fishing cooperatives, 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 would allow fishermen to operate with greater efficiency. In general, however, the groundfish fisheries in the GOA and the BSAI are conducted in an essentially open-access environment. 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 be large enough to cover the opportunity costs of labor and capital.

Specifications associated with gross revenues that are larger than current levels of production would relax constraints on fishermen and fish processors and would almost certainly be associated with higher levels of profits; specifications associated with lower gross revenues would increase the constraints on fishermen and would likely result in lower profits.

Alternatives 1 and 2, which had insignificant impacts on gross revenues and costs are assumed to have insignificant impacts on net returns. Alternatives 3 and 4 had significantly negative impacts on revenues and positive impacts on costs, and have been given a "negatively significant" rating for net returns. Alternative

5 eliminates all revenues and variable costs, but fishermen would be left with fixed costs. This alternative has been rated "negatively significant."

Safety and Health Impacts

As described in Section 4.10.1, groundfish fishing off Alaska is a dangerous occupation. However, little 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. 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. The net impact of changes in TACs on accident rates and accident severity are thus difficult to determine. Shoreside stress and related health problems are probably associated with large negative changes in production and fishery revenues. The extent of stress related health problems associated with decreases in revenues is unknown.

Alternatives 1 and 2 are generally associated with modest changes in projected TACs compared to 2002.[13] Because of this, these alternatives have been given an "insignificant" safety and health rating. Alternatives 3 and 4 generally involve cuts in 2003 TACs. In some instances, there are large percentage reductions in harvests from important stocks. Because there is no clear relation between changes in fish production and safety and health the impacts of these changes are rated "unknown."

Alternative 5 stops all fishing for groundfish. Under these conditions, there would be no groundfish vessels at sea, and fatalities, injuries, and property damage, 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 persons 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. The net impact of these various effects is unknown, however, because fishery closure for a year would be such an extraordinary event, the stress issue must be a concern. This alternative has thus been given a significance rating of "negatively significant."

Impacts on Related Fisheries[14]

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

[13]The TACs in this EA are projected on the basis of the ABCs in the alternatives, fishery optimum yields, and past Council decisions - particularly those incorporated in the 2002 specifications. The Council may adopt a different set of TACs at its December 2002 meetings. For more details on the methods used to make the TAC projections incorporated here, see Section 4.10.3)

[14]The impact of groundfish fisheries on fisheries for species that are prohibited catches in groundfish fisheries is discussed under another heading in this section.

fishermen often fish for crab as well and Pacific cod harvests provide them with low cost 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 their revenues from their CDQ operations to invest in new fishing 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.

Changes in Alaska groundfish TACs may also affect other fisheries through market impacts. As noted in Section 4.10.1, Alaska groundfish are substitutes for groundfish products produced elsewhere. For example, Pacific cod has 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.

The projected TACs under Alternatives 1 and 2 are very similar to those in place in 2002. The impact of these alternatives on related fisheries has been rated, "insignificant." Alternatives 3 and 4 produce moderate reductions in fish harvests. Given the uncertainties associated with projecting impacts on other fisheries, these alternatives have been given a rating of "unknown." Alternative 5 sets all TACs equal to zero. This alternative would clearly create strong incentives for fishermen to explore other fisheries, 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 related through substitution relationships in markets. For these reasons, this alternative has been given a "negatively significant" rating.

Consumer Effects

Consumer effects of changes in production will be measured by changes in the consumers' surplus. The 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.[15] A

[15]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 price of the good.

decrease in consumers' surplus is not a total loss to society, since some of that loss is usually transferred to industry in the form of higher prices. However, this transfer is still a loss to consumers.

The description of groundfish markets in Section 4.10.1 suggests that for pollock, Pacific cod, and Atka mackerel, the impact on domestic consumers of moderate increases or decreases in production might be fairly modest. Pollock surimi and roe and Atka mackerel were described as being principally sold overseas. Pacific cod and pollock fillets were described as being sold into domestic markets in which there were many relatively close substitutes. Under these circumstances, consumers would be unlikely to gain or lose much from changes in supply.

TACs projected under Alternatives 1 and 2 are not expected to change much from those in 2002. These alternatives have therefore been given a consumer impact significance rating of "insignificant. Alternatives 3 and 4 lead to large reductions in a number of TACs. Alternative 5 would close Alaska's federal groundfish fisheries in 2003, creating large reductions in supplies to U.S. consumers. These alternatives would reduce (or in the case of Alternative 5, eliminate) the consumers' surplus from consumption of Alaska groundfish and lead to price increases in markets for substitute species. These alternatives have been given a "significantly negative" rating.

Management and Enforcement Costs

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[16].

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 on TACs. Over a wide range of possible specifications, in-season management expenses are largely fixed. For example, increases in TACs from 50% above 2002 levels to 50% below 2002 levels could probably be handled with existing in-season management resources[17] (Tromble, pers. comm[18].).

Alternatives 1 and 2 do not change TACs to a great extent. Therefore, the management and enforcement cost impacts of these alternatives have been rated "insignificant." Alternatives 3 and 4 impose larger reductions in TACs, but, in light of the considerations described above, the impacts of these have also been rated "insignificant."

---

[16] Jeff Passer. (2001). NOAA Enforcement. "Personal Communication." NMFS Alaska Region, P.O. Box 21668, Juneau, Alaska 99802. November 19, 2001.

[17] 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.).

[18] Galen Tromble. (2002). National Marine Fisheries Service. Alaska Region, Sustainable Fisheries Division, P.O. Box 21668, Juneau, Alaska 99802 "Personal Communication." November 21, 2002.

Under Alternative 5, in which there was no groundfish fishing in 2002, 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 2002, however, management and research efforts devoted to the longer term would still continue. Because of the expected reduction in groundfish management and enforcement costs under Alternative 5, it has been given a significance rating of "positively significant."

Excess Capacity

The Groundfish fisheries off of Alaska have considerable excess capacity. A recent study tried to estimate the difference between the maximum amount of fish that could and would be caught by fishermen, given existing technological and economic constraints if the limitations imposed by TACs were removed, and the amounts of fish harvested in 2001. This study used two methodologies to address this question, the results of the more conservative method are summarized here. The study estimated that, conservatively, there was about 17% excess capacity (as described above) in the Atka mackerel fleet, about 26% for flatfish, 35% for Pacific cod, 39% for pollock, 21% for rockfish, 24% for sablefish, and 30% for other groundfish. (Hiatt, *et al.* 2002, page 111).[19] These estimates apply to the catcher vessel and catcher-processor components of the fleet. Excess capacity for pollock may have been reduced since 2001 as fishing operations take advantage of cooperative fishing arrangements under the American Fisheries Act (AFA). Corresponding data are not available for on-shore processors.

TACs projected under Alternatives 1 and 2 are not expected to change much from those in 2002. These alternatives have therefore been given a significance rating of "insignificant. Alternatives 3 and 4 would involve reduced amounts of fish available for harvest for a given fleet and would increase excess capacity in 2003. Under Alternative 5, no groundfish fishing would occur in 2003 and would increase excess capacity in 2003 by an even greater amount. These three alternatives have been rated "negatively significant."

Bycatch and Discards

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 harvests of prohibited species, and, under most circumstances, to discard prohibited species if they are taken.

In the BSAI prohibited species are protected by harvest caps and/or the closure of areas to directed groundfish fishing if high concentrations of the prohibited species are present. Because of the caps 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. The exception is Alternative 5, which, in shutting down the groundfish fisheries, clearly would reduce associated prohibited species catches to zero.

[19]Felthoven, Ron, Economist. Alaska Fisheries Science Center, 7600 Sand Point Way N.E., Seattle WA. 98115-6349. Personal communication, 11-15-02.

In the GOA bycatch rates are typically low. The only average bycatch amounts that are meaningful in terms of numbers or weight in the Gulf of Alaska are Pacific halibut in the Pacific cod fishery, 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. Halibut is the only prohibited species managed under a cap in the Gulf.

The impacts of the alternatives on the bycatch and discard of prohibited species are discussed in EA Section 4.4. The results of the analysis are summarized in Table 6.0-1. This table indicates that all alternatives have "insignificant" ratings, with the exception of Alternative 5, which has a positively significant rating for bycatch levels of prohibited species in directed groundfish fisheries. These ratings have been adopted for this criterion. Alternatives 1 through 4 have been rated "insignificant," while Alternative 5 has been rated "positively significant."

Passive Use Values

Passive use is also called "non-use" value, because a person need never actually use a resource in order to derive value from it.[20] That is, people enjoy a benefit (which can be measured in economic terms) from simply knowing that some given aspect of the environment exists. Survey research suggests that passive use values can be significant in at least some contexts. Because passive use values pertain to the continued existence of resources, the focus in this discussion is on classes of resources in the GOA and BSAI which have been 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 affect (largely indirectly) passive use values by affecting the 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; (d) three species of sea birds (Table 6.0-2 lists the affected species).

The mechanisms through which the fisheries might affect endangered species are poorly understood. Models that would relate fishing activity to changes in the probability that a species would become extinct are not available or do not yet have strong predictive power, and information on the ways in which passive use values would change as these probabilities change is not available.

Section 4.4 of the EA described the effects of the alternatives on prohibited species. Section 4.5 described the effects on Marine Mammals (including ESA listed marine mammals. Section 4.6 described the effects on seabirds." The significance ratings for these impacts are summarized in Table 6.0-1 in Section 6.0 ("Conclusions"). All alternatives were given "insignificant" ratings for impacts on marine mammals. All alternatives were given "insignificant" ratings for impacts on prohibited species (including Pacific Northwest salmon). The one exception to this was a positively significant rating for bycatch levels of prohibited species in directed groundfish fisheries under Alternative 5. The impacts on endangered seabirds were either "insignificant," "unknown," or "positively significant. The one exception was an "unknown or negatively significant" impact due to processing waste and offal on norther fulmars under Alternative 5.

[20]"Passive use" has also been referred to in the literature as "existence value" since it picks up the value people place on the mere existence of a resource, whether or not they ever expect to have anything to do with it.

Alternatives 1 and 2 involve little change in the ways the fisheries are conducted. These alternatives have been rated "insignificant." Alternatives 3 and 4 involve moderate reductions in TACs and fishing activity and Alternative 5 involves large reductions. These have been given an "unknown significance" reflecting the Table 6.0-1 summary of some impacts on seabirds.

Non-Market Use Value (e.g., subsistence)

While some persons use small amounts of groundfish for subsistence purposes, groundfish are not one of the more important subsistence products (NMFS 2001c, page F3-109). Groundfish specifications, however, may affect subsistence harvests of other natural resources through two mechanisms: (1) they influence the levels of harvest of groundfish which may be used by other animals that are themselves used for subsistence purposes; (2) they influence the bycatch of prohibited species that have subsistence uses. Changes in groundfish harvests, for example, could affect the prey available to Steller sea lions and thus affect sea lion population status and sea lion availability to subsistence hunters. Alternatively, changes in bycatch of prohibited species, particularly salmon and herring, could directly affect subsistence use of these 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. In addition, as noted earlier in this section, prohibited species bycatch is limited by bycatch caps and area closures. These measures limit groundfish harvests if necessary to protect prohibited species. It thus seems unlikely that Alternatives 1 to 4 might affect subsistence harvests by changing bycatch. 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 subsistence fishermen, how much to commercial fishermen targeting bycaught species, and how much would be lost to natural mortality.

TACs projected under Alternatives 1 and 2 are not expected to change much from those in 2002. These alternatives have therefore been given a significance rating of "insignificant. Alternatives 3, 4, and 5 all reduce groundfish harvests to a greater or lesser extent. However, since the impact of this on subsistence activity is hard to gauge, Alternatives 3, 4, and 5 have been rated "unknown" on this criterion.

Non-Consumptive Use Value (e.g., eco-tourism)

Groundfish themselves do not support non-consumptive eco-tourism uses. Groundfish are preyed upon by marine mammals and birds that may themselves be the object of eco-tourism, and gear used in groundfish fishing may impose direct mortalities on sea birds. Models describing how changes in specifications and fishing activity will impact marine mammals and seabirds, and relating eco-tourism values to the sizes and distribution of marine mammal and seabird populations, are not available.

Given the similarity of considerations for this criterion and the passive use value criterion, the passive use ratings have been adopted here: Alternatives 1 and 2 are "insignificant, and Alternatives 3, 4, and 5 are "unknown."

Summary of the significance analysis

The significance ratings for the different indicators, discussed in this section, are summarized in the following table.

Table 4.10.1 Summary of effects of Alternatives 1 through 5 on Economic Impacts

Economic Indicators	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
First wholesale gross revenues	I	I	S-	S-	S-
Operating cost impacts	I	I	S+	S+	S+
Net returns to industry	I	I	S-	S-	S-
Safety and health impacts	I	I	U	U	S-
Impacts on related fisheries	I	I	U	U	S-
Consumer effects	I	I	S-	S-	S-
Management and enforcement costs	I	I	I	I	S+
Excess capacity	I	I	S-	S-	S-
Bycatch and discards	I	I	I	I	S+
Passive use values	I	I	U	U	U
Non-market use values	I	I	U	U	U
Non-consumptive use values	I	I	U	U	U

S = Significant, I = Insignificant, U = Unknown, + = positive, - = negative

4.10.3 Detailed Analysis of 2002 Gross Value Impacts

Prices used to calculate gross values

The gross value analysis provides estimates of gross revenues for products received at the first wholesale level, or "first wholesale gross revenues." First wholesale gross revenues are used as a measure of gross value for two reasons. First, they provide the first price level common to two major sectors of the industry: (1) the "inshore sector," comprised of catcher vessels that harvest fish and deliver them for processing to shoreside or at-sea processors, and these same processors; and (2) catcher/processor vessels that process their own harvest. Ex-vessel revenues for catcher vessels would not be comparable to the revenues received in the first commercial transaction of a catcher/processor, because the latter transaction involves a value added product, while the former involves raw catch. The second reason first wholesale gross revenues were used, was to capture impacts on the combined fishing and fish processing sectors.

The prices are defined as "first wholesale price per metric ton of retained catch." First wholesale prices are necessary for calculating gross revenues at the first wholesale level. Prices are measured in metric tons of retained catch by the fishermen. Retained catch differs from total catch because fishermen often discard parts of their total catch.

Price projections are not available for 2003. The most recent year for which relatively complete price data are available is 2001. The first wholesale price per metric ton of retained catch was calculated by dividing an estimate of gross first wholesale revenues by an estimate of retained catch for seven species groupings.

These groupings were pollock, sablefish, Pacific cod, flatfish, rockfish, Atka mackerel, and "other" species.[21] Prices for the first six groupings are "Alaska-wide" while separate prices for "other" species were available for the BSAI and GOA. Price estimates for the first six species were based on data in the 2002 Economic SAFE.[22] Price estimates for "other" species were made at the Alaska Fisheries Science Center[23].

How first wholesale revenues were estimated

The volumes of fish harvested under the different alternatives were estimated as follows: (a) species ABCs for each alternative were obtained from the Council plan teams following their November 2002 meeting (these are summarized in EA Tables 2.0-3 (BSAI) and 2.0-4 (GOA); (b) the species ABCs were grouped using the groupings in Tables 6 and 7 of the Economic SAFE;[24] (c) TACs were projected for each species group (using a procedure discussed below) in the BSAI and GOA; (d) BSAI TACs were divided into the CDQ reserve and the ITAC plus unspecified reserves using formulas from the regulations; (e) an estimate of the average proportion of the projected TAC for the species group taken on average in the years 1998-2001 was used to estimate total catch (separate proportions were used in the BSAI and GOA and for CDQ and other fishing in the BSAI); (f) an estimate of the average proportion of the total catch that was discarded in 1998 to 2001was used to estimate the proportions of catch that were discarded and retained.[25]

Only plan team ABC recommendations were available for Alternatives 1, 3, 4, and 5. No TAC information was available for these alternatives. The Council recommended 2003 TACs for Alternative 2 at its December meeting. However, projections of revenues for Alternatives 1, 3, 4, and 5 by monetizing ABCs could be seriously misleading. This is particularly the case in the BSAI, where the sum of ABCs is 165% of the optimum yield (OY) for Alternative 1, and 163% of the OY for Alternative 2.

It was thus necessary to make projections of the TACs for Alternatives 1, 3, 4 and 5 that might be associated with the ABCs for each alternative (as noted, Alternative 2 TACs were recommended by the Council in December). This was done by using actual 2002 TACs unless these were greater than the proposed 2003 ABCs, in which case the ABCs were adopted. This ensured that the sum of the TACs in the BSAI would

[21]2001 price estimates were: $648/mt for pollock, $6,069 for sablefish, $1,109 for Pacific cod, $527 for flatfish, $602 for rockfish, $789 for Atka mackerel, $370 for BSAI other species, $789 for GOA other species.

[22]Retained catch was calculated using Tables 4 and 5 which contains information on catch and discards. Total first wholesale revenues were estimated from Table 36. The species groupings used were determined by the groupings used in the 2002 Economic SAFE.

[23]Hiatt, Terry. (2002). National Marine Fisheries Service. Alaska Fisheries Science Center. 7600 Sand Point Way N.E., Seattle, WA. 98115-6349. Personal communication. September 10, 2002.

[24]These tables report on fishery discards) In the BSAI the species groupings were pollock, sablefish, Pacific cod, Arrowtooth flounder, Flathead sole, rock sole, Greenland turbot, yellowfin sole, other flatfish, rockfish, Atka mackerel, and other species. In the GOA the species groupings were pollock, sablefish, Pacific cod, arrowtooth, flathead sole, rex sole, deep water flatfish, shallow water flatfish rockfish, Atka mackerel, and other species.

[25]The proportions of available harvest actually taken were obtained for the NOAA Fisheries Alaska Region web site. BSAI and GOA percents caught were averaged over 1998-2001; CDQ percents were averaged over 1999-2001. Separate discard rates for the GOA and BSAI were obtained from Economic SAFEs for various years; rates were averaged over the period 1998-2001.

be less than the two million metric ton OY and created TACs that reflected decisions made by the Council in 2002.

However, since there were some 2003 ABCs in each case that were smaller than the 2002 TACs, this approach led to overall total fishery yields that were less than they might be in the Council process. No effort was made to anticipate the how the Council might reallocate these "spare" metric tonnages to other species. This creates a downward bias in the final gross revenue estimates.

In the BSAI, following the estimation of the TACs, the TACs were divided into two categories. The fish available in the CDQ reserves, and the fish available for use by fishermen harvesting the ITAC and the unspecified reserves. 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.

The first wholesale value of the harvests under each alternative were estimated using the first wholesale price per metric ton of retained weight and the estimated retained harvests. Prior to this calculation, the species groupings were aggregated into larger groupings corresponding to the seven groups for which first wholesale prices were available. Values were estimated for each species grouping and then summed across groupings.

Estimates of gross revenues for actual TACs in 2001 and 2002 were also prepared using similar procedures. In each year, the actual TACs were adjusted by the average percentage of the TAC caught, and by the discard rate, and monetized with 2001 prices (just as the alternatives were). Thus, these revenue estimates are based on estimated, rather than actual, harvests in those years and incorporate 2001 prices. This was done for two reasons. The 2001 estimates were prepared to see if the procedure generated revenue estimates similar to those provided in the Economic SAFE. The 2002 estimates were prepared using the 2001 prices to provide a benchmark against which to compare the revenue estimates produced for the five alternatives.

For the BSAI and GOA combined, the estimates of 2001 revenues generated in this analysis were close to the estimates of 2001 revenues in the Economic SAFE. The estimates prepared for this analysis were 1.3% lower than the corresponding estimates from the Economic SAFE. This overall comparison masks differences between the BSAI and GOA however. While in the BSAI, the estimates for this analysis were 0.2% lower, the estimates in the GOA were 8.3% lower.

There are several important conceptual problems with this approach. First, changes in the quantity of fish produced, might be expected to lead to changes in the price paid. However, in this analysis, the same price 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 Alternatives 1 and 2, because TAC changes are relatively small. It is not an issue for Alternative 5, since with no harvests, prices are undefined. It may cause the revenue reductions for Alternatives 3 and 4, which have moderate reductions in TACs, to be overstated, since the declines in TACs might be offset to some extent by increases in prices.

Second, many of the groundfish fisheries become limited by PSC catch limits, 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 in this instance, since TACs generally are the same as or lower than TACs in 2002.

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 were used 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.

This discussion has pointed to several factors that tend to bias the revenue estimates associated with the alternatives down. In the BSAI, the method for projecting TACs leaves some ABC that might be assigned to TACs, given the ABCs and OY, unassigned. The procedures appear to underestimate revenues in the GOA (based on the estimate for 2001). Price impacts are not considered, and these might offset harvest reductions to some extent under Alternatives 3 and 4.

Estimates of first wholesale gross revenues

Estimates of the projected TACs, by species group, are summarized in Table 4.10-2 for both the BSAI and GOA. The bottom two lines in each section of the table show (a) the potential maximum sum of the TACs ("potential max.") under the alternatives (either two million metric tons in the BSAI if the sum of ABCs is greater than the BSAI OY, or the sum of the ABCs for the different species groups), and (b) the difference between this potential maximum and the sum of the projected TACs ("Shortfall"). This shortfall represents metric tonnages for which a species ABC was less than the 2002 TAC (recall that most TACs were projected at 2002 levels unless the proposed ABC was less). These tonnages were not reassigned to another species and represent a potential source of downward bias in the first wholesale gross revenue estimates.

Estimates of the percentage changes between 2002 ABCs and TACs and the ABCs and projected TACs for the alternatives are summarized in Tables 4.10-3 and 4.10-4. There is an important difference between (a) a comparison of the plan team ABCs for the alternatives with 2002 ABCs, and (b) a comparison of the projected TACs for the alternatives with the 2002 TACs. An examination of Tables 4.10-3 and 4.10-4 shows that the projected percentage TAC changes were smaller than the percentage ABC changes.

Estimates of the first wholesale value of the BSAI ITAC and unspecified reserves are summarized in Table 4.10-5, estimates of the value for the CDQ reserve are summarized in Table 4.10-6, and estimates for the GOA are summarized in Table 4.10-7.

Table 4.10-2 Projected TACs in metric tons (based on plan team 2003 ABC recommendations)

Species group	A1	A2	A3	A4	A5	2002
BSAI						
Pollock	1,486,100	1,492,810	1,258,000	1,123,000	0	1,486,100
Sablefish	4,480	6,000	3,650	4,480	0	4,480
Pacific cod	200,000	207,500	147,000	168,200	0	200,000
Arrowtooth	16,000	12,000	16,000	7,300	0	16,000
Flathead sole	25,000	20,000	25,000	14,700	0	25,000
Rock sole	54,000	44,000	54,000	34,800	0	54,000
Greenland turbot	8,000	4,000	7,700	5,880	0	8,000
Yellowfin sole	86,000	83,750	58,200	86,000	0	86,000
Flats (other)	15,000	13,000	15,000	14,200	0	15,000
Rockfish	23,625	22,661	7,600	10,800	0	23,625
Atka mackerel	49,000	60,000	45,400	49,000	0	49,000
Other	21,290	34,279	0	0	0	32,795
Total	1,988,495	2,000,000	1,637,550	1,518,360	0	2,000,000
Potenial max.	2,000,000	2,000,000	1,764,650	1,526,980	0	n.a.
Shortfall	11,505	0	127,100	8,620		n.a.
GOA						
Pollock	58,250	54,350	33,625	58,250	0	58,250
Sablefish	12,820	14,890	9,301	11,148	0	12,820
Pacific cod	44,230	40,540	31,600	44,230	0	44,230
Arrowtooth	38,000	38,000	38,000	12,820	0	38,000
Flathead sole	9,280	11,150	9,280	2,103	0	9,280
Rex sole	9,470	9,470	4,774	3,691	0	9,470
Flats (deep)	4,880	4,880	2,149	1,970	0	4,880
Flats (shallow)	20,420	21,620	20,420	6,220	0	20,420
Rockfish	28,610	29,680	17,945	18,223	0	28,610
Atka mackerel	600	600	600	229	0	600
Other	11,328	11,260	8,385	7,944	0	11,330
Total	237,888	236,440	176,079	166,828	0	237,890
Potenial max.	448,288	414,820	231,595	179,009	0	n.a.
Shortfall	210,400	178,380	55,516	12,181	0	n.a.

Notes: TACs were projected on the basis of 2003 Plan Team ABC recommendations. Actual TACs will be prepared by the NPFMC at its December 2002 meeting. BSAI TAC estimates have been constrained to meet the two million metric ton optimum yield constraint. BSAI 2003 projected TACs are equal 2002 TACs for Alternatives 1 and 2 (unless the 2002 TAC was greater than the proposed 2003 ABC) and equal to proposed 2003 ABCs for Alternatives 3 and 4. (GOA Potential max is sum of ABCs)

Table 4.10-3 Percent differences between BSAI ABCs and TACs for the Alternatives, and 2002 BSAI ABCs and TACs

Species	2002 (mt)	Alt. 1 %	Alt 2%	Alt 3%	Alt 4%
ABCs					
Pollock	2,138,110	9%	9%	-41%	-47%
Sablefish	4,480	63%	18%	-19%	0%
Pacific cod	223,000	25%	10%	-34%	-25%
Arrowtooth	113,000	-1%	-1%	-47%	-94%
Flathead sole	82,600	-20%	-20%	-58%	-82%
Rock sole	225,000	-51%	-51%	-75%	-85%
Turbot	8,100	81%	-27%	-5%	-27%
Yellowfin	115,000	-1%	-1%	-49%	-19%
Flats (other)	161,100	0%	0%	-47%	-91%
Rockfish	23,625	1%	1%	-68%	-54%
Atka mackerel	49,000	69%	69%	-7%	4%
Other	41,070	-48%	-48%	-100%	-100%
TACs					
Pollock	1,486,100	0%	0%	-15%	-24%
Sablefish	4,480	0%	34%	-19%	0%
Pacific cod	200,000	0%	4%	-27%	-16%
Arrowtooth	16,000	0%	-25%	0%	-54%
Flathead sole	25,000	0%	-20%	0%	-41%
Rock sole	54,000	0%	-19%	0%	-36%
Turbot	8,000	0%	-50%	-4%	-27%
Yellowfin	86,000	0%	-3%	-32%	0%
Flats (other)	15,000	0%	-13%	0%	-5%
Rockfish	23,625	0%	-4%	-68%	-54%
Atka mackerel	49,000	0%	22%	-7%	0%
Other	32,795	-35%	5%	-100%	-100%

Notes: Alt 4 estimates are based on Alt 4 projections that may contain errors. As noted in the footnote to Table 2.0-4, the assessment authors may have used a recent 5 year total catch by target over periods ranging from 1995-1999 to 1998-2002. In the final EA for this action these values will be corrected to the average for the period 1997-2001.

Table 4.10-4 Percent differences between GAO ABCs and TACs for Alternatives, and 2002 GOA ABCs and TACs

Species	2002 (mt)	Alt. 1 %	Alt 2%	Alt 3%	Alt 4%
ABCs					
Pollock	58,250	13%	-7%	-42%	33%
Sablefish	12,820	41%	2%	-27%	-13%
Pacific cod	57,600	4%	-8%	-45%	-22%
Arrowtooth	146,260	6%	6%	-45%	-91%
Flathead sole	22,690	82%	82%	-1%	-91%
Rex sole	9,470	0%	0%	-50%	-61%
Flats (deep)	4,880	0%	0%	-56%	-60%
Flats (shallow)	49,550	7%	0%	-44%	-87%
Rockfish	32,660	10%	3%	-45%	-44%
Atka mackerel	600	683%	0%	292%	-62%
Other	0				
TACs					
Pollock	58,250	0%	-7%	-42%	0%
Sablefish	12,820	0%	16%	-27%	-13%
Pacific cod	44,230	0%	-8%	-29%	0%
Arrowtooth	38,000	0%	0%	0%	-66%
Flathead sole	9,280	0%	20%	0%	-77%
Rex sole	9,470	0%	0%	-50%	-61%
Flats (deep)	4,880	0%	0%	-56%	-60%
Flats (shallow)	20,420	0%	6%	0%	-70%
Rockfish	28,610	0%	4%	-37%	-36%
Atka mackerel	600	0%	0%	0%	-62%
Other	11,330	0%	-1%	-26%	-30%

Notes: Alt 4 estimates are based on Alt 4 projections that may contain errors. As noted in the footnote to Table 2.0-4, the assessment authors may have used a recent 5 year total catch by target over periods ranging from 1995-1999 to 1998-2002. In the final EA for this action these values will be corrected to the average for the period 1997-2001.

Table 4.10-5 Estimates of First Wholesale Value of ITAC and Unspecified Reserves in the BSAI (millions of dollars)

	First Wholesale Value by Alternative (millions of dollars)				
Species group	**1**	**2**	**3**	**4**	**5**
Pollock	842	846	713	636	0
Sablefish	10	15	9	11	0
Pacific cod	198	205	145	166	0
Flatfish	31	27	24	27	0
Rockfish	7	7	2	3	0
Atka mackerel	27	34	25	27	0
Other	1	1	0	0	0
Total	1,115	1,135	919	871	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. Alt 4 estimates are based on Alt 4 projections that may contain errors. As noted in the footnote to Table 2.0-4, the assessment authors may have used a recent 5 year total catch by target over periods ranging from 1995-1999 to 1998-2002. In the final EA for this action these values will be corrected to the average for the period 1997-2001.

Table 4.10-6 Estimates of First Wholesale Value of CDQ Reserve in the BSAI (millions of dollars)

	First Wholesale Value by Alternative (millions of dollars)				
Species group	**1**	**2**	**3**	**4**	**5**
Pollock	94	94	80	71	0
Sablefish	2	1	1	1	0
Pacific cod	15	16	11	13	0
Flatfish	0	0	0	0	0
Rockfish	0	0	0	0	0
Atka mackerel	2	3	2	2	0
Other	0	0	0	0	0
Total	114	114	94	87	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. Alt 4 estimates are based on Alt 4 projections that may contain errors. As noted in the footnote to Table 2.0-4, the assessment authors may have used a recent 5 year total catch by target over periods ranging from 1995-1999 to 1998-2002. In the final EA for this action these values will be corrected to the average for the period 1997-2001.

Table 4.10-7 Estimates of First Wholesale Value in the GOA (millions of dollars)

	Gross Revenue by Alternative (millions of dollars)				
	1	**2**	**3**	**4**	**5**
Pollock	29	27	17	29	0
Sablefish	69	69	50	60	0
Pacific cod	44	40	31	44	0
Flatfish	8	8	7	3	0
Rockfish	10	10	7	7	0
Atka	0	0	0	0	0
Other	0	0	0	0	0
Total	161	156	112	143	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. Alt 4 estimates are based on Alt 4 projections that may contain errors. As noted in the footnote to Table 2.0-4, the assessment authors may have used a recent 5 year total catch by target over periods ranging from 1995-1999 to 1998-2002. In the final EA for this action these values will be corrected to the average for the period 1997-2001.

4.10.4 Proposed and Interim Specifications Analysis

Sections 4.10.2 and 4.10.3 analyze the final specifications as adopted by the Council at its December 2002 meeting. Section 4.10.2 provides a summary of the gross revenues analysis and evaluates other impacts. Section 4.10.3 provides a detailed description of the approach used in the gross revenues analysis of the Council's December 2002 action. The current section, Section 4.10.4, provides a summary of the analysis conducted following the October 2002 Council meeting to evaluate interim specifications alternatives. This analysis does not reflect the Council's December 2002 actions, since the interim specifications are based on the proposed specifications adopted by the Council in October 2002.

The proposed specifications (which may be found in Tables 2.0-1 and 2.0-2) were compared on the basis of the gross revenues associated with Alternatives 1, 3, 4, and 5. The gross revenues for the alternatives are summarized in Table 4.10-8. The gross revenues for Alternative 1 and Alt 2 were generally very close. The analysis was unable to discern a meaningful difference between them. The proposed specifications were associated with higher gross revenues than the Alternatives 3, 4, and 5. The model was used to estimate gross revenues for the year 2002 as well as for the alternatives. Gross revenues in 2002 were estimated to be $1,117 for the BSAI ITAC, $113 for the BSAI CDQ program, and $161 for the GOA. These revenues are very similar to those generated by Alternatives 1 and 2, and above those generated by Alternatives 3, 4, and 5.

Table 4.10-8 Estimated Proposed Gross Revenues by Alternative (in millions of dollars)

Species	BSAI ITAC	BSAI CDQ	GOA
Alt 1	$1,115	$114	$161
Alt 2 (proposed)	$1,116	$113	$161
Alt 3	$919	$94	$112
Alt 4	$871	$87	$143
Alt 5	$0	$0	$0

The Council's recommended specifications for 2003 are made at the December 2002 Council meeting. It takes a period of months to publish a complicated rule like that necessary to implement the specifications; typically the final specifications publish in March of the year in which they become effective. Some of the most important fisheries of the year, however, take place in January, February, and March. Many of these fisheries harvest species in a spawning condition, and produce valuable roe in addition to other products. In order to ensure that fishing can take place during this early period, NMFS annually publishes interim specifications to manage the fisheries from January 1 until they are superceded by the final specifications.

As specified in 50 CFR § 679.20(c)(2), interim specifications are one-fourth of each proposed initial TAC (ITAC) and apportionment thereof, one-fourth of each proposed PSC allowance, and the first seasonal allowance of GOA and BSAI pollock and BSAI Atka mackerel. For most BSAI target species, the ITAC is calculated as 85 percent of the previous year's TACs (50 CFR § 679.20(b)). First seasonal allowances generally exceed one-fourth of the TAC. The first seasonal allowance of GOA and BSAI Pacific cod is 60% of the annual TAC, the first seasonal allowance for BSAI Atka mackerel is 50% of the TAC, the first seasonal allowance for BSAI pollock is 40% of the TAC, and the first seasonal allowance of GOA pollock is 25% of the TAC. Interim specifications apply to CDQ allocations as well as to TACs. In the GOA, interim specifications for fixed gear sablefish have been set equal to zero, since the sablefish IFQ fishery doesn't begin until mid-March, about the time the final specifications would become effective.

The interim PSC limits are one quarter of the annual limit and PSC reserves. A PSC reserve of 7.5 percent is set aside to establish the prohibited species quota (PSQ) for the CDQ program (50 C FR § 679.21(e)(1)(i)). For interim specifications PSQ reserves are subtracted from the previous year's PSC limit and 25 percent of the remaining amount is established as an interim value until final specifications are adopted.

NMFS publishes the interim specifications in the Federal Register as soon as practicable after the October Council meeting and prior to the December meeting. Retention of sablefish with fixed gear is not currently authorized under interim specifications. Further, existing regulations do not provide for an interim specification for the CDQ non-trawl sablefish reserve or for an interim specification for sablefish managed under the IFQ program. This means that retention of sablefish is prohibited prior to the effective date of the final harvest specifications.

Table 4.10-9 summarizes estimates of gross revenues for interim specifications associated with each of the five alternatives analyzed in this EA. These were calculated by applying the appropriate interim allowances to the gross revenues associated with each alternative. For this analysis, Alt 2 gross revenues were based

on the ABC estimates provided to the NPFMC at its October meeting rather than those used elsewhere for Alt 2 in this analysis (these are the ABC estimates summarized in Tables 2.0-1 and 2.0-2 of this EA). This was done because the interim TACs are based on those projections.

Note that annual prices were used to prepare these estimates. For many species, including pollock and Pacific cod, the actual prices received during this period for which the interim specifications apply should be well above the annual average. That is because these species are in spawning condition at this time and the market for the roe increases the market value of the fish, substantially. Since prices are often higher in the first half of the year, these gross revenue estimates are likely underestimates of actual interim revenues. This, however, should not interfere with the comparison among alternatives in the table.

Table 4.10-9 Estimated Interim Gross Revenues by Alternative (in millions of dollars)

Species	BSAI ITAC	BSAI CDQ	GOA
Alt 1	$481.3	$48.3	$40.8
Alt 2	$481.4	$48.2	$40.8
Alt 3	$394.0	$39.8	$29.1
Alt 4	$378.3	$37.5	$38.5
Alt 5	$0	$0	$0

Notes: These represent estimated gross revenues for interim TACs associated with the five alternatives. These were calculated by applying the appropriate interim allowances to the gross revenues associated with each alternative. For this analysis, Alt 2 gross revenues were based on the ABC estimates provided to the NPFMC at its October meeting rather than those used elsewhere for Alt 2 in this analysis. This was done because the interim TACs are based on those projections. Note that annual prices were used to prepare these estimates. Since prices are often higher in the first half of the year, these gross revenue estimates are likely underestimates of actual interim revenues.

5.0 Cumulative Effects

The SEIS prepared on Steller sea lion protection measures (NMFS 2001c) presents an assessment of cumulative effects of alternative protection measures in its Section 4.13. The SEIS assesses cumulative effects of environmental factors; external factors and consequences; incidental take/entanglements of Steller sea lions, other marine mammals and birds; spacial/temporal harvest of prey; and disturbance of prey by fishing activities.

The 2003 TAC specifications are developed under and managed according to the preferred alternative developed in the Steller Sea Lion Protection Measures SEIS. As such, the cumulative effects associated with the preferred alternative for Steller sea protection measures and the 2003 TACs are expected to be similar as well. In both cases, the TAC levels are consistent with the harvest control rule developed for pollock, Pacific cod and Atka mackerel under the SEIS and total about 1.8 million mt. The temporal distribution of major fisheries are governed by the seasonal apportionments of pollock, Pacific cod, and Atka mackerel TACs, as well as by the seasonal apportionments of prohibited species bycatch allowances. In addition, the 2003 TAC specifications maintain spatial distribution of harvest as envisioned by new Steller

sea lion protection measures through the implementation of groundfish directed fishery closures around rookeries, haulouts, and other critical habitat areas, as well as critical habitat harvest limits for Atka mackerel in the Aleutian Islands and for pollock in the Bering sea. The application of new management measures for the Aleutian Islands Atka Mackerel fishery also will reduce area specific harvest rates by 50 percent by dividing the fleet in half and assigning each half to different geographical areas in the Aleutian Islands Subarea.

Beyond the cumulative impacts analysis documented in the Steller Sea Lion Protection Measures SEIS no additional past, present, or reasonably foreseeable cumulative impact issues have been identified that would accrue from these fisheries in total, or these 2003 TAC specifications in particular. The 2003 TAC specifications are therefore determined to have insignificant cumulative impacts over and above impacts evaluated in the most recent environmental impact statements prepared for these fisheries.

6.0 Conclusions

As stated in section 4.0 of this EA, the intent of TAC setting deliberations is to balance the harvest of fish during the 2003 fishing year consistent with established total optimum yield amounts and ecosystem needs. The effect of the alternatives must be evaluated for all resources, species and issues that may directly or indirectly interact with the groundfish fisheries within the action area as a result of specified TAC levels. The impacts of alternative TAC levels are assessed in section 4 of this EA.

In addition to the Steller sea lion SEIS assessments, the significance of impacts of the actions analyzed in this EA were determined through consideration of the following information as required by NEPA and 50 CFR Section 1508.27:

Context: The setting of the proposed action is the groundfish fisheries of the BSAI and GOA. Any effects of the action are limited to these areas. The effects on society within these areas is on individuals directly and indirectly participating in the groundfish fisheries and on those who use the ocean resources. The action is to set upper limits on harvest specifications for fishing year 2003. Because this action 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 50 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.

6.1 Adverse or beneficial impact determinations for marine resources accruing from establishment of year 2003 federal groundfish fisheries harvest specifications (see Table 6.0-1).

6.2 Public health and safety will not be affected in any way not evaluated under previous actions or disproportionally. Specifying TAC results in harvest quota assignments to gear groups, along previously established seasons, and according to allocation formulas previously established in regulations.

6.3 Cultural resources and ecologically critical areas: This action takes place in the geographic areas of the Bering Sea, Aleutian Islands, and Gulf of Alaska, 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 this action and mitigation measures such as a bottom trawling ban in the Bering Sea are part of fisheries management measures.

6.4 Controversiality: This action deals 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.

6.5 Risks to the human environment by setting TAC specifications in the BSAI and GOA groundfish fisheries are described in detail in the Draft Programmatic SEIS (NMFS 2001a). 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 Draft Programmatic SEIS (NMFS 2001a) or the Steller Sea Lion Protection Measures SEIS (NMFS 2001c).

6.6 Future actions related to this action may result in impacts. NMFS is required to establish fishing harvest levels on an annual basis for the BSAI and GOA groundfish fisheries. 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. Pursuant to NEPA, appropriate environmental analysis documents (EA or EIS) will be prepared to inform the decision makers of potential impacts to the human environment and will strive to implement mitigation measures to avoid significant adverse impacts.

6.7 Cumulatively significant impacts beyond those described in the TAC setting SEIS (NMFS 1998) are possible with this action. Fisheries are regulated by federal and state agencies in marine waters. NMFS and the State of Alaska work closely in setting harvest levels and managing the nearshore and offshore fisheries of the state. In many instances, state fishing regulations are in addition to and more conservative than federal fishing regulations (Kruse *et al.* 2000). The state and federal fisheries are unlikely to cause cumulative effects beyond those described in the Draft Programmatic SEIS (NMFS 2001a) for the biological component of the BSAI and GOA.

6.8 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.

6.9 Impact on ESA listed species: ESA listed species that range into the fishery management areas are listed in Table 6.0-2. The status of Section 7 consultations is summarized below by group: marine mammals, Pacific salmon, and seabirds.

ESA Listed Marine Mammals A Biological Opinion was written on Alternative 4 (the chosen alternative) for the Steller Sea Lion Protection Measures SEIS (NMFS 2001c). The 2001 Biological Opinion concluded the Alternative 4 suite of management measures would not likely jeopardize the continued existence of the western or eastern populations of Steller sea lions, nor would it adversely modify the designated critical habitat of either population. It is important to point out that the 2001 Biological Opinion does not ask if Alternative 4 helps the Steller sea lion population size recover to some specified level so that the species could be delisted, but rather asks if Alternative 4 will jeopardize the Steller sea lion's chances of survival or recovery in the wild. While the Biological Opinion has concluded that Alternative 4 does not jeopardize the continued survival and recovery of Steller sea lions, it none-the-less identified four reasonable and prudent measures to include with Alternative 4 as necessary and appropriate to minimize impacts of the fisheries to Steller sea lions. The measures are: (1) monitoring the take of Steller sea lions incidental to the BSAI and GOA groundfish fisheries; (2) monitoring all groundfish landings; (3) monitoring the location of all groundfish catch to record whether the catch was taken inside critical habitat; and (4) monitoring vessels fishing for groundfish inside areas closed to pollock, Pacific cod and Atka mackerel to see if they are illegally fishing for those species.

Informal consultation for all ESA listed marine mammal species was completed November 26, 2002. See appendix E.

ESA Listed Pacific Salmon When the first Section 7 consultations for ESA listed Pacific salmon taken by the groundfish fisheries were done, only three evolutionary significant units (ESU)s of Pacific salmon were listed that ranged into the fishery management areas (NMFS 1992; 1993). Additional ESUs of Pacific salmon and steelhead were listed under the ESA in 1997, 1998 and 1999. Only the Snake River fall chinook salmon has designated critical habitat and none of that designated habitat is marine habitat (Table 6.0-2). In 2000, formal consultation was reinitiated for all twelve ESUs of ESA listed Pacific salmon that are thought to range into Alaskan waters. A determination of not likely to jeopardize the continued existence is in the resulting biological opinion (NMFS 1999). The FMP level consultation (NMFS 2000) included reconsideration of all the listed species of Pacific salmon thought to range into the management area and redetermined no jeopardy for all ESUs. The Incidental Take Statements accompanying the biological opinions state the catch of listed fish will be limited specifically by the measures proposed to limit the total bycatch of chinook salmon. Bycatch should be minimized to the extent possible and in any case should not exceed 55,000 chinook salmon per year in the BSAI fisheries or 40,000 chinook salmon per year in the GOA fisheries.

No new information is available on ESA listed salmon and the groundfish fisheries beyond what was considered in the December 22, 1999, biological opinion on the effects of the groundfish fisheries on listed salmon (NMFS 1999) and the subsequent FMP level biological opinion.

ESA Listed Seabirds The most recent Biological Opinion on the effects of the groundfish fisheries on listed seabird species expired December 31, 2000. Two section 7 consultations regarding seabirds were reinitiated in 2000. The first is an FMP-level consultation on the effects of the BSAI and GOA FMPs in their entirety on the listed species (and any designated critical habitat) under the jurisdiction of the USFWS. The second consultation is action-specific and is on the effects of the 2001 to 2004 TAC specifications for the BSAI and GOA groundfish fisheries on the listed species (and any critical habitat) under the jurisdiction of the USFWS. This action-specific consultation incorporates the alternatives proposed in this SSL Protection Measures SEIS and the 2003 TACs for the groundfish fisheries. Consultations have not been concluded as yet. NMFS requested and was granted an extension of that Biological Opinion and its accompanying Incidental Take Statement (USFWS 2001, appendix F).

6.10 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. Alternative 5 would set TACs in both the BSAI and GOA below the lower limits set for OY. Alternative 5 would set TACs for some species above ABC levels (for example: pollock, Pacific cod, sablefish and Atka mackerel in the GOA). While Alternative 3 sets TAC for only 1 species above the ABC level (Atka mackerel in the GOA) and falls within the range specified for OY in both the BSAI and GOA it neither 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 being chosen as 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) Sets all TACs at levels equal to or below ABC levels; 3) falls within the specified range of OY for both the BSAI and GOA, and 4) is consistent with the Endangered Species Act and the National Standards and other requirements of the Magunson Stevens Fishery Conservation and Management Act.

Table 6.0-1 Summary of significant determinations with respect to direct and indirect impacts.

Coding: I = Insignificant, S = Significant, + = beneficial, - = adverse, U = Unknown					
Issue	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Marine Mammals					
Incidental take/entanglement in marine debris	I	I	I	I	I
Spatial/temporal concentration of fishery	I	I	I	I	I
Disturbance	I	I	I	I	I
Target Fish Species					
Fishing mortality	I	I	I	I	I
Spatial temporal concentration of catch	I	I	I	I	I
Change in prey availability	I	I	I	I	I
Habitat suitability: change in suitability of spawning, nursery, or settlement habitat, etc.	I	I	I	I	I
Prohibited Species Management					
Condition of prohibited species stocks	I	I	I	I	I
Harvest levels in directed fisheries targeting prohibited species	I	I	I	I	I
Bycatch levels of prohibited species in directed groundfish fisheries	I	I	I	I	S+
Northern Fulmar					
Incidental take–BSAI	U	U	U	U	U(S+)
Incidental take–GOA	I	I	I	I	I
Prey availability	I	I	I	I	I
Benthic habitat	I	I	I	I	I
Proc. waste & offal	U	U	U	U	U(S-)
Short-tailed Albatross					
Incidental take	U	U	U	U	U(S+)
Prey Availability	I	I	I	I	I
Benthic Habitat	I	I	I	I	I
Proc. Waste & Offal	I	I	I	I	I
Other Albatrosses & Shearwaters					
Incidental Take	U	U	U	U	U(S+)
Prey Availability	I	I	I	I	I
Benthic Habitat	I	I	I	I	I
Proc. Waste & Offal	I	I	I	I	I

Coding: I = Insignificant, S = Significant, + = beneficial, - = adverse, U = Unknown					
Issue	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Piscivorous Seabirds (Also Breeding in Alaska)					
Incidental Take	I	I	I	I	I
Prey Availability	U	U	U	U	U
Benthic Habitat	I	I	I	I	I
Proc. Waste & Offal	I	I	I	I	I
Eiders (Spectacled and Stellers)					
Incidental Take	I	I	I	I	I
Prey Availability	U	U	U	U	U
Benthic Habitat	U	U	U	U	U
Proc. Waste & Offal	I	I	I	I	I
Other Seabird Species					
Incidental Take	I	I	I	I	I
Prey Availability	I	I	I	I	I
Benthic Habitat	I	I	I	I	I
Proc. Waste & Offal	I	I	I	I	I
Marine Benthic Habitat					
Removal and damage to HAPC biota	I	I	I	I	I
Modification of nonliving substrates,	I	I	I	I	I
Changes to species mix	I	I	I	I	I
Ecosystem Considerations					
Predator-Prey Relationships	I	I	I	I	I
Energy Flow and Balance	I	I	I	I	I
Diversity	I	I	I	I	I
State waters seasons					
Pollock PWS	I	I	I	I	I
Pacific cod GOA	I	I	S-	I	S-
Sablefish PWS and SEI	I	I	I	I	I
Parallel seasons BSAI and GOA	I	I	I	I	S-

Coding: I = Insignificant, S = Significant, + = beneficial, - = adverse, U = Unknown					
Issue	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Economic Indicators					
First wholesale gross revenues	I	I	S-	S-	S-
Operating cost impacts	I	I	S+	S+	S+
Net returns to industry	I	I	S-	S-	S-
Safety and health impacts	I	I	U	U	S-
Impacts on related fisheries	I	I	U	U	S-
Consumer effects	I	I	S-	S-	S-
Management and enforcement costs	I	I	I	I	S+
Excess capacity	I	I	S-	S-	S-
Bycatch and discards	I	I	I	I	S+
Passive use values	I	I	U	U	U
Non-market use values	I	I	U	U	U
Non-consumptive use values	I	I	U	U	U

Table 6.0-2 ESA listed and candidate species that range into the BSAI or GOA groundfish management areas and whether Reinitiation of Section 7 Consultation is occurring for these 2003 TAC specifications.

Common Name	Scientific Name	ESA Status	Whether Reinitiation of ESA Consultation is occurring
Blue Whale	*Balaenoptera musculus*	Endangered	No
Bowhead Whale	*Balaena mysticetus*	Endangered	No
Fin Whale	*Balaenoptera physalus*	Endangered	No
Humpback Whale	*Megaptera novaeangliae*	Endangered	No
Right Whale	*Balaena glacialis*	Endangered	No
Sei Whale	*Balaenoptera borealis*	Endangered	No
Sperm Whale	*Physeter macrocephalus*	Endangered	No
Steller Sea Lion (WesternPopulation)	*Eumetopias jubatus*	Endangered	Informal
Steller Sea Lion (Eastern Population)	*Eumetopias jubatus*	Threatened	No
Chinook Salmon (Puget Sound)	*Oncorhynchus tshawytscha*	Threatened	No
Chinook Salmon (Lower Columbia R.)	*Oncorhynchus tshawytscha*	Threatened	No
Chinook Salmon (Upper Columbia R. Spring)	*Oncorhynchus tshawytscha*	Endangered	No
Chinook Salmon (Upper Willamette .)	*Oncorhynchus tshawytscha*	Threatened	No
Chinook Salmon (Snake River Spring/Summer)	*Oncorhynchus tshawytscha*	Threatened	No
Chinook Salmon (Snake River Fall)	*Oncorhynchus tshawytscha*	Threatened	No
Sockeye Salmon (Snake River)	*Oncorhynchus nerka*	Endangered	No

Common Name	Scientific Name	ESA Status	Whether Reinitiation of ESA Consultation is occurring
Steelhead (Upper Columbia River)	*Onchorynchus mykiss*	Endangered	No
Steelhead (Middle Columbia River)	*Onchorynchus mykiss*	Threatened	No
Steelhead (Lower Columbia River)	*Onchorynchus mykiss*	Threatened	No
Steelhead (Upper Willamette River)	*Onchorynchus mykiss*	Threatened	No
Steelhead (Snake River Basin)	*Onchorynchus mykiss*	Threatened	No
Steller's Eider [1]	*Polysticta stelleri*	Threatened	Ongoing
Short-tailed Albatross [1]	*Phoebaotria albatrus*	Endangered	Ongoing
Spectacled Eider[1]	*Somateria fishcheri*	Threatened	Ongoing
Northern Sea Otter[1]	*Enhydra lutris*	Candidate	No

[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 proposed only for the Steller's eider (65 FR 13262). The northern sea otter has been proposed by USFWS as a candidate species (November 9, 2000; 65 FR 67343).

7.0 Final Regulatory Flexibility Analysis

7.1 Introduction

This Final Regulatory Flexibility Analysis (FRFA) evaluates the economic impacts on small entities of the final harvest level specifications for the groundfish fisheries in the Bering Sea and Aleutian Islands and the Gulf of Alaska in 2003. This FRFA 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).

Separate proposed rules were published for the groundfish fisheries in the GOA and in the BSAI. The proposed specifications for the groundfish fisheries in the GOA were published in the *Federal Register* on December 12, 2002 (67 *FR* 76344). The comment period on the proposed rule and the Initial Regulatory Flexibility Analysis (IRFA) ended on January 13, 2003. NMFS did not receive any comments on the IRFA.

The proposed specifications for the groundfish fisheries in the BSAI were also published in the *Federal Register* on December 12, 2002 (67 *FR* 76362). The comment period on the proposed BSAI rule and IRFA ended on January 13, 2003. NMFS did not receive any comments on the IRFA.

7.2 What is the purpose of a FRFA

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 made the final regulatory flexibility analysis, including a description of the steps an agency must take to minimize the significant economic impact on small entities judicially reviewable. 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 a FRFA, 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 published proposed rules on December 12, 2002 (67 FR 67344 and 67 FR 67362) which contained a summary of the IRFA. No comments were received on the IRFA summary. When an Agency promulgates a proposed rule with request for public comment on an IRFA, it must, thereafter, publish a FRFA as required under section 604(a) of the RFA. The following section contains the FRFA as required by section 604(a) of the RFA.

7.3 What is required in a FRFA?

The FRFA incorporates the IRFA that was prepared earlier and made available during publication of the proposed rule, and the following elements as required under 5 U.S.C., Section 604(a) of the RFA:

(1) A succinct statement of the need for, and objectives of, the rule

(2) a summary of the significant issues raised by the public comments in response to the initial regulatory flexibility analysis, a summary of the assessment of the agency of such issues, and a statement of any changes made in the proposed rule as a result of such comments

(3) a description of and an estimate of the number of small entities to which the rule will apply or an explanation of why no such estimate is available

(4) a description of the projected reporting, recordkeeping and other compliance requirements of the rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record

(5) a description of the steps the agency has taken to minimize the significant economic impact on small entities consistent with the stated objectives of applicable statutes, including a statement of the factual, policy, and legal reasons for selecting the alternative adopted in the final rule and why each one of the other significant alternatives to the rule considered by the agency which affect the impact on small entities was rejected.

7.4 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 business 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.

7.5 What is this action?

Detailed descriptions of each alternative analyzed in this EA/FRFA can be found in Section 2.0. This action is adoption of a final notice of specifications based on the ABCs and TACs recommended by the North Pacific Fishery Management Council at it's December 2002 meeting. This action is described as Alternative 2 below. The details of these specifications may be found in Tables 2.0-1 and 2.0-2 of this EA/FRFA. The five alternatives are:

Alternative 1: Set *F* equal to $maxF_{ABC}$, "$maxF_{ABC}$" refers to the maximum permissible value of F_{ABC} under Amendment 56. Historically, TAC has been constrained by ABC, so this alternative provides a likely upper limit for setting TAC within the limits established by the fishery management plan.

Alternative 2: *(The alternative adopted in this action)* Set *F* within the range of ABCs recommended by the Plan Team at their September 2002 meeting and TACs recommended by the Council. Under this scenario, *F* is set equal to a constant fraction of $maxF_{ABC}$, where this fraction is equal to the ratio of the F_{ABC} value recommended in the assessment to the $maxF_{ABC}$. The recommended fractions of $maxF_{ABC}$ may vary among species or stocks, based on other considerations unique to individual species or stocks. Tier 1 to 3 species ABCs are based on 2003 projections of ABCs from the 2001 SAFE report. Tier 4 and 5 ABCs are based on rollovers from 2002.

Alternative 3: Set *F* equal to 50% of $maxF_{ABC}$. 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: Set *F* equal to the most recent five year average actual *F*. This alternative recognizes that for some stocks, TAC may be set well below ABC, and recent average *F* may provide a better indicator of F_{TAC} than F_{ABC}.

Alternative 5: Set *F* equal to zero. This alternative recognizes that, in extreme cases, TAC may be set at a level close to zero. This is the no action alternative. Alternative 5, effectively, "set all TACs equal to zero," has been chosen as the baseline alternative, against which the impacts of the other alternatives have been measured. This has been done to simplify the comparison of the alternatives and does not imply any preference among them.

7.6 Need for, and objectives of, the rule

The reasons for the proposed action are discussed in detail in Sections 1.0 of this EA/FRFA.

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, longline, 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, longline, 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 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.

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.

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.

7.7 Public comments received on the IRFA

The proposed specifications for the groundfish fisheries in the GOA were published in the *Federal Register* on December 12, 2002 (67 *FR* 76344). The comment period on the proposed rule and the IRFA ended on January 13, 2003. NMFS did not receive any comments on the IRFA.

The proposed specifications for the groundfish fisheries in the BSAI were also published in the *Federal Register* on December 12, 2002 (67 *FR* 76362). The comment period on the proposed BSAI rule and IRFA ended on January 13, 2003. NMFS did not receive any comments on the IRFA.

7.8 Number and description of small entities regulated by the proposed action

What are the regulated entities?

The entities regulated by this action are those entities that harvest fish in the BSAI and GOA. These entities include the groundfish catcher vessels and catcher/processor vessels active in these areas. It also includes organizations to whom direct allocations of groundfish are made. In the BSAI, this includes the CDQ groups and the AFA fishing cooperatives.

Number of small regulated entities

Table 7.8-1 shows the estimated numbers of small entities in the BSAI and GOA groundfish fisheries. The reasoning behind these estimates is described in the paragraphs which follow the table.

Table 7.8-1 Estimated numbers of regulated small entities in the BSAI and GOA groundfish fisheries

Fleet segment	GOA	BSAI
Catcher vessels	1,264	193
Catcher processors	16	31
CDQ groups	0	6
AFA cooperatives	0	0

Notes: 2001 catcher vessel and catcher/processor estimates prepared from fish tickets, weekly processor reports, product price files, and intent-to-operate listing (2002 Economic SAFE Report). The methodology used probably overstates the numbers of small catcher vessel and catcher processor entities since it only considers revenues from groundfish fishing in Alaska, and it cannot fully capture ownership, control, and affiliation. All CDQ groups are non-profits and are therefore treated as small.

Fishing vessels, both catcher vessels and catcher/processors, are small if they gross less than $3.5 million in a year. Table 7.8-2 provides estimates of the numbers of catcher vessels and catcher/processors with less

than $3.5 million in gross revenues from groundfish fishing in the BSAI and GOA.[26] Estimates of the numbers of vessels are provided by year and gear type from 1996 to 2000. Estimates are also broken out for the GOA, the BSAI, and for all of Alaska. Table 7.8-3, provides similar information for catcher vessels and catcher/processors grossing more than $3.5 million.

Table 7.8-2 indicates that, in 2000, there were 1,264 small catcher vessels in the GOA and 301 in the BSAI. There were 1,422 small vessels in total. These numbers suggest that 143 vessels must have operated in both the BSAI and the GOA. Table 7.8-2 implies that each of the small catcher vessels is treated as a separate small entity. This may overstate the number of separate entities since there is probably not a strict one-to-one correspondence between vessels and entities; some persons or firms may own more than one vessel.

A consideration of catcher vessel involvement in BSAI AFA cooperatives makes it possible to add more precision to the estimates of small catcher vessel entities. This FRFA reports that 112 catcher vessels were active in the pollock fisheries covered by the American Fisheries Act. One hundred of these delivered to inshore processing plants, 7 delivered to catcher/processors offshore, and 5 delivered only to motherships (a total of 20 delivered to motherships, but 15 of these also delivered to onshore processors and these 15 are included here with the onshore processing group). (NMFS 2002a) Not all the vessels delivering to inshore plants are in cooperatives, a few vessels opt out each year. Three opted out in 2001and four in 2002. While Table 7.8-2 suggests that all but one of these had gross revenues under $3.5 million, those involved in the cooperatives were affiliated with entities that grossed more than $3.5 million dollars. They are thus large entities for the purpose of the RFA. If four vessels opted out of the inshore cooperatives (as in 2002) a total of 108 catcher vessels should be treated as large rather than small. Adjusting the numbers of small entities in light of these considerations, the number for the BSAI drops from 301 to 193 and the total for the BSAI and GOA drops from 1,422 to 1,314. The change in the GOA alone can't be determined.

Table 7.8-2 indicates that, in 2000, there were 16 small catcher/processors in the GOA and 31 in the BSAI. There were 33 small catcher/processors in total. These numbers suggest that 14 catcher/processors must have operated in both the BSAI and the GOA. For the purposes of this IRFA, there were an estimated 33 small catcher/processor entities. These numbers may overstate the numbers of small entities. The gross revenue estimates only consider revenues from groundfish fishing in Alaska. These vessels may have had revenues from other sources. Moreover, Table 7.8-2 implies that each of the small catcher/processors is a separate small entity. This may overstate the number of separate entities if a single firm owns multiple vessels, or if a vessel is owned by a large processing firm. Moreover, some of these vessels may have been affiliated with the BSAI AFA catcher-processor cooperative. (NMFS 2002a, pages 4-176 to 4-181)

The six Community Development Quota (CDQ) groups are non-profit entities supporting the community development objectives of 65 Western Alaska communities and, as such, are small entities, consistent with

[26]The tables are believed to overstate the number of small catcher vessels and catcher/processors. One important reason is that the tables only consider revenues from groundfish fishing in Alaska. They do not consider revenues that these vessels may have earned from fishing for other species or from fishing in other areas. In addition, the SBA small entity criteria state that an entity's affiliations should be considered in determining whether or not an entity is small. In many cases vessels are owned by larger firms, or multiple vessels are owned by a single person or firm. These affiliation issues are not reflected in the counts in Tables 7.8-2 and 7.8-3. Catcher/processor affiliations are addressed in the text.

SBA definitions. In 2002 there were seven AFA inshore cooperatives, one catcher-processor cooperative, and one mothership cooperatives. All of these are considered large entities.

Table 7.8-2 Number of vessels that caught or caught and processed less than $3.5 million ex-vessel value or gross product value of groundfish by area, vessel type and gear, 1997-2000.

	Gulf of Alaska			Bering Sea and Aleutian			All Alaska		
	Catcher Vessels	Catcher process	Total	Catcher Vessels	Catcher process	Total	Catcher Vessels	Catcher process	Total
1996									
All gear	1190	30	1220	311	52	363	1317	55	1372
H & L	984	23	1007	114	35	149	1015	38	1053
Pot	146	1	147	88	15	103	203	15	218
Trawl	152	7	159	116	8	124	203	9	212
Oth. & unk.	4	1	5	0	0	0	4	1	5
1997									
All gear	1186	29	1215	264	51	315	1265	52	1317
H & L	949	19	968	94	35	129	961	36	997
Pot	145	1	146	74	9	83	191	9	200
Trawl	166	9	175	100	10	110	194	10	204
Oth. & unk.	24	0	24	0	0	0	24	0	24
1998									
All gear	1111	18	1129	226	40	266	1187	40	1227
H & L	865	14	879	72	29	101	883	29	912
Pot	170	0	170	71	7	78	215	7	222
Trawl	164	4	168	102	6	108	197	6	203
Oth. & unk.	35	0	35	0	0	0	35	0	35
1999									
All gear	1164	29	1193	274	31	305	1272	34	1306
H & L	905	16	921	75	18	93	929	21	950
Pot	204	10	214	89	12	101	258	12	270
Trawl	154	3	157	116	4	120	194	4	198
Oth. & unk.	21	1	22	0	0	0	21	1	22
2000									
All gear	1264	16	1280	301	31	332	1422	33	1455
H & L	1011	8	1019	105	18	123	1050	19	1069
Pot	252	4	256	91	11	102	304	12	316
Trawl	127	4	131	113	6	119	205	7	212
Oth. & unk.	21	0	21	0	1	1	21	1	22

Note: Includes only vessels that fished part of Federal TACs.

Source: CFEC fish tickets, weekly processor reports, NMFS permits, annual processor survey, ADFG intent-to-operate listings. National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070. Terry Hiatt, pers. comm. February 28, 2002.

Table 7.8-3 Number of vessels that caught or caught and processed more than $3.5 million ex-vessel value or gross product value of groundfish by area, vessel type and gear, 1997-2000.

	Gulf of Alaska			Bering Sea and Aleutian			All Alaska		
	Catcher Vessels	Catcher process	Total	Catcher Vessels	Catcher process	Total	Catcher Vessels	Catcher process	Total
1996									
All gear	1	33	34	2	62	64	2	62	64
H & L	0	4	4	0	9	9	0	9	9
Trawl	1	29	30	2	53	55	2	53	55
1997									
All gear	1	21	22	1	56	57	1	56	57
H & L	0	4	4	0	8	8	0	8	8
Pot	0	0	0	0	1	1	0	1	1
Trawl	1	17	18	1	48	49	1	48	49
1998									
All gear	0	25	25	0	59	59	0	59	59
H & L	0	5	5	0	14	14	0	14	14
Trawl	0	20	20	0	44	44	0	44	44
Oth. & unk.	0	0	0	0	2	2	0	2	2
1999									
All gear	0	28	28	0	57	57	0	57	57
H & L	0	13	13	0	21	21	0	21	21
Pot	0	1	1	0	3	3	0	3	3
Trawl	0	14	14	0	36	36	0	36	36
Oth. & unk.	0	0	0	0	1	1	0	1	1
2000									
All gear	0	26	26	1	57	58	1	57	58
H & L	0	12	12	0	25	25	0	25	25
Pot	0	0	0	0	1	1	0	1	1
Trawl	0	14	14	1	33	34	1	33	34

Note: Includes only vessels that fished part of Federal TACs.

Source: CFEC fish tickets, weekly processor reports, NMFS permits, annual processor survey, ADFG intent-to-operate listings. National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070. Terry Hiatt, pers. comm. February 28, 2002.

Description of directly regulated small entities

Section 4.10-1 of this EA/FRFA provides a description of the fishery participants. The section also lists other reports with detailed descriptions of the fishery. This section focuses on the average revenues of small entities.

Tables 7.8-4 and 7.8-5 provide estimates of average gross revenues from groundfish production in the BSAI and GOA for small and for large vessels.[27] Considering activity in both the BSAI and the GOA, small catcher vessels grossed an average of about $170,000 in 2000. This average conceals variation by fishery management area and gear type. Small longline and jig vessels in the BSAI had the smallest average gross revenues at about $30,000, while small trawlers in the BSAI had the largest at $920,000. The overall average gross revenues for all small catcher vessels active in the GOA was $100,000, while the overall average gross revenues for all small catcher vessels active in the BSAI was $380,000. Corresponding average gross revenues for large entities for these gear types and areas may be found in Table 7.8-5.

Catcher/processors carry the equipment and personnel they need to process the fish that they themselves catch. In some cases catcher/processors will also process fish harvested for them by catcher vessels and transferred to them at sea. There are many types of catcher/processors operating in the BSAI and GOA groundfish fisheries. They are distinguished by target species, gear, products, and vessel size. The 33 small catcher/processor vessels had first wholesale gross revenues of about $46 million in 2000; average revenues were about $1.4 million. Corresponding average gross revenues for large entities may be found in Table 7.8-5.[28]

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 fishery activities that will result in ongoing, regionally based, commercial fishery or related businesses. The CDQ groups are reported to have had gross revenues of about $63.2 million in 2000 (Alaska Department of Community and Economic Development 2001, page 25); average gross revenues were thus about $10.5 million.

[27]Since these estimates only include information on gross revenues from groundfish fishing, these are low estimates of the total gross revenues for these entities.

[28]Hiatt, Terry. (2002). National Marine Fisheries Service. Alaska Fisheries Science Center. 7600 Sand Point Way N.E., Seattle WA 98115-6349. Personal communication. February 28, 2002.

Table 7.8-4. Average revenue of vessels that caught or caught and processed less than $3.5 million ex-vessel value or gross product value of groundfish by area, vessel type and gear, 1997-2000. ($ millions)

	Gulf of Alaska			Bering Sea and Aleutian			All Alaska		
	Catcher Vessels	Catcher process	Total	Catcher Vessels	Catcher process	Total	Catcher Vessels	Catcher process	Total
1996									
All gear	.08	.55	.10	.30	1.23	.43	.15	1.45	.20
H & L	.06	.47	.07	.02	1.32	.33	.06	1.50	.12
Pot	.05	-	.05	.08	.49	.14	.07	.49	.10
Trawl	.21	.72	.23	.71	1.29	.75	.56	1.71	.61
Oth. & unk.	.00	-	.00	-	-	-	.00	-	.00
1997									
All gear	.09	.59	.10	.38	1.23	.52	.17	1.53	.22
H & L	.06	.56	.07	.03	1.44	.41	.07	1.69	.13
Pot	.06	-	.06	.07	.40	.11	.07	.40	.09
Trawl	.23	.67	.25	.93	.90	.93	.67	1.51	.71
Oth. & unk.	.00	-	.00	-	-	-	.00	-	.00
1998									
All gear	.07	.62	.08	.31	1.34	.46	.13	1.61	.17
H & L	.05	.55	.05	.02	1.26	.37	.05	1.52	.09
Pot	.05	-	.05	.05	.83	.12	.06	.83	.08
Trawl	.19	.85	.21	.63	1.86	.70	.49	2.43	.54
Oth. & unk.	.00	-	.00	-	-	-	.00	-	.00
1999									
All gear	.08	.49	.09	.35	.96	.41	.15	1.25	.18
H & L	.05	.46	.06	.02	1.00	.21	.05	1.21	.07
Pot	.08	.55	.10	.09	.87	.18	.09	1.33	.15
Trawl	.23	-	.23	.75	.30	.74	.63	.30	.63
Oth. & unk.	.00	-	.00	-	-	-	.00	-	.00
2000									
All gear	.10	.69	.10	.38	1.13	.45	.17	1.40	.19
H & L	.07	.52	.07	.03	1.33	.22	.07	1.48	.09
Pot	.08	.31	.08	.09	.34	.12	.09	.41	.10
Trawl	.27	1.43	.31	.92	1.23	.93	.67	1.88	.71
Oth. & unk.	.00	-	.00	-	-	-	.00	-	.00

Notes: Includes only vessels that fished part of Federal TACs. Categories with fewer than four vessels are not reported.

Source: CFEC fish tickets, weekly processor reports, NMFS permits, annual processor survey, ADFG intent-to-operate listings. National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070. Terry Hiatt, pers. comm. February 28, 2002.

Table 7.8-5 Average revenue of vessels that caught or caught and processed more than $3.5 million ex-vessel value or gross product value of groundfish by area, vessel type and gear, 1997-2001. ($ millions)

	Gulf of Alaska		BSAI		All Alaska	
	Catcher process	Total	Catcher process	Total	Catcher process	Total
1996						
All gear	.97	.97	9.24	9.24	9.75	9.75
H & L	.81	.81	3.69	3.69	4.05	4.05
Trawl	.99	.99	10.18	10.18	10.72	10.72
1997						
All gear	.76	.76	10.09	10.09	10.37	10.37
H & L	.60	.60	3.98	3.98	4.28	4.28
Trawl	.80	.80	11.11	11.11	11.39	11.39
1998						
All gear	.70	.70	8.30	8.30	8.61	8.61
H & L	.33	.33	4.40	4.40	4.51	4.51
Trawl	.80	.80	9.55	9.55	9.91	9.91
1999						
All gear	.91	.91	9.56	9.56	9.99	9.99
H & L	.56	.56	4.00	4.00	4.34	4.34
Trawl	1.24	1.24	12.81	12.81	13.29	13.29
2000						
All gear	1.16	1.16	10.11	10.11	10.64	10.64
H & L	.91	.91	4.27	4.27	4.71	4.71
Trawl	1.38	1.38	14.22	14.22	14.80	14.80

Notes: Includes only vessels that fished part of Federal TACs. Categories with fewer than four vessels are not reported.

Source: CFEC fish tickets, weekly processor reports, NMFS permits, annual processor survey, ADFG intent-to-operate listings. National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070. Terry Hiatt, pers. comm. February 28, 2002.

7.9 Recordkeeping and reporting requirements

The FRFA 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.

7.10 Description of significant alternatives

A FRFA should include "a description of the steps the agency has taken to minimize the significant economic impact on small entities consistent with the stated objectives of applicable statutes, including a statement of the factual, policy, and legal reasons for selecting the alternative adopted in the final rule and why each one of the other significant alternatives to the rule considered by the agency which affect the impact on small entities was rejected."

Alternative 2 and the associated proposed and interim specifications (see EA Tables 2.0-1 and 2.0-2) is the preferred alternative. Table 7.10-1, below, provides summary information on the relative impacts of the five alternatives considered on regulated small entities. In the absence of net revenue information, differences in aggregate estimated gross revenues have been used as an index of adverse impact on small entities.

Table 7.10-1 Reasons why significant alternatives to the preferred alternative were not chosen.

Alternative	Description	Why not adopted
1	Set *F* equal to $maxF_{ABC}$	Alternative 1 is based on 2002 TACs, which are, in turn, based on biological survey and analysis from 2001. Alternative 2 is based on biological survey information collected and analyzed in 2002, and evaluated by the Council and its SSC and AP committees at the end of 2002. Alternative 2 was therefore adopted, rather than Alternative 1, because the underlying biological information was better. Note that the first wholesale revenue differences between these alternatives were relatively small.
2	Set *F* within the range of ABCs recommended by the Plan Team's and TACs recommended by the Council.	This is the alternative incorporated into the notice of specifications.
3	Set *F* equal to 50% of $maxF_{ABC}$.	These two alternatives set harvests for some stocks below biologically allowable levels, and below constraints imposed by optimum yield (OY) considerations. They are associated with first wholesale revenues that are significantly lower than those produced by the preferred alternative.
4	Set *F* equal to the most recent five year average actual *F*.	
5	Set *F* equal to zero.	No fishing would occur. Gross revenues would equal zero. First wholesale revenues would be negative, reflecting the need to pay fixed costs. This alternative would have a devastating impact on all fishing entities and fishery dependent communities.

Alternatives 1 and 2 have similar gross revenue estimates (see EA Tables 4.10-5, 4.10-6, 4.10-7, 4.10-8). The model was unable to discern a meaningful difference between the revenues for these alternatives. Given the errors inherent in this analysis, it is impossible to say that one or the other produces lesser impact on small entities. Alternatives 2, 3, and 5, all are associated with reductions in estimated fishery gross revenues, and are believed to impose larger impacts on small entities than Alternative 2. Therefore, impacts associated with the preferred alternative are less than that for Alternatives 3, 4, and 5, and no greater than that for Alternative 1. Consequently, the preferred alternative minimizes the impact on small entities.

8.0 List of Preparers

Tamra Faris, NEPA Coordinator / Regional Planner, NMFS Alaska Region, P.O. Box 21668, Juneau, Alaska 99802 (Overall analysis and coordination of analysts).

Ben Muse, Economist, Sustainable Fisheries Division, NMFS Alaska Region, P.O. Box 21668, Juneau, Alaska 99802 (Economic analysis).

Tom Pearson, Regulatory Specialist, Sustainable Fisheries Division, NMFS Alaska Region, Kodiak, Alaska (TAC specifications GOA and Prohibited Species analysis).

Mary Furuness, Regulatory Specialist, Sustainable Fisheries Division, NMFS Alaska Region, P.O. Box 21668, Juneau, Alaska 99802 (TAC specifications BSAI).

Pat Livingston, Biologist, Alaska Fisheries Science Center, 7600 Sand Point Way, N.E., Seattle, Washington 98115 (Ecological indicators and Ecosystems Considerations).

Melanie Brown, Regulatory Specialist, Sustainable Fisheries Division, NMFS Alaska Region, P.O. Box 21668, Juneau, Alaska 99802 (Endangered Species lists).

Kathy Kuletz, Wildlife Biologist, USDI Fish and Wildlife Service, 1011 E Tudor Road, Anchorage, Alaska 99503 (Seabird analysis).

Appendix A by Council Groundfish Plan Team and BSAI Stock Assessment authors
Appendix B by Council Groundfish Plan Team and GOA Stock Assessment authors
Appendix C edited by Pat Livingston, Biologist, Alaska Fisheries Science Center, 7600 Sand Point Way, N.E., Seattle, Washington 98115
Appendix D by Alaska Fisheries Science Center Resource Ecology Fishery Management Division economists, Alaska Fisheries Science Center, 7600 Sand Point Way, N.E., Seattle, Washington 98115

9.0 References

ADCED (Alaska Department of Commerce and Economic Development). (2001). "Western Alaska Community Development Quota Handbook." Juneau: June, 2001.

Hiatt, T., R. Felthoven and J. Terry. (2002) "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, 2001." November 2002. Socioeconomic Assessments Program. Resource Ecology and Fisheries Management Division, Alaska Fisheries Science Center, NMFS. 7600 Sand Point Way, Seattle, WA 98115.

Kruse, G. H., Funk, F. C., Geiger, H. J., Mabry, K. R., Savikko, H. M., and Siddeek, S. M. (2000). "Overview of State-managed Marine Fisheries in the Central and Western Gulf of Alaska, Aleutian Islands, and the Southeastern Bering Sea, with Reference to Steller Sea Lions.", Alaska Department of Fish and Game, Division of Commercial Fisheries, P.O. Box 25526, Juneau, AK 99802.

Lincoln, J.M., and G. A. Conway. (1999). "Preventing commercial fishing deaths in Alaska." *Occup. Environ. Med.*, 56, pp 691-695.

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.

National Marine Fisheries Service (NMFS). (1992). Endangered Species Act-Section 7 Consultation Biological Opinion: Fishing conducted under the Pacific Coast Groundfish Fishery Management Plan for the California, Oregon, and Washington Groundfish Fishery. August 28, 1992. Northwest Region, 7600 Sand Point Way N. E. BIN C15700, Seattle, WA. 53 pp.

NMFS. (1993). Section 7 Consultation-Biological Opinion: 1992/1993 and 1993/1994 Winter Season, Regulations Under the Fishery Management Plan for Salmon Fisheries off the Coast of Alaska and other activities. May 28, 1993. Northwest Region, 7600 Sand Point Way N. E. BIN C15700, Seattle, WA. 74 pp.

NMFS. (1998). Final Supplemental Environmental Impact Statement: Groundfish Total Allowable Catch Specifications and Prohibited Species Catch Limits Under the Authority of the Fishery Management Plans for the Groundfish Fishery of the Bering Sea and Aleutian Islands Area and Groundfish of the Gulf of Alaska. December 1998. DOC, NOAA, National Marine Fisheries Service, AK Region, P.O. Box 21668, Juneau, AK 99802-1668. p. 692 + Appendices and Comments.

NMFS. (1999). "Endangered Species Act - Section 7 Consultation-Biological Opinion: Take of listed salmon in the groundfish fisheries conducted under the BSAI and GOA groundfish FMPs. Office of Protected Resources, NMFS. December 22, 1999. p. 60.

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). Alaska Groundfish Fisheries Draft Programmatic Supplemental Environmental Impact Statement. January 2001. DOC, NOAA, National Marine Fisheries Service, AK Region, P.O. Box 21668, Juneau, AK 99802-1668. pp. Volumes I-VIII approx 3300.

NMFS. (2001b). "EA/RIR for the Extension and Revisions of the Emergency Interim Rule for 2001 Harvest Specifications for the Alaska Groundfish Fisheries and for Steller Sea Lion Protective Fisheries Management Measures." No FONSI. EA transmittal letter dated July 20, 2001, DOC, NOAA, National Marine Fisheries Service, AK Region, P.O. Box 21668, Juneau, AK 99802-1668. p. 306.

NMFS. (2001c). Steller sea lion protection measures supplemental environmental impact statement. November 2001. DOC, NOAA, National Marine Fisheries Service, AK Region, P.O. Box 21668, Juneau, AK 99802-1668.

NMFS. (2001d). Environmental Assessment for the Total Allowable Catch Specifications for the Year 2002 Alaska Groundfish Fisheries. P.O. Box 21668, Juneau, AK 99801. 72pp.

NMFS. (2002a). Environmental Impact Statement for the American Fisheries Act Amendments 61/61/13/8. February 2002. P.O. Box 21668, Juneau, AK 99801.

NMFS. (2002b). Still in planning phases as of November 2002 — Essential Fish Habitat Consultation on the 2002 Steller Sea Lion Protection Measures to be implemented off Alaska under the FMPs for groundfish in the GOA and BSAI. Memorandum from Jon Kurland to Sue Salveson, date P.O. Box 21668, Juneau, AK 99801. _pp.

North Pacific Fishery Management Council. 2002. Stock assessment and fishery evaluation report for the king and Tanner crab fisheries of the Bering Sea and Aleutian Islands regions. NPFMC, 605 W. 4th Ave, #306, Anchorage, AK 99501.

Northern Economics (2002). *Assessment of Changes in IRIU Flatfish Requirements. Public Review Draft.* Prepared for the North Pacific Fishery Management Council by Northern Economics. Anchorage: September 2002. Available on the Internet at http://www.fakr.noaa.gov/npfmc/IRIU.pdf . Accessed November 13, 2002.

Sullivan, P. J., R. L. Trumble, and S. A. Adlersen. (1994). Pacific halibut bycatch in the groundfish fisheries: effects on and management implications for the halibut fishery. IPHC Sci. Rpt. No. 78: 28 p.

USFWS. (2001). Endangered Species Act Formal Consultation for the 2001-2004 Total Allowable Catch Specifications for the Gulf of Alaska and Bering Sea/Aleutian Island Groundfish Fisheries. Letter from Ann G. Rappoport to James W. Balsiger. 1011 E. Tudor Road, Suite 219, Anchorage, AK 99503. FWS Log No. WAES-01016.

Witherell D. and G. Harrington. (1996). Evaluation of alternative management measures to reduce the impacts of trawling and dredging on Bering Sea crab stocks. In High latitude crabs: biology, management, and economics, p 41-58. Alaska Sea Grant Coll. Rep. AK-SG-96-02, Univ. Alaska, Fairbanks.

Witherell, D. and C. Pautzke. (1997). A brief history of bycatch management measures for eastern Bering Sea groundfish fisheries. Mar. Fish. Rev. 59(4): 15-22.

Brown, Muse, Pearson, Furuness, Faris
Revised 12-02 by Muse and Brown to address issues raised in 11-26 conference call
Revised 12-04 by bmuse to reflect Commerce GC concerns
Revised 1-09-03 by bmuse to update in light of Council 12-02 action and prepare FRFA
G:\FMGROUP\03specs\2003 Specs final EA-FRFA 1-31-03 Final Edits.ea.wpd
r:\region\2002\sf\nov\2003 Specs final EA-FRFA 1-31-03 Final Edits.ea.wpd