UNITED STATES DEPARTMENT OF COMMERCE
Office of the Under Secretary for
Oceans and Atmosphere
Washington, D.C. 20230

MAR 13 2000

To All Interested Government Agencies and Public Groups:

Under the National Environmental Policy Act, an environmental review has been performed on the following action.

TITLE: Environmental Assessment for Amendment 57 to the Fishery Management Plan for the Groundfish Fishery of the Bering Sea/Aleutian Islands Area

LOCATION: Bering Sea/Aleutian Islands Area off Alaska

SUMMARY: Amendment 57 would prohibit the use of nonpelagic trawl gear in the directed fishery for pollock in the Bering Sea and Aleutian Islands area. The amendment would also reduce the prohibited species catch limit for red king crab, Pacific halibut, C. bairdi crab, and C. opilio crab. The amendment addresses the Magnuson-Stevens Fishery Conservation and Management Act requirement that conservation and management measures shall, to the extent practicable, minimize bycatch and, to the extent bycatch cannot be avoided, minimize mortality.

RESPONSIBLE OFFICIAL: Steve Pennoyer
Regional Administrator
National Marine Fisheries Service
P.O. Box 21668
Juneau, AK 99801
Phone: 907-586-7221

The environmental review process led us to conclude that this action will not have a significant impact on the environment. Therefore, environmental impact statement was not prepared. A copy of the finding of no significant impact, including the environmental assessment, are enclosed for your information. Also, please send one copy of your comment to me in Room 5805, PSP, U.S. Department of Commerce, Washington, D.C. 20230.

Sincerely,

Susan Fruchter

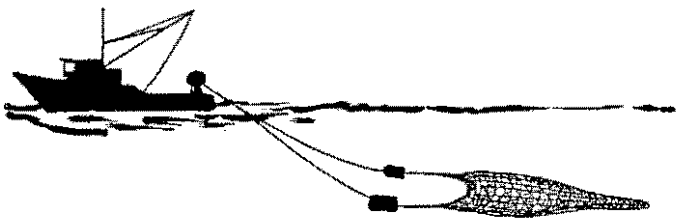
Susan B. Fruchter
NEPA Coordinator

Enclosure

Dopp BCEA1

ENVIRONMENTAL ASSESSMENT/REGULATORY IMPACT REVIEW/
INITIAL REGULATORY FLEXIBILITY ANALYSIS
for
Amendment 57 to the FMP for the Groundfish Fishery of the
Bering Sea and Aleutian Islands Area

To Prohibit the Use of Nonpelagic Trawl Gear In Directed Pollock Fisheries



including analysis of a regulatory amendment to
split the pollock/Atka mackerel/other fishery category
for apportionment of PSC limits

Prepared by staff of the
North Pacific Fishery Management Council
and the
National Marine Fisheries Service

March 2000

Table of Contents

Executive Summary

The 1996 Magnuson-Stevens Act amendments emphasize the importance of limiting bycatch in order to achieve sustainable fisheries. National Standard 9 mandates that conservation and management measures, to the extent practicable, should minimize bycatch; and, to the extent bycatch cannot be avoided, should minimize bycatch mortality. This Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis (EA/RIR/IRFA) addresses: (1) a proposed amendment to the North Pacific Fishery Management Plan (plan) that would prohibit the use of nonpelagic trawl gear in the directed pollock fisheries of the Bering Sea and Aleutian Islands (BSAI), and (2) a proposed regulatory amendment that would split out pollock from the pollock/Atka mackerel/other species fishery category for purposes of apportioning prohibited species catch (PSC) limits.

Plan Amendment

Alternative 1: No Action. Allocation of BSAI pollock quota among pelagic and nonpelagic trawl gear types can be established for each fishing year during the annual specification process.

Alternative 2 (**preferred**): Prohibit the use of nonpelagic trawl gear in the BSAI pollock fishery. Only pelagic trawl gear as defined in regulations[1] could be used by vessels when engaged in a directed pollock fishery.[2] Bottom trawling would be further restricted by a performance-based standard limiting crab bycatch to no more than 20 crabs on board a vessel at one time. Total bycatch limits for PSC species would be reduced to account for the effect of these measures.

Option 1:	Reduce PSC limit for halibut only, by 50 mt.
Option 2:	Reduce PSC limit for halibut by 50 mt, for red king crab by 1,000 animals, for C. bairdi crab by 5,000 animals, and for C. opilio crab by 25,000 animals.
Option 3:	(**preferred**) Reduce PSC limit for halibut by 100 mt, for red king crab by 3,000 animals, for C. bairdi crab by 50,000 animals, and for C. opilio crab by 150,000 animals.

The PSC reductions specified in Options 1 and 2 were based on estimated savings using data from gear specific bycatch rates. Option 3 was based on estimated savings using bycatch rates from vessels using pelagic gear only, when the performance-based standard was in effect. Under Option 1, the overall BSAI halibut bycatch limit would be reduced from 3,775 mt to 3,725 mt. Under Options 2 and 3, PSC limits for crab would also be reduced. Crab PSC limits would be first determined based on crab abundance, as currently regulated, and then reduced by the numbers indicated above. For example, if this regulation had been in place for 1998, the PSC limit for zone 1 red king crab would have been 99,000 animals under Option 2, and 97,000 animals under Option 3.

Of these choices, Option 3 may provide the most realistic estimates of the bycatch savings that could be expected if Alternative 2 were adopted. Data indicated that fishermen were clearly able to alter their behavior by fishing off the bottom and catching fewer crabs and halibut. Because Alternative 2 would include a performance-based standard as part of the pelagic trawl only regulation, these rates are likely indicative of what the fleet can do within a pelagic only fishery.

---

[1] Regulations referred to in this document are at 50 CFR part 679--Fisheries of the Exclusive Economic zone off Alaska.

[2] Vessels engaged in fishing for pollock for pollock under the CDQ program would be excluded from the prohibition on nonpelagic trawling. There currently exists no definition for directed fishing for pollock CDQ, but incentives for bycatch reduction have been built into the program. The CDQ Program, which currently receives a 7.5 % allocation of each PSC species, would continue to receive a 7.5 % allocation of the reduced PSC allowances.

Adopting Alternative 2 would also reduce the bycatch of groundfish (other than pollock) in the directed pollock fisheries. A sizable proportion of these uncaught groundfish would be available to other fisheries. Analysis suggests that under Alternative 2, the incidental catch of groundfish in the BSAI pollock fisheries would be 1,581 mt lower. The groundfish at 1996 prices of about $.15 per pound are worth about $532,000 to the fishery; most of the foregone bycatch would be Pacific cod, with smaller amounts of rock sole, arrowtooth flounder, yellowfin sole, and other species. However, slightly higher incidental catches of Greenland turbot, POP, Atka mackerel, and squid in the BSAI pollock fishery would be expected under Alternative 2.

The benefits of reducing halibut and crab bycatch need to be weighed against the costs to the groundfish trawl and processing industry. Vessels currently using nonpelagic gear in the directed pollock trawl fishery could potentially bear some unquantifiable but possibly substantial costs from having to switch entirely to pelagic gear. With very few exceptions, the vessels using bottom trawls in the BSAI directed pollock fishery also have pelagic trawls and would not have to buy new gear, although they would lose the flexibility of being able to choose between gear types. Vessels catching and processing pollock for fillets could be particularly affected by the gear restriction, as they sometimes use nonpelagic gear to target larger fish. This EA analysis shows that the average size of pollock taken with nonpelagic trawl gear is larger than for pelagic gear. Therefore, prohibiting nonpelagic trawls could result in smaller pollock being taken, on average. It is however plausible that this will not occur and that the average size of pollock caught will not change significantly, since modern pelagic gear can be fished close to or on the bottom and may be used to catch some of the larger fish currently taken with nonpelagic trawl gear. It has been asserted that vessels with lower horsepower cannot use pelagic gear with as much versatility as the larger vessels and might have to upgrade their engines or leave the fishery. However, the BSAI pollock fishery is comprised mostly of larger vessels. Most of the smaller catcher vessels, which fish primarily in the Gulf of Alaska but occasionally in the BSAI, and would have the most difficulty adjusting to a prohibition on nonpelagic trawl gear, will be excluded from the fishery even in the absence of this rule by the American Fisheries Act (Division C, title II of the Omnibus Consolidated and Emergency Supplemental Appropriations Act, 1999: Public Law No. 105-277), which limits participation in the BSAI pollock fishery to 20 factory trawlers, along with qualifying catcher vessels that caught at least 250 mt of pollock in 1995, 1996 or 1997.

Under Alternative 2, the trawl fleet would still be able to take the total allowable catch (TAC) of pollock. Large costs could be incurred if the fleet were unable to harvest the TAC of pollock, but under current regulations, the pollock/Atka mackerel/other species category is not shut down on reaching its guideline limits. However, it is possible that if the pollock fishery does not realize the full estimated bycatch savings from eliminating nonpelagic trawl gear, other fisheries might be affected. Apportionments of bycatch limits might have to be reduced during the annual Council specification process to fully account for halibut bycatch mortality in the BSAI trawl fisheries.

The effects of combining Alternative 2 with the improved retention/improved utilization (IR/IU) program are not completely predictable at this time. A possible conflict between the two has been suggested but is unlikely to occur, as trawl fishermen targeting Pacific cod and other species have little incentive to catch pollock, which they are not equipped to process into surimi or fillets, and are unlikely to reach the 20% maximum retainable bycatch rate above which the IR/IU program requires them to discard bycatch.

Regulatory Amendment .

This document also analyzes a regulatory amendment to split the pollock/Atka mackerel/other species category for purposes of allocating the PSC limits among fisheries. Two alternatives were examined:

Alternative 1 **(preferred)**: Status Quo. Maintain PSC accounting for the pollock fishery within the pollock/Atka mackerel/other species category, as specified in 50 CFR Part 679.21.

Alternative 2: Split out pollock from the pollock/Atka mackerel/other species category and account for PSC bycatch separately. The pollock fishery would be closed to fishing in specified areas when PSC limits are reached.

The alternative of splitting out pollock into its own separate category seems to be a straightforward method of accounting for and monitoring bycatch. In 1998, for example, the pollock/Atka mackerel/other species category was allocated 350 mt of halibut, 155 mt of herring, 7,500 red king crabs, and 29,408 bairdi in zone 1, and 470,000 bairdi in zone 2. Under Alternative 2, a split of the category would indicate that PSC limits for Atka mackerel/other species could be reduced, and the pollock fishery could then be allocated PSC based on what was predicted for a pelagic trawl only fishery. Under plan amendment's Alternative 2, option 2, PSC limits for a pelagic trawl only pollock fishery would then be on the order of 175 mt of halibut, 30,000 bairdi, and 1,500 red king crabs.

One potential drawback of having a separate allocation of PSC for the pollock fishery as specified under Alternative 2 is that, once the PSC limit is met in a zone, the pollock fishery would be closed there. If the halibut PSC limit is met in the BSAI and the pollock fishery is completely shut down, there would be major economic consequences. This analysis indicates that the pollock fishery generates about $1 million per metric ton of halibut bycatch mortality (a metric ton of halibut bycatch at an estimated 1999 price of $1.75 per pound may be worth $7000,000 annually to the longline halibut industry in the long run; see further discussion in Section 3.2). To avoid the possibility of risking losses to this high value fishery, managers might apportion more PSC than required to the pollock category, and hence there might be impacts on other groundfish fisheries as well.

Summary of EA/RIR Impacts

None of the alternatives is expected to have a significant impact on endangered, threatened, or candidate species, and none of the alternatives would affect takes of marine mammals. Actions taken to prohibit the use of bottom trawls in the directed pollock fishery will not alter the harvest of groundfish, scallops, or salmon, but will reduce the incidental bycatch of halibut under all three options, and crab under Options 2 and 3.

None of the alternatives is expected to result in a "significant regulatory action" as defined in E.O. 12866.

None of the alternatives is likely to significantly affect the quality of the human environment, and the preparation of an environmental impact statement for the proposed action is not required by Section 102(2)(C) of the National Environmental Policy Act or its implementing regulations.

1.0 INTRODUCTION

The groundfish fisheries in the Exclusive Economic Zone (EEZ) (3 to 200 miles offshore) off Alaska are managed under the Fishery Management Plan (FMP) for the Groundfish Fisheries of the Gulf of Alaska and the FMP for the Groundfish Fisheries of the Bering Sea and Aleutian Islands Area (BSAI). Both FMPs were developed by the North Pacific Fishery Management Council (Council) under authority of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). The Gulf of Alaska (GOA) FMP was approved by the Secretary of Commerce and took effect in 1978, and the BSAI FMP took effect in 1982.

The purpose of this EA/RIR is to comply with Federal laws regulating any action, such as the one under consideration here, taken to amend FMPs or to implement other regulations governing the groundfish fisheries. These laws require that assessments be done of the potential physical, biological, social, and economic affects of the action. The overarching law governing the fisheries is the Magnuson-Stevens Act, which, as amended by the Sustainable Fisheries Act in 1996, promotes a transition to sustainable fisheries in the United States through sound conservation and management practices and through the protection of essential fish habitat (EFH). Besides the Magnuson-Stevens Act, applicable laws include the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), Executive Order (E.O.) 12866, and the Regulatory Flexibility Act (RFA).

NEPA, E.O. 12866 and the RFA require a description of the purpose and need for the proposed action as well as a description of alternative actions which might address the problem. This information is included in Section 1 of this document. Section 2 contains information on the biological and environmental impacts of the alternatives, as required by NEPA and by the EFH requirements of the Magnuson-Stevens Act. Section 2 also addresses impacts on endangered species and marine mammals. Section 3 contains a Regulatory Impact Review that considers the economic impacts of the alternatives, as required both by E.O. 12866 and by the RFA. Section 4 contains the Initial Regulatory Flexibility Analysis, which specifically addresses the impacts of the proposed action on small entities, as required by the RFA.

This Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis (EA/RIR/IRFA) addresses: (1) an FMP amendment proposal to prohibit the use of nonpelagic trawls in the directed pollock fisheries of the Bering Sea and Aleutian Islands and reduce PSC limits in those fisheries, and (2) a regulatory amendment to split out pollock from the pollock/Atka mackerel/other species fishery PSC category.

1.1 Purpose of and Need for the Action

Several Magnuson-Stevens Act amendments emphasize the importance of limiting bycatch in order to achieve sustainable fisheries. National Standard 9, in Section 301, mandates that conservation and management measures shall, to the extent practicable: (1) minimize bycatch; and (2) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch. Section 303 (b)(2) provides more specific authority for the proposed rule. It states: "Any fishery management plan which is prepared by any Council, or by the Secretary, with respect to any fishery, may . . . designate zones where, and periods when, fishing . . . shall be permitted only . . . with specified types and quantities of fishing gear."

To comply with these provisions of the Act, the Council emphasized the need for additional bycatch management measures during its 1997 call for proposals. At its September meeting, the Council approved further analysis of several of the proposals received. One of these, submitted by the Alaska Marine Conservation Council, was to eliminate nonpelagic trawling for pollock in the BSAI in order to reduce halibut bycatch. Although this action could be taken annually as part of the BSAI TAC specification process, the proposed plan amendment analyzed in this EA/RIR/IRFA would make this prohibition a permanent

regulation.

1.2 Alternatives Considered for Plan Amendment

1.2.1 Alternative 1: No Action. Allocation of BSAI pollock quota among pelagic and nonpelagic trawl gear types can be established for the following fishing year during the annual specification process.

Amendment 16a allows the Regional Administrator, in consultation with the Council, to limit how much pollock can be taken by nonpelagic trawl gear specifically to control the bycatch of crab and halibut. A complete prohibition on nonpelagic trawl gear for pollock can be achieved by assigning no pollock quota to this gear type. Proposed and final apportionment of pollock TAC to the directed fishery for pollock using nonpelagic trawl gear would be published in the Federal Register with the publication of final specifications.

1.2.2 Alternative 2 **(preferred)**: Prohibit the use of nonpelagic trawl gear in the BSAI pollock fishery. Only pelagic trawl gear as defined in regulations could be used by vessels when engaged in a directed pollock fishery.[3] In order to prevent fishermen from using pelagic gear to trawl on the bottom, a performance standard would also be employed, under which it would be unlawful for an owner or operator to have 20 or more crabs on board a vessel at one time. Total bycatch limits for PSC species would be reduced to account for the effect of these measures.

Option 1:	Reduce PSC limit for halibut only by 50 mt.
Option 2:	Reduce PSC limit for halibut by 50 mt, for red king crabs by 1,000 animals, for C. bairdi crabs by 5,000 animals, and C. opilio crabs by 25,000 animals.
Option 3:	**(preferred)** Reduce PSC limit for halibut by 100 mt, red king crabs by 3,000 animals, for C. bairdi crabs by 50,000 animals, and for C. opilio crabs by 150,000 animals.

1.3 Alternatives Considered for Regulatory Amendment

This document also analyzes a regulatory amendment to split the pollock/Atka mackerel/other species category for purposes of allocating the PSC limits among fisheries. Two alternatives were examined:

1.3.1 Alternative 1 (preferred): Status quo. Maintain PSC accounting for the pollock fishery within the pollock/Atka mackerel/other species category, as specified in 50 CFR Part 679.21.

1.3.2 Alternative 2: Split out pollock from the pollock/Atka mackerel/other species category and account for PSC bycatch separately. The pollock fishery would be closed to fishing in specified areas when PSC limits are reached.

The following information must be considered when limiting the amount of BSAI pollock TAC apportioned to the directed pollock fishery using nonpelagic trawl gear:

A. The PSC limits and PSC bycatch allowances;
B. The projected bycatch of prohibited species that would occur with and without a limit in the amount of pollock TAC that may be taken in the directed fishery for pollock using nonpelagic trawl gear;
C. Costs of a limit in terms of amounts of pollock TAC that may be taken with nonpelagic trawl gear on the nonpelagic and pelagic trawl fisheries; and
D. Other factors pertaining to consistency with the goals and objectives of the FMP.

1.4 Background

Bering Sea and Aleutian Islands - Under existing regulations, allocation of BSAI pollock quota among pelagic and nonpelagic trawl gear types can be

[3]Vessels engaged in fishing for pollock for pollock under the CDQ program would be excluded from the prohibition on nonpelagic trawling. There currently exists no definition for directed fishing for pollock CDQ, but incentives for bycatch reduction have been built into the program. The CDQ Program, which currently receives a 7.5 % allocation of each PSC species, would continue to receive a 7.5 % allocation of the reduced PSC allowances.

established for the next fishing year during the annual specification process. Amendment 16a allows the Regional Administrator, in consultation with the Council, to limit the amount of pollock that can be taken by nonpelagic trawl gear specifically to control the bycatch of crab and halibut. A list of issues must be considered when limiting the amount of pollock TAC that can be apportioned to the directed pollock fishery using nonpelagic trawl gear. These issues, as detailed by Amendment 16a, are listed in the table above.

In 1990, the Council recommended that 88% of the BSAI pollock TAC be apportioned to the pelagic trawl fishery, and 12% to the nonpelagic trawl fishery. For the 1991 through 1997 fisheries, the Council noted that additional pollock harvests with nonpelagic trawl gear likely would be constrained by halibut bycatch, and did not recommend a separate pollock TAC for nonpelagic gear.

A second way to limit pollock catch by nonpelagic trawls would be to allocate little or no halibut bycatch mortality to the nonpelagic trawl pollock fishery. Currently, PSC is allocated among the following fisheries: yellowfin sole, rock sole/other flatfish, turbot/sablefish/arrowtooth, rockfish, Pacific cod, pollock/mackerel/other species, and pelagic trawl pollock (which receives no PSC allowance of halibut).

At its June 1997 meeting, the Council reviewed available information on BSAI and GOA pollock catches, and determined that a pelagic trawl only regulation might not be necessary for the GOA. At its September 1997 meeting, the Council requested staff to prepare an EA/RIR evaluation of a proposal to ban the use of bottom trawl gear for BSAI pollock fisheries, and to examine bycatch in the GOA pollock fisheries.

At its April 1998 meeting, the Council, its Advisory Panel, and its Scientific and Statistical Committee reviewed a draft EA/RIR to prohibit the use of bottom trawl gear in the BSAI pollock fisheries. Public testimony was taken. A revised document was distributed on May 12, 1998. In June, the Council and its advisory bodies reviewed the revised draft, and took public testimony. The Council adopted plan amendment Alternative 2, Option 3, together with regulatory amendment Alternative 1, as its final recommendation. The preferred alternatives are highlighted in this document.

1.4.1 Defining Pelagic and Nonpelagic trawls

Pollock fisheries have been defined in different ways, and understanding these definitions is important for evaluating a proposal to ban nonpelagic trawling in directed pollock fisheries. To reduce confusion, standard definitions are shown in the adjacent box. Defining what exactly is nonpelagic trawling for pollock depends on the distinction between *gear* and *targets*.

Definitions of pollock fisheries used in this paper.

Pelagic trawl	is specific gear as defined (no rollers, chafing gear, etc.) regardless of the target fishery.
Nonpelagic trawl	is all trawl gear that doesn't meet the pelagic trawl gear definition.
Midwater pollock	is a trawl target fishery with total catch ≥ 95% pollock by weight (per week).
Bottom pollock	is a trawl target fishery with pollock dominant species in catch, but < 95% of total.

Regulation on Trawl Performance Standard (679.7.14).

It is unlawful for any person to ... use a vessel to participate in a directed fishery for pollock with trawl gear and have on board the vessel, at any particular time, 20 or more crabs of any species that have a width of more than 1.5 inches (38 mm) at the widest dimension when directed fishing for pollock with nonpelagic trawl gear is closed.

Gear of different types are defined in regulations; the definition of a pelagic trawl is relatively complex, whereas non-pelagic trawls are all other trawls not meeting the pelagic trawl definition. Regulations that define pelagic trawl gear are listed in the accompanying table. Note that a performance-based standard for pelagic trawls kicks in when nonpelagic trawling is prohibited because the PSC limit has been reached: when the pollock fishery nears its allocation of halibut PSC, the National Marine Fishery Service (NMFS) closes that fishery to nonpelagic gear. This

occurred in the Bering Sea on September 11, 1996 and on September 7, 1997. It is the gear definition, together with the performance standard, that is most important for the purposes of evaluating this proposal.

Definition of pelagic and nonpelagic trawl gear.
(§ 672.2 Parts 5 and 7)

(5) Nonpelagic trawl means a trawl other than a pelagic trawl;
(6) ....
(7) Pelagic trawl means a trawl that:
(i) Has no discs, bobbins, or rollers;
(ii) Has no chafe protection gear attached to the foot rope or fishing line;
(iii) Except for the small mesh allowed under paragraph (7)(ix) of this definition:
(A) Has no mesh tied to the fishing line, head rope, and breast lines with less than 20 inches (50.8 cm) between knots, and has no stretched mesh size of less than 60 inches (152.4 cm) aft from all points on the fishing line, head rope, and breast lines and extending past the fishing circle for a distance equal to or greater than one half the vessel's length overall; or
(B) Has no parallel lines spaced closer than 64 inches (162.6 cm), from all points on the fishing line, head rope, and breast lines and extending aft to a section of mesh, with no stretched mesh size of less than 60 inches (152.4 cm), extending aft for a distance equal to or greater than one half the vessel's LOA;
(iv) Has no stretched mesh size less than 15 inches (38.1 cm) aft of the mesh described in paragraph (7)(iii) of this definition for a distance equal to or greater than one half the vessel's length overall;
(v) Contains no configuration intended to reduce the stretched mesh sizes described in paragraphs (7)(iii) and (iv) of this definition;
(vi) Has no flotation other than floats capable of providing up to 200 pounds (90.7 kg) of buoyancy to accommodate the use of a net-sounder device;
(vii) Has no more than one fishing line and one foot rope for a total of no more than two weighted lines on the bottom of the trawl between the wing tip and the fishing circle;
(viii) Has no metallic component except for connectors (e.g., hammerlocks or swivels) or net-sounder device aft of the fishing circle and forward of any mesh greater than 5.5 inches (14.0 cm) stretched measure;
(ix) May have small mesh within 32 feet (9.8 m) of the center of the head rope as needed for attaching instrumentation (e.g., net-sounder device); and
(x) May have weights on the wing tips;

Target fishery definitions for pollock are used to assign bycatch rates and PSC among the pelagic and nonpelagic trawl apportionments. It is the target definition that NMFS uses to report catch and bycatch in pollock fisheries. Unfortunately, the target definitions are less useful for regulating how fishermen fish their gear. For example, to achieve a midwater only fishery, vessels targeting pollock would have to catch over 95% pollock. A vessel that took mostly pollock, but less than 95%, would be in violation of any regulation that mandated midwater trawling based on target definitions. This would be impossible to regulate.

Amendment 16a, allowing management to limit non-pelagic gear on an annual basis for vessels engaged in a pollock target fishery, and the current proposal to prohibit the use of nonpelagic gear altogether in the fishery, are intended to circumvent these difficulties. While target fishery definitions would still be used to define a directed (dominant species) pollock fishery, fishermen would not be required to catch 95% pollock. One needs to recognize, however, that pelagic gear can still be fished on or near the bottom.

1.4.2 Prohibited Species Catch Limits

Alternative 2 specifies that any reduction in bycatch of prohibited species expected to result from this action would be subtracted from the prohibited species catch (PSC) limits established for BSAI trawl fisheries. PSC limits have been established by the BSAI Groundfish FMP (section 14) for halibut, herring, salmon, red king crabs, Tanner crab (C. bairdi), and snow crab (C. opilio). The PSC limits for halibut and herring apply to the entire management area, whereas PSC limits for chum salmon, chinook salmon, red king crab, Tanner crab, and snow crab, apply to specific areas. Note that 7.5% of the total PSC limit for each species is apportioned to the Community Development Quotas (CDQs).

PSC limits apply to trawl fisheries for groundfish that are categorized by target species or species groups. Fishery categories are set forth in regulations implementing the goals and objectives of the FMP, the Magnuson-Stevens Act, and other applicable laws. The fishery categories remain in effect unless amended. When recommending a regulatory amendment to revise fishery categories, the Council must consider the best information available on whether recommended fishery categories would best optimize groundfish harvests under the PSC limits.

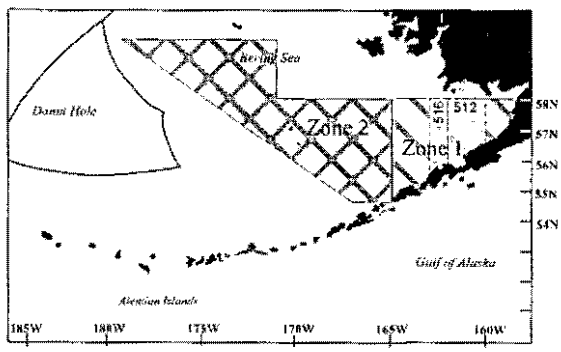
During the specification process, the Council reviews the need to control the bycatch of prohibited species and recommends appropriate apportionments of PSC limits to fishery categories as bycatch allowances. Fishery bycatch allowances are intended to optimize total groundfish harvest under established PSC limits, taking into consideration the anticipated amounts of incidental catch of prohibited species in each fishery category. The Council may recommend exempting specified non-trawl fishery categories from the non-trawl halibut bycatch mortality limit restrictions after considering factors (1) through (8) set forth under Section 14.4.2.2, Part D of the FMP. The Council also reviews the need for seasonal apportionments of fishery bycatch allowances. The 1998 bycatch limits and apportionments for halibut, herring, and crab are listed in **Table 1**.

A summary of current bycatch management measures is provided below.

Crab - Prescribed bottom trawl fisheries in specific areas are closed when (PSC) limits of *C. bairdi* Tanner crab, *C. opilio* crab, and red king crab are taken. Bycatch limitation zones for Tanner and red king crab PSC are shown in the figure below. Crab PSC limits for groundfish trawl fisheries are based on crab abundance, as shown in the table below.

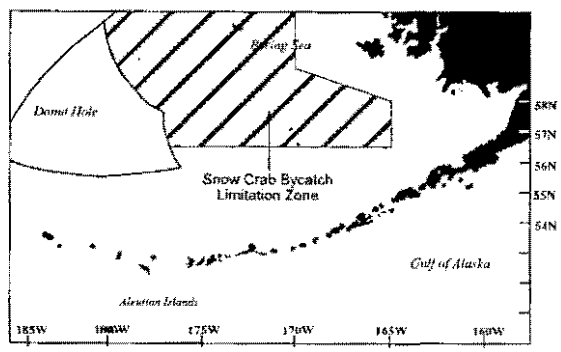
PSC limits for red king crab and C. bairdi Tanner crab.

Species	Zone	Crab Abundance	PSC Limit
Red King Crab	Zone 1	Below threshold or 14.5 million lbs of effective spawning biomass (EBS)	35,000
		Above threshold, but below 55 million lbs of EBS	100,000
		Above 55 million lbs of EBS	200,000
Tanner Crab	Zone 1	0-150 million crabs	0.5% of abundance
		150-270 million crabs	750,000
		270-400 million crabs	850,000
		over 400 million crabs	1,000,000
Tanner Crab	Zone 2	0-175 million crabs	1.2% of abundance
		175-290 million crabs	2,100,000
		290-400 million crabs	2,550,000
		over 400 million crabs	3,000,000



Location of the crab bycatch limitation zones.

Under Amendment 40, PSC limits for snow crab (C. opilio) taken in groundfish fisheries are based on total abundance of opilio crab as indicated by the NMFS standard trawl survey. The snow crab PSC cap is set at 0.1133% of the Bering Sea snow crab abundance index, with a minimum PSC of 4.5 million snow crabs and a maximum of 13 million snow crabs. Snow crabs taken within the "Snow Crab Bycatch Limitation Zone" accrue towards the PSC limits established for individual trawl fisheries. Upon attainment of a snow crab PSC limit apportioned to a particular trawl target fishery, that fishery is prohibited from fishing within the snow crab zone.

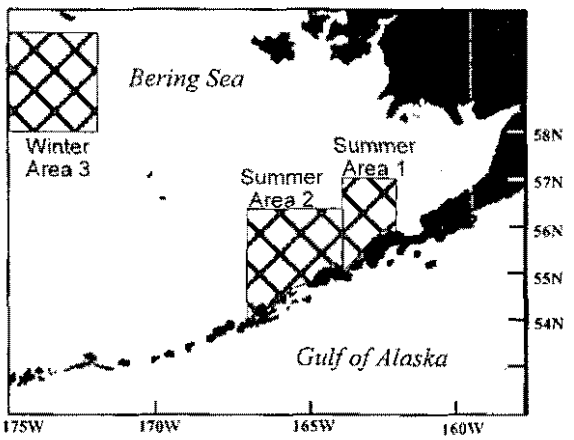


Location of the snow crab bycatch limitation zone.

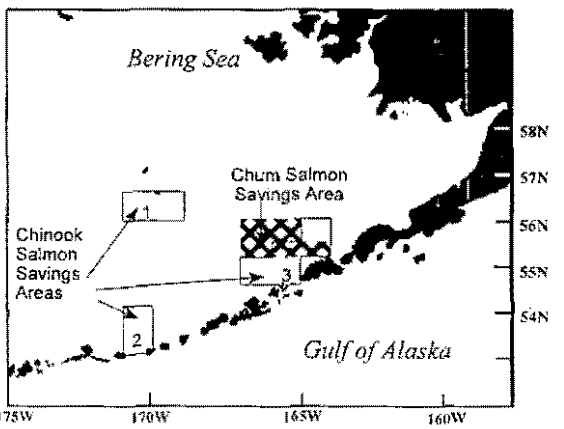
Pacific Halibut - Halibut bycatch limits are established in terms of total mortality. Overall bycatch mortality is limited to 4,665 mt (3,775 mt for trawl and 900 mt for non-trawl fisheries). The trawl halibut bycatch

limits are apportioned to the following six fisheries in proportion to their anticipated bycatch use: (1) Yellowfin sole, (2) Rock sole/"other flatfish," (3) Turbot/arrowtooth flounder/sablefish, (4) Rockfish, (5) Pacific cod, and (6) Pollock/Atka Mackerel/"other species." Non-trawl halibut bycatch limits are primarily allocated to the Pacific cod longline fishery. For longline fisheries, careful release requirements have been established in addition to the bycatch limits.

Pacific Herring - Herring PSC is established annually at 1% of the estimated eastern Bering sea herring biomass. The herring PSC cap is apportioned among trawl fisheries expected to take herring as bycatch. If a fishery reaches its herring PSC apportionment, that fishery will be closed to trawling in two Herring Summer Savings Areas north of the Alaska peninsula and a Herring Winter Savings Area northwest of the Pribilof Islands. These Herring Savings Areas are depicted in the adjacent figure.



Salmon - The Chum Salmon Savings Area closes to all trawling from August 1 through August 31, and remains closed if a bycatch limit of 42,000 chum salmon is taken in the catcher vessel operational area (CVOA). Trawling is prohibited in the Chinook Salmon Savings Areas upon attainment of a bycatch limit of 48,000 chinook salmon in the BSAI. These areas are shown in the adjacent figure.



1.4.3 Pollock Catch by Gear Type

1.4.3.1 Total Weight of Pollock Catch

Bering Sea and Aleutian Islands - The impacts of prohibiting a gear type depend not only on bycatch savings, but also costs to directed fisheries, markets, etc.. **Table 2** summarizes the 1996 BSAI pollock catch by gear type, target fishery, and processor type.[4] Over 93% of the total pollock catch (all fisheries and targets) was

---

[4] Processors were broken out into six classes. Shoreside processing facilities were separated into Gulf of Alaska and Bering Sea/Aleutian Island plants. All plants located west of, and including, Dutch Harbor and Akutan were considered BSAI plants. The remaining plants were classified as Gulf of Alaska. Processing vessels were divided into four categories. Motherships were defined as true motherships and unidentified processing vessels. Catcher/processors were separated into three categories (Surimi, Fillet, or Head and Gut) based on the products they produce. Catch delivered to catcher/processors by catcher vessels was included in the catcher/processor classes.

The Alaska Regional office of NMFS does not distinguish between bottom and midwater trawl gear in their PSC data sets. To divide PSC among the two types of trawl gear, a straightforward methodology was used as follows:

1) If the blend data reported only bottom or midwater trawl gear, then that gear type was assigned to the PSC for the week, zone, target, and processor. This was the case for all but about 50,000 tons of catch.
2) If both trawl gear types were reported then a linear programing model was used to estimate a bycatch rate by processor and gear type. The model used the average PSC bycatch rate by gear type and target when only one trawl gear was used. The model then minimized the change in that rate, subject to the constraint that the total PSC bycatch for those classes remained constant.

taken with pelagic trawls. When pollock was the target, 98.5% of the pollock was taken with pelagic trawls and 1.5% with nonpelagic trawls. Note that pollock catches with pelagic trawl gear fell into the bottom pollock target category about 8% of the time. Conversely, over 27% of the pollock catches with nonpelagic gear fell into the midwater pollock target category. This means that nonpelagic gear can be fished in a manner that takes > 95% pollock.

Examination of the 1997 data confirms observations based on the 1996 information (**Table 3**). Again, nearly all (96%) of the pollock caught in the BSAI directed pollock fishery were taken with pelagic trawls. Although more pollock was taken in 1997 with nonpelagic gear, most (64%) of these catches fell into the midwater target (>95% pollock).

Some other observations on gear used by processing type can be gleaned from the catch data. For example, in 1996 only 2% of the catch taken by surimi factory trawlers was taken with nonpelagic gear. Factory vessels targeting pollock for fillet production caught 7% of their pollock with nonpelagic trawls in 1996 and 5% in 1997. Larger fish, preferred by fillet producers, are found near the bottom and may be taken with non-pelagic trawls in some years (Pereyra 1995). Relatively few pollock were processed by head and gut (H&G) vessels, and shoreside and mothership processor data indicate that no pollock were taken with nonpelagic trawls.

BSAI pollock catch by season for each gear type was also examined in relation to the implementation of the performance-based definition (>20 crabs per haul), as shown in the adjacent table. Analysis of blend data did not indicate any clear trend for use of pelagic trawl gear. In 1996, very little pollock (4,119 mt) was taken with nonpelagic gear, whereas in 1997, more (30,227 mt) was taken with this gear type. It is interesting to note that in 1997, over 18,000 mt of pollock was taken with nonpelagic gear in directed pollock fisheries after September 7, when regulations kicked in requiring pelagic gear only. Some of this may be due to vessels which targeted yellowfin sole, but were assigned to a pollock target category because pollock was the dominant species in their catch. This should no longer be a problem since under the IR/IU program, fishermen not targeting pollock must discard any amount of pollock over 20% of their catch, and will therefore not fall accidentally into the directed pollock category. (Note that the total catch numbers for target pollock fisheries reported in the tables may differ slightly, due to algorithms used for blend and observer data, and revisions made to the data set.)

Catch of pollock in the BSAI (including CDQ harvest), by gear type and season, 1996-1997 (based on **nearest** week ending date before date pelagic only gear is allowed). (5/1/98 data run)

	Bottom	Pelagic
1996 'A' Season	13,102	529,465
1996 'B' Season		
Prior to 9/11	2,991	195,660
After 9/11	1,128	420,748
1997 'A' Season	15,859	523,424
1997 'B' Season		
Prior to 9/7	11,492	92,686
After 9/7	18,735	417,104

Gulf of Alaska - The use of pelagic trawls was "more prevalent" in the 1997 GOA pollock fisheries than in 1996. **Tables 4 and 5** show the GOA pollock catch by gear type, target fishery, and processor type. In 1996, when pollock was the target, 92.4% of the pollock was taken with pelagic trawls and 7.6% with nonpelagic trawls. In 1997, the percentage taken with pelagic trawls increased to 96.9% of the total. As with the BSAI pollock fisheries, some of the GOA pollock catches with nonpelagic gear fell into the midwater pollock target category.

In the GOA, 100% of the pollock TAC is allocated to the inshore component of the fishery. In 1996, most (77%) of the pollock was processed at GOA shore plants in Kodiak, Sand Point, and King Cove. About 23% was processed in shore plants classified as BSAI plants (primarily on Akutan, with lesser amounts to Dutch Harbor). Vessels delivering to BSAI shore plants took 11% of their pollock using nonpelagic gear, whereas those delivering to GOA shore plants took 7% of their pollock with nonpelagic gear. In 1997, vessels

delivering to BSAI shore plants took none of their pollock using nonpelagic gear, whereas those delivering to GOA shore plants took 3.5% of their pollock with nonpelagic gear.

1.4.3.2 Size and Recovery Rate of Pollock Catch

The NMFS Observer Program supplied data so that the size of pollock taken by the two gear types could be examined. Data from 1997 show that, on average, larger pollock were taken by bottom trawls. Mean length of pollock, by area and gear type, is shown in the adjacent table. Only area/gear combinations with large sample sizes (>450 pollock/gear/area) are shown. Note that some areas (e.g., 509) show bigger differences than other areas (e.g., 524). Also note that the smallest pollock were taken in the northern area (524) and the largest pollock in the southern areas, particularly in the Aleutian Islands region (541, 542). Length frequency information is also displayed graphically, in **Figures 1-5**.

Average length (cm) of pollock measured by observers from hauls with pelagic trawls and bottom trawls, 1997.

Area	Bottom Trawls	Pelagic Trawls
509	49.9	46.7
513	47.7	43.7
517	49.6	49.5
524	36.4	36.7
531	41.7	40.7
541	53.6	51.8
542	53.1	52.1

The average size of pollock taken by different gear types will vary from year to year with changes in population size structure. **Tables 6 and 7** show the age structure of the Bering Sea and Aleutian Islands pollock stocks, based on fishery catch data. Note that in some years, catch consists mostly of older pollock, whereas in other years, younger age classes predominate. Fishermen can target larger and older pollock in some years by increasing their use of bottom trawl gear. As noted by Pereyra (1995), fishermen harvesting pollock for fillet production prefer larger pollock found near the bottom due to higher product yields, larger fillets of greater value, and lower production costs.

No data were available to verify or refute claims that larger pollock yield higher recovery rates for fillet and surimi production by vessels fishing with nonpelagic as opposed to pelagic trawls. Staff discussed the possibility of comparing catch and product weight from blend estimates using observed fillet and surimi producing vessels utilizing these gear types. However, it was felt that the results of such an analysis would be inconclusive, given the high variability involved (Joe Terry, NMFS, pers. comm.).

1.4.4 Incidental Catch of Groundfish by Gear Type

In both 1996 and 1997, Pacific cod was the predominant groundfish taken incidentally in the BSAI and GOA pollock fisheries (**Tables 8-11**). This was true regardless of target category or gear type. Note that since a higher percentage of pollock was taken by pelagic trawls, bycatch rates of cod were higher for nonpelagic trawls. Nonetheless, incidental catch of Pacific cod represented a small percentage of the 1996 TAC in the BSAI (5%) and GOA (1%). Flatfish were also taken in small quantities by both gear types, with bycatch rates higher for nonpelagic trawls. Of the 1,167 mt of squid bycatch taken in all the BSAI trawl fisheries in 1996, 96% were taken in the directed pollock fisheries (about two thirds in the midwater target and one third in the bottom target); of that 96%, 99% was taken with pelagic gear and only 1% with nonpelagic gear. The percentage of squid bycatch in the pollock fisheries which was taken by nonpelagic gear remained low in the following two years, rising slightly (to 2%) in 1997 and then falling (to .02%) in 1998.

1.4.5 Incidental Bycatch of PSC by Gear Type

A total of 321 mt of halibut bycatch mortality was attributable to BSAI pollock fisheries in 1996, based on updated data (**Table 12**). GOA pollock fisheries accounted for 18 mt of halibut mortality. Most of the halibut mortality was attributable to pelagic trawl gear (69% in BSAI, 56% in GOA). Putting this in context, over 98% of the pollock catch in the BSAI was taken by pelagic trawls, which means that the nonpelagic trawls were taking a much higher proportion, almost a third, of the total halibut bycatch, even though they

caught under 2% of the pollock. Nearly all of the chinook salmon and "other salmon"[5] bycatch in pollock fisheries in the BSAI was taken by pelagic trawl gear. Similarly, in the GOA, pelagic trawling accounted for 97% of the herring, 82% of the chinook salmon, and 98% of the "other salmon" bycatch taken in pollock fisheries. Crabs, on the other hand, were taken in more equal amounts by each gear type; this means that the ratio of crab bycatch in a haul was much higher for nonpelagic gear, which would be expected, since crabs live on the bottom. Bycatch of crabs is relatively low in GOA pollock fisheries.

The 1997 data for PSC were similar to 1996 data in most cases. A total of 208 mt of halibut bycatch mortality was attributable to BSAI pollock fisheries in 1997 (**Table 13**). GOA pollock fisheries accounted for only 6 mt of halibut mortality. As observed in 1996, most of the halibut mortality was attributable to pelagic trawl gear. The most noticeable difference between the two years was the bycatch of red king crab, which was much lower in 1997 (377 crabs in 1997; 4,473 in 1996). Bycatch rates for 1996 and 1997 BSAI and GOA fisheries are shown in **Tables 14 and 15**.

1.4.6 Incidental Bycatch of PSC by Gear Type and Season

Bycatch rates of PSC in the pollock fishery varies seasonally. This occurs for several reasons. First, PSC species may move on a seasonal basis; for example, halibut tend to be found in deeper waters in the winter, and move shoreward in the spring and summer months. Second, fisheries may occur in different places at different times. In the BSAI pollock fishery, for example, fishing effort tends to concentrate near Unimak Island during the 'A' season, but disperses to the northwest during the 'B' season. This occurs because of regulations (implementation of the CVOA) and location of fish aggregations.

The third and most important reason bycatch rates vary seasonally is the presence of the performance-based standard for pelagic trawls. Note that a performance-based standard for pelagic trawls kicks in when nonpelagic trawling is prohibited due to PSC attainment. When the pollock fishery nears its allocation of halibut PSC, NMFS closes that fishery to nonpelagic gear. This occurred in the Bering Sea during the 'B' season in 1996 (September 11) and 1997 (September 7). To examine the impacts of this regulation, bycatch rates were examined before and after the closure to nonpelagic gear. **Table 16** shows the bycatch rates of halibut and crab from the 1996 and 1997 pollock 'A' and 'B' season. According to these data, fishermen were able to alter their behavior by fishing off the bottom and catching fewer crabs and halibut.

At the April 1998 Council meeting, the Advisory Panel requested additional information on the number of crabs taken with pelagic and nonpelagic trawl gear in the BSAI pollock fisheries. In response to this request, personnel from the NMFS observer program provided data for sampled hauls that exceeded the performance-based definition of greater than 20 crabs counted versus those that did not exceed the standard. However, the NORPAC database does not have the target defined in it. Targeting is assigned to aggregate data in the Alaska Region, while the NORPAC database contains detailed haul and species composition sampling records. To derive information on the pollock fishery, the target for each sampled haul was defined using a function we have written that evaluates the species composition of each individual sampled haul. This function assigns a target fishery according to which species group is predominant in the haul.

After comparing the resulting tabulations with inseason datafiles, vessel by vessel, observer program data analysts found that the function was categorizing hauls from other fisheries as pollock target hauls. For instance, flatfish hauls in which discarded pollock made up the predominant fraction of the haul had been included along with the true pollock fishery haul data. Because of this problem, the analysts urge caution in the interpretation of these data. The results of this effort are shown in **Tables 17-21**.

---

[5]The "other salmon" category primarily consists of chum salmon.

1.4.7 Bycatch of PSC in the Pollock/Mackerel/Other Category

The following tables show the history of PSC apportionment and use of halibut and crab for the pollock/Atka mackerel/other species fishery category (herring and salmon numbers not shown). Herring is allocated separately for the midwater pollock category, as shown in **Table 1**, and salmon bycatch triggers were first implemented in 1996.

History of PSC apportionment for the BSAI pollock/ Atka mackerel/ other species PSC category, 1992-98.

	Halibut (mt)	red king crab	Tanner crab, Z1	Tanner crab, Z2
1992	1,297	30,000	100,000	712,500
1993	1,257	40,000	175,000	1,150,000
1994	957	40,000	175,000	1,250,000
1995	555	30,000	75,000	690,000
1996	430	30,000	75,000	690,000
1997	350	7,500	44,408	470,000
1998	350	7,500	29,408	470,000

History of PSC bycatch taken by the BSAI pollock/ Atka mackerel/ other species category though 4/18/98.

	Halibut (mt)	red king crab	Tanner crab, Z1	Tanner crab, Z2
1992	1,855	38,017	181,240	1,094,978
1993	1,134	43,665	494,428	1,153,516
1994	858	38,584	61,366	309,657
1995	421	3,588	105,821	48,171
1996	462	5,872	78,824	11,901
1997	280	137	10,854	12,749
1998	63	50	6,125	187

Clearly, the amount of halibut and crab allocated and used in the pollock/Atka mackerel/other species fishery category has been much reduced in recent years. This reduction may be due in part to implementation of a pelagic trawl definition (together with the 20 crabs performance-based definition) in 1993. Other regulatory measures, such as implementation of the Pribilof Islands Habitat Conservation Area and the Red King Crab Savings Area in 1995, also account for reductions in crab bycatch. Lower bycatch of Tanner crab may reflect reduced population abundance through the time period. PSC reductions may have also been due to non-regulatory factors, such as industry monitoring of hotspot areas.

Two other reasons for the observed reduction in halibut bycatch mortality are changes in technology and in the age and size composition of pollock stocks. First, technology has improved to the extent that pelagic gear (equipped with very large mesh) can now be fished so that the gear remains in contact with the bottom. Testimony at the April 1998 Council meeting indicated that this is now common practice for the pollock fleet. Second, the pollock population is currently dominated by young year-classes, which may be found higher off the bottom.

1.4.8 PSC Bycatch Rate Comparison

When evaluating fisheries for their impact on bycatch species, it is useful to compare bycatch rates among various fisheries. **Table 22** shows the bycatch of halibut, red king crab, Tanner crab, snow crab, chinook salmon, and "other salmon" in the 1996 groundfish fisheries of the BSAI and GOA (Kinoshita et al. 1997). The data indicate that of all the groundfish fisheries managed by the Council and NMFS, the pelagic pollock trawl fishery has the lowest bycatch rate of halibut. Crab bycatch in the BSAI pollock fishery is also very low, whereas bycatch rates for salmon are relatively high, exceeded only by the Pacific cod trawl fishery (for chinook salmon), and the arrowtooth trawl fishery (for "other salmon").

1.4.9 Size and Number of Halibut Taken as Bycatch

Concerns have been raised regarding the size of halibut taken as bycatch in the BSAI pollock fisheries. This information is collected for groundfish trawl fisheries by observers, and analyzed by the International Pacific Halibut Commission annually (e.g., Williams 1997a). Data indicate that for most target fisheries, trawl-caught halibut are on average smaller and weigh less than longline-caught fish. In 1996, for example, the mean length of halibut caught incidentally in the BSAI trawl fisheries ranged from 53 cm to 81 cm, whereas

the mean length of halibut taken as bycatch in BSAI longline fisheries ranged from 70 cm to 90 cm. Halibut taken as bycatch in the BSAI pollock fisheries are generally at the lower end of the size range. A history of the size of halibut taken in the pollock fisheries, by target category, is shown in the following table.

Concerns have also been raised regarding the number of halibut taken as bycatch in the BSAI pollock fisheries. Based on an average weight of about 3.5 kg each, the 1997 pollock fishery total bycatch mortality of 208 mt (458,000 pounds), and a mortality rate of 80%, one could estimate that approximately 74,286 individual halibut were taken as bycatch. For comparison purposes, one could also estimate the number of pollock caught. Assuming an average weight of 0.8 kg per pollock, and a catch of 1,097,879 mt, about 1,372,349,000 individual pollock were caught in the 1997 BSAI pollock fishery. Hence, about 18,474 pollock were caught for each halibut taken as bycatch in this fishery.

A quick comparison of total halibut bycatch mortality taken in the BSAI pollock fisheries with other fisheries reveals that the pollock fishery is relatively a minor source of mortality to halibut. In 1995, 62.1% of halibut removals in Alaska were due to commercial catch, 25.3% to bycatch, 11.6% to sport fishing, and 0.9% to other uses such as subsistence and deadloss (NPFMC 1997). Of the BSAI removals, approximately 3,577 mt of bycatch mortality was due to groundfish trawl fisheries, 709 mt from longline fisheries, and 11 mt from pot gear fisheries (Williams 1997b). Just focusing on the BSAI groundfish trawl fisheries, bycatch mortality was distributed as shown in the adjacent table (1997 data from Sadorus and Williams 1997b). Note that the bottom pollock and midwater pollock, combined, account for slightly less than 5% of the total halibut mortality due to groundfish fisheries.

Compared to the catch in directed fisheries for halibut, the mortality due to halibut bycatch in the BSAI pollock fisheries is very small. For example, in 1997 the Alaska commercial halibut fishery caught 52,500,000 pounds, and the sport fishery took about 6,500,000 pounds (preliminary data). The BSAI pollock fishery bycatch mortality of 458,000 pounds represented only about 0.78% of the total from the commercial and sport halibut fisheries.

Mean size of halibut bycatch in the 1990-1996 BSAI pollock trawl target fisheries. Source: G. Williams, IPHC, from NMFS observer data.

Year	Fishery	Mean Length (cm)	Mean Weight net wt. (lbs)	Mean Weight rd. wt. (kg)
1990	Bottom	46	2.67	1.61
	Midwater	47	3.89	2.35
1991	Bottom	43	2.05	1.23
	Midwater	69	9.77	5.89
1992	Bottom	49	2.57	1.55
	Midwater	54	4.26	2.57
1993	Bottom	49	2.69	1.62
	Midwater	55	3.72	2.25
1994	Bottom	54	3.84	2.32
	Midwater	64	6.12	3.69
1995	Bottom	50	3.29	1.99
	Midwater	63	6.35	3.83
1996	Bottom	58	5.21	3.14
	Midwater	65	6.36	3.84

Halibut bycatch mortality (mt) in 1997 BSAI groundfish fisheries. Source: Williams (1997b).

Target Fishery	Bycatch Mortality	Percent of Total
TRAWL		
Atka mackerel	73	1.70
Bottom pollock	77	**1.79**
Pacific cod	1,325	30.84
O. Flatfish	11	0.26
Rockfish	14	0.33
Flathead sole	251	5.84
Midwater pollock	132	**3.07**
Rock sole	795	18.50
Turbot	10	0.23
Arrowtooth	2	0.05
Yellowfin sole	887	20.64
LONGLINE		
Pacific cod	659	15.34
Rockfish	8	0.19
Turbot	42	0.98
POT		
Pacific cod	11	0.26

1.5 Eastern Bering Sea Habitat Description

The pollock trawl fisheries in the BSAI Management Area, for the purposes of regulations governing the groundfish fisheries, means the Bering Sea and Aleutian Islands subareas (§50CFR679.2). The Bering Sea subarea is defined as the portion of the EEZ contained in Statistical Areas 508, 509, 512, 513, 514, 516, 517, 518, 519, 521, 523, 524, and 530. The Aleutian Islands subarea is defined as the portion of the EEZ contained in Statistical Areas 541, 542, 543 (§50CFR67, Appendix A, Figure 1).

For its description of the affected environment, this EA tiers off the Supplemental Environmental Impact Statement for the 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 (SEIS)(NMFS 1998a, 25). The SEIS describes the affected environment in section 3.1, which includes subsections on the substrate, the water column; temperature/nutrient regimes, currents, and the effects of different kinds of fishing gear on the substrate and on benthic communities. NMFs notes that in a July 8, 1999, order, amended on July 13, 1999, the court in Greenpeace, et al., v. NMFS, et al., Civ No. 98-0492 (W.D. Wash.) held that the SEIS did not adequately address aspects of the GOA and BSAI groundfish fishery managment plans other than TAC setting, and therefore was insufficient in scope under NEPA. In response to the Court's order, NMFS is currently preparing a programmatic SEIS for the GOA and BSAI groundfish fishery management plans. Notwithstanding the less expansive scope of the 1998 SEIS, NMFS believes that the discussion of impacts and alteratives in the SEIS is directly applicable to the proposed action to be analyzed in this EA.

Since gear effects on habitat are the consideration most germane to the proposed rule, in section 1.5.1 following we extend the SEIS (section 3.1.2.1) discussion of that issue to include recently published work.

1.5.1 Environmental Effects of Bottom Trawling

Otter trawls, the principle gear used in bottom trawling, have become much more efficient in recent years, due to changes in gear and vessel technology. Vessels are larger on average, with greater horsepower, and larger, stronger nets. The vessels are able to explore fishing areas not previously available to them; they drag heavier nets over seabeds and may be altering the sea floor more than was observed in early studies (Auster et al. 1996). The character of trawling in Alaska has also changed because of the domestication of the groundfish industry in the BSAI and the GOA since passage of the Magnuson Act in 1976. Since then, the large foreign factory vessels have been replaced by a mixed fleet of factory trawlers and specialized catcher vessels, which deliver their catch to shoreside processors and motherships.

Although numerous studies on the effects of trawling have taken place in the eastern and western Atlantic, the North Sea, and around Australia and New Zealand–some of the conclusions of which could be applicable to the Bering Sea–until recently such studies had not taken place in the northern Pacific Ocean. Since 1996, however, the Alaska Fisheries Science Center has been conducting research to remedy this gap. Studies of trawl impacts are ongoing in the Gulf of Alaska, the eastern Bering Sea and the Aleutian Islands area. A summary of these research efforts can be found in the Science Center's Quarterly Report for Jan-Feb-March 1999 (AFSC 1999) and in a more detailed version in the "Ecosystem Considerations for 1999" chapter of the 1999 Stock Assessment and Fishery Evaluation Report (NPFMC 1999).

The study probably most pertinent to this EA was conducted by Robert A. McConnaughey (McConnaughey et al. 1999). McConnaughey sees the eastern Bering Sea as presenting an excellent opportunity for studying trawling impacts since the commercial fisheries are relatively new there, recordkeeping has been good, and it is therefore possible to reconstruct the spatial and temporal patterns of exploitation. Untrawled areas immediately adjacent to areas that have been heavily fished can be used for controls. In other regions, such

as the Atlantic, such areas have not generally been available and researchers have had to rely for controls on areas more recently closed to trawling.

In order to study the long-term effects of trawling on the benthos in the eastern Bering Sea, McConnaughey collected samples of over 100 types of organisms from 104 shallow (48-m average), soft-bottom, heavily fished sites, each one square nautical mile in size, and all straddling the boundary of a closed area, Crab and Halibut Protection Zone 1. The sampling results were compared to results from the unfished area, with the following conclusions:

1. Sedentary macrofauna (e.g. anemones, soft corals, sponges, whelk eggs, ascidians) neptunid whelks and empty shells were more abundant in the unfished areas than the trawled areas.
2. Mixed responses were observed within motile groups (e.g. crabs, sea stars, whelks) and infaunal bivalves, suggesting that responses to trawls are complex, depending on the ecological requirements of the organism.
3. Overall diversity and niche breadth were greater, for sedentary taxa, in the trawled area. The lower diversity in the trawled areas may be related to greater abundance in the these areas of the seastar *Asterias amurensis*.

As McConnaughey points out in the same paper, patterns can be seen from the worldwide studies on trawling. Clearly, for example, bottom trawls remove substantial amounts of biomass, including the target species, which is often a key predator in the system. According to a 1996 National Research Council report, removals of the magnitude that have occurred in the Eastern Bering Sea since World War II could significantly alter species composition and may explain the shift to a pelagic-dominated system (NRC 1996).

A second common theme in these studies is that bottom trawling causes significant mortality and injury to non-target epifauna and infauna. These are important to the ecosystem in that they are important prey items, low on the food chain, which influence the character of the seafloor with their burrowing activities.

Another general conclusion that can be drawn from worldwide studies is that trawling tends to reduce structural complexity and diversity on the ocean floor. This will occur to different degrees, depending on the characteristics of the habitat and the fishery.

The consequences of trawling are complex. Actions that affect one species adversely may benefit another species. Environmental conditions, including oxygen content in bottom layers (Krost 1993) and natural wind stress (Riemann and Hoffman 1991) will play a role in determining the severity and direction of impacts. Some of the physical effects of trawling, and their potential impacts on the eastern Bering Sea, are discussed in more detail below:

Resuspension of sediments

Trawling an area kicks up both inorganic and organic sediments, contributing significantly to the average suspended sediment load in the trawled area, especially at depths where bottom stress due to tidal and current action is weak (Churchill 1989). Compared to the Gulf of Alaska, the Bering Sea has relatively weak currents but relatively strong tidal action, accounting for up to 95% of all flow as deep as 200 m. Unlike the Gulf of Alaska, which has a greater variety of bottom types, the Bering Sea has a bottom mostly comprised of sand and mud.

Sediment resuspension can have a long-term effect on benthic communities. An increase of sediment reduces light levels on the seabed, can smother the benthos when it resettles, create anaerobic conditions near the seabed, and reintroduce toxins that may have settled out of the water column (Churchill 1989, Jones 1992, Messieh et al. 1991). Sediment resuspension may also have the beneficial effect of enhancing the food supply to the water column (Churchill 1989). Effects both beneficial and negative would probably be greater

in the deep ocean where the bottom is relatively unaffected by natural disturbances, but minimal in areas with significant current or tidal transport, because organisms in such areas are adapted to such events (International Council for the Exploration of the Sea 1988, Jones 1992). The eastern Bering Sea with its winter storms, whose effects are in some ways similar to that of trawling, falls in the latter category, especially in the shallower areas..

The resuspension of sediments can lead to a recomposition of the ocean floor, in an effect called winnowing In winnowing, small particles which are resuspended by a trawl pass may move with the currents to another area instead of resettling, so that the texture of the bottom coarsens. Again, areas subject to storm activity may naturally experience this phenomenon, so that trawling would not make much difference, especially in shallower waters. But in waters at a depth exceeding storm-related effects, the resuspension caused by trawls could have a stronger impact on the composition of the bottom.

Alteration of the seabed due to contact with the gear

The extent to which the gear penetrates the substrate depends on the makeup of the bottom, the speed with which the gear is being towed, the strength of tides and currents, the gear configuration, and the component of the gear encountered. Otter trawl doors can penetrate the substrate as little as 1 cm, on sand and rock substrata, or as much as 30 cm in some mud strata (Jones 1992). Heavier doors create deeper troughs.

The length of time that the benthic troughs last is also variable. In sand or mud substrata with strong tidal action or currents, the troughs can be washed away within a few hours or days (Caddy 1973, Jones 1992). But in very deep seabeds (deeper than 100 m) with weak currents and a mud or sandy-mud substrate, the troughs can last for much longer, from a few months to over five years (Brylinsky *et al.* 1994, Jones 1992, Krost et al. 1990).

While trawl doors cause the most intensive effects over relatively narrow paths (< 3 m wide),[6] the aweeps and footropes may have a more profound effect on the environment, as they impact a much larger area, due to their greater width (Jones 1992, Kaiser and Spencer 1996b, Reise 1982). Different types of footropes cause different levels of disruption. Footropes designed to skim over the seafloor, which are typically used in the BSAI on soft bottoms, cause little physical alteration aside from smoothing of the substrate and minor compression. However, if the area is trawled repeatedly, by the same vessel or different vessels, the cumulative effect of these minor compressions can cause a "packing" of the substrate (Schwinghammer et al. 1996). This packing effect can be further exacerbated when the net fills up and the codend is dragged along the bottom.

Alteration of species mix

The survival of benthic organisms in the path of trawl gear depends on several factors, including the species, age and size, type of gear, size of the haul, substrate morphology, and ocean conditions. Trawl doors cause the most intensive damage, although the footropes affect a larger area. The sedentary organisms living in the upper 5 cm of the seabed are especially vulnerable (Rumohr and Krost 1991). Thin-shelled bivalves and starfish tend to sustain heavy damage from the trawl doors, while thick-shelled bivalves are less likely to be damaged. Diatoms, nematodes and polychaetes have been found to be affected by the passage of trawls (Brylinsky et al. 1994). Hard-shelled red king crab seem to fare better; in one experiment the crab were tethered in the path of an Aleutian combination trawl, and only 2.6% of the crabs that interacted with the trawl, but were not retained, were injured (Donaldson 1990). In another experiment, an estimate was made of the rate of injuries sustained by red king crabs passing under three types of bottom trawl footropes

[6]Craig Rose, Alaska Fisheries Science Center, pers. comm., October. 15, 1999.

commonly used in the bottom trawl fisheries of the eastern Bering Sea. Injury rates of 5%, 7% and 10% were estimated for crab passing under the three types of commercial footropes (Rose *in press*).

Some studies have found that recolonization in disturbed habitat can occur over a relatively short period. Brylinsky et al. (1994) found that nematodes and polychaetes returned to their pre-trawled levels in less than seven weeks, and diatoms increased in abundance in trawl troughs within 80 days; in a study by Rumohr and Krost (1991), small epibenthic species recovered to pre-trawl densities in 24 hours.

Several studies have observed increases in scavenging in the wake of beamtrawls. These short-term changes in individual species distribution, however, are not likely to affect the ecosystem in any profound sense. The more important question is whether bottom trawl fishing causes long-term changes in the benthic community structure. Intensive fishing in an area can possibly result in such changes by promoting populations of opportunistic fish species that migrate into fished areas in order to feed on animals that have been disturbed in the wake of a trawl tow (Caddy 1973, Kaiser and Spencer 1994, 1996a).

Another potential long-term effect on the species mix is the smoothing caused by multiple trawls in the same area. Boulders are moved, patchy biogenic depressions are removed (both important habitat for juvenile fish), the exchange capacity is reduced, and species diversity may suffer.

Studies of the long-range effects of trawling are in their early stages. In an extensive review of trawl studies, Auster and Langton (1999) caution that it is not easy to characterize the long-term effects of fishing on the benthic community structure. The authors write: "The pattern that does appear to be emerging from the available literature is that communities that are subject to variable environments and are dominated by short-lived species are fairly resilient. Depending on the intensity and frequency of fishing, the impact of such activity may well fall within the range of natural perturbations. In communities that are dominated by long-lived species in more stable environments, the impact of fishing can be substantial and longer term."

A recent study (Thrush et al 1998), designed to evaluate the magnitude of fishing effects on benthic habitat, throws doubt on some of the studies showing resilience. Thrush points out, first of all, that small-scale experiments (such as most of those examined by Auster and Lang) are usually done in reasonably homogeneous habitas and over small time scales and could miss chronic, cumulative effects of fishing. Second, the recovery rates of benthic organisms are highly dependent on proximity to areas from which new organisms can be recruited. Broader areas of fishing disturbance would be expected to recover much more slowly than small, isolated experimental areas.

Thrush et al conclude that, although unequivocally linking structural changes to changes in ecosystem function is difficult, the weight of evidence should be of concern. Auster and Lang (1999) similarly conclude that primary information is lacking which would be necessary to strategically manage fisheries without invoking precautionary measures. More research is needed in three areas, according to Auster and Langton: (1) the spatial extent of fishing-induced disturbances; (2) the effects of specific gear types, along a gradient of effort, on specific habitat types; and (3) the role of seafloor habitats in the population dynamics of fishes. A fourth area of needed research[7] involves investigating the life histories of affected non-commercial invertebrates, their relationships to one another, and to managed stocks of fish and shellfish. Little is known about these invertebrates. Until more is known, it is difficult to judge the affects of observed reductions in diversity and structural heterogeneity on the mortality, growth, and recruitment rates of important species.

[7]Robert McConnaughey, pers. comm., Sept 15, 1999.

Table 1. Pre-season apportionments of prohibited species for Bering Sea and Aleutian Islands groundfish fisheries, 1998.

1998 BSAI Trawl Fisheries PSC

Apportionments and Seasonal Allowances – Council Recommendations

Fishery Group	Halibut Mortality Cap (mt)	Herring (mt)	Red King Crab (animals) Zone1	C. bairdi Zone1	C. bairdi Zone2	C. opilio COBLZ
Yellowfin sole	1,005	268	10,000	276,316	1,071,000	
January 20 - March 31	285					
April 1 - May 10	210					
May 11 - August 14	100					
August 15 - Dec 31	410					
Rocksole/other flatfish	795	22	75,000*	296,052	357,000	
January 20 - March 29	485					
March 30 - June 30	130					
July 1 - December 31	180					
Turbot/sablefish/ Arrowtooth	0				0	
Rockfish	75	8			7,000	
July 1 - Dec 31	75					
Pacific cod	1,550	22	7,500	148,224	195,000	
Pollock/mackerel/o.species	350	155	7,500	29,408	470,000	
January 20 - April 15	300					
April 16 - December 31	50					
Pelagic Trawl Pollock		1,239				
TOTAL	**3,775**	**1,714**	**100,000**	**750,000**	**2,100,000**	**4,654,000**

Note: unused PSC allowances may be rolled into the following seasonal apportionment.

*** Red king crab PSC for the rock sole fishery is apportioned 26,250 inside 56 - 56o10' (available Feb 1), and 48,750 outside.**

The Council recommends that the opilio cap not be apportioned among fisheries until fishery specific bycatch data from the opilio savings area are available.

1998 BSAI Non-Trawl Fisheries PSC Bycatch Allowances and fixed gear Pacific cod seasonal apportionments

Fishery Group	Halibut Mortality (mt)	Seasonal Apportion of cod TAC (mt)
Pacific Cod	810	
Jan 1 - April 30	495	70,735
May 1 - September 14	40	15,000
Sept. 15 - Dec. 31	275	13,332
Other Non-Trawl*	90	
Groundfish Pot	Exempt	
TOTAL	**900 mt**	99,068

Note: unused PSC halibut from first trimester will be rolled into the third trimester.

Any halibut PSC removed from the CDQ fisheries will be replaced from PSC apportioned from the third trimester.

*** Includes hook & line fisheries for rockfish and Greenland turbot.**

Sablefish hook & line fisheries will be exempted from the halibut mortality cap.

Jig gear will also be exempted from the halibut mortality cap.

Table 2. BSAI pollock catch (mt) and deliveries by processor class, gear, and target, 1996.

	Nonpelagic Trawls			Pelagic Trawls			
Processor class	**bottom pollock**	**midwater pollock**	other targets	**bottom pollock**	**midwater pollock**	other targets	**Total catch**
Motherships	268	58	4,291	16,674	123,273	2	144,831
BS shore plants	0	0	10,835	389	339,140	3,730	354,093
GOA shore plants	0	0	1,161	4,036	13,944	389	15,494
surimi factory trawlers	4,386	2,905	6,671	38,830	407,692	2	460,485
fillet factory trawlers	6,349	1,296	5,736	19,586	88,695	37	121,698
H&G factory trawlers	153	17	30,346	286	1,214	25	32,041
TOTAL	11,156	4,276	59,039	79,800	973,958	4,119	1,128,643
Pollock targets only	**15,432 (1.4%)**			**1,053,758 (98.6%)**			**1,069,190**

Table 3. BSAI pollock catch (mt) and deliveries by processor class, gear, and target, 1997. CDQ data not included.

	Nonpelagic Trawls			Pelagic Trawls			
Processor class	**bottom pollock**	**midwater pollock**	other targets	**bottom pollock**	**midwater pollock**	other targets	**Total catch**
Motherships	4,069	16,276	6,625	3,264	159,136	0	189,370
BS shore plants	0	0	16,485	2,328	304,390	239	323,442
GOA shore plants	0	0	1,463	318	10,834	0	12,615
surimi factory trawlers	2,530	7,293	2,855	13,555	301,830	82	328,145
fillet factory trawlers	6,077	1,571	2,817	8,122	126,380	0	144,966
H&G factory trawlers	1,661	184	35,412	164	21,226	5	58,651
TOTAL	14,337	25,324	65,656	27,751	923,796	326	1,057,190
Pollock targets only	**39,661 (4.0%)**			**951,547 (96.0%)**			
991,208							

Table 4. GOA pollock catch (mt) and deliveries by processor class, gear, and target, 1996.

	Nonpelagic Trawls						Pelagic Trawls
Processor class	**bottom pollock**	**midwater pollock**	other targets	**bottom pollock**	**midwater pollock**	other targets	**Total catch**
Motherships	0	0	0	83	215	0	298
BS shore plants	504	726	502	1,172	8,564	0	11,467
GOA shore plants	2,012	322	1,570	508	32,720	32	37,163
surimi factory trawlers	0	0	17	0	300	0	317
fillet factory trawlers	0	0	516	0	33	25	574
H&G factory trawlers	0	0	1,501	0	0	0	1,501
TOTAL	2,516	1,048	4,106	1,763	41,833	57	51,322
Pollock targets only	**3,564 (7.6%)**			**43,596 (92.4%)**			**47,160**

Table 5. GOA pollock catch (mt) and deliveries by processor class, gear, and target, 1997.

	Nonpelagic Trawls						Pelagic Trawls
Processor class	**bottom pollock**	**midwater pollock**	other targets	**bottom pollock**	**midwater pollock**	other targets	**Total catch**
Motherships	0	0	19	0	782	0	802
BS shore plants	0	0	92	0	11,011	0	11,103
GOA shore plants	2,162	528	2,754	1,633	69,399	3	76,479
surimi factory trawlers	0	0	0	0	240	0	240
fillet factory trawlers	0	0	23	128	114	2	267
H&G factory trawlers	0	0	775	0	132	5	912
TOTAL	2,162	528	3,664	1,761	81,678	10	89,803
Pollock targets only 86,129	**2,690 (3.1%)**			**83,439 (96.9%)**			

Table 6. Eastern Bering Sea walleye pollock catch by age in numbers (millions), 1979-1996.

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14+	Total
1979	101.4	543.2	720.0	420.2	392.6	215.5	56.3	25.7	35.9	27.5	17.6	7.9	3.0	0.5	2567.3
1980	9.8	462.4	823.3	443.5	252.2	211.0	83.7	37.6	21.8	23.9	25.5	15.9	7.7	2.5	2420.7
1981	0.6	72.2	1012.9	638.0	227.0	102.9	51.7	29.6	16.1	9.4	7.5	4.6	1.5	0.6	2174.6
1982	4.8	25.3	161.4	1172.4	422.4	103.7	36.0	36.0	21.5	9.1	5.4	3.2	1.9	0.7	2003.7
1983	5.1	118.6	157.8	313.0	817.0	218.3	41.4	24.7	19.8	11.1	7.6	4.9	3.5	1.7	1744.5
1984	2.1	45.8	88.6	430.8	491.9	654.3	133.9	35.6	25.1	15.7	7.1	2.5	2.9	1.7	1938.0
1985	2.7	55.3	382.2	122.1	366.7	322.3	444.3	112.8	36.7	25.9	24.9	10.7	9.4	4.0	1919.9
1986	3.1	86.0	92.3	748.5	214.1	378.1	221.9	214.2	59.7	15.2	3.3	2.6	0.3	1.2	2040.4
1987	0.0	19.9	112.2	78.0	415.8	139.6	123.2	91.2	248.6	54.4	38.9	21.6	29.1	6.1	1378.5
1988	0.0	10.7	455.2	422.8	252.8	545.9	225.4	105.2	39.3	97.1	18.3	10.2	3.8	5.5	2192.2
1989	0.0	4.8	55.3	149.5	452.6	167.3	574.1	96.6	104.1	32.5	129.5	10.9	4.0	2.6	1783.8
1990	1.3	33.2	57.3	220.7	201.8	480.3	129.9	370.4	66.1	102.5	9.1	60.4	8.5	4.7	1746.2
1991	1.0	60.9	40.7	85.4	141.5	156.9	396.4	51.6	217.1	22.1	114.7	15.2	74.4	60.9	1438.8
1992	0.0	79.0	721.7	143.5	98.1	125.0	145.4	276.8	109.3	165.4	59.4	50.2	14.2	91.0	2079.0
1993	0.1	9.2	275.0	1144.5	103.0	64.3	62.2	53.5	84.9	21.8	34.5	12.6	13.1	26.5	1905.2
1994	0.3	31.5	59.8	383.4	1109.5	180.5	54.9	21.0	13.5	20.1	9.1	10.7	7.6	15.7	1917.5
1995	0.0	0.3	75.3	146.6	398.4	764.7	131.8	34.9	10.9	6.0	15.3	4.4	7.1	11.3	1606.9
1996	0.0	9.5	19.7	43.8	144.9	350.7	486.3	190.4	32.9	14.8	8.9	8.8	4.1	11.3	1326.1

Table 7. Aleutian Islands pollock catch by age in numbers (millions) 1978-1996.

Year	Age											
	3	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
1978	0.016	0.220	0.615	0.292	2.116	0.682	0.967	1.210	0.945			
1979	0.000	1.300	1.648	2.049	2.323	2.148	1.400	1.268	0.082			
1980	3.554	2.384	3.729	6.916	14.123	10.584	10.127	4.835	4.746			
1981	0.000	9.664	8.161	6.301	7.611	12.720	12.848	11.019	8.117			
1982	0.000	0.083	46.090	9.933	4.506	6.383	9.177	8.720	4.752			
1983												
1984	0.057	2.600	0.000	8.036	38.166	18.855	24.567	17.379	11.305			
1985	0.161	0.692	11.886	3.010	7.963	32.382	10.880	7.782	7.448			
1986												
1987												
1988												
1989												
1990												
1991	0.055	0.812	2.145	12.561	20.702	5.404	15.423	2.390	7.727	6.735	10.400	6.939
1992	1.032	0.325	1.930	3.694	1.985	5.520	1.231	5.981	3.645	3.582	2.426	12.779
1993	0.334	3.783	1.753	4.420	5.267	2.578	6.520	3.072	3.367	2.884	1.346	2.542
1994	0.045	1.224	11.103	3.163	4.393	5.344	4.571	3.280	1.586	3.708	1.330	1.094
1995	0.206	0.714	2.064	14.116	2.016	5.316	4.940	1.607	2.836	2.278	4.006	0.864
1996	0.145	0.229	0.971	2.598	7.463	2.560	2.434	1.468	1.173	0.865	0.277	0.828

Table 8. Target catch of pollock, and incidental catch (mt) of other groundfish in BSAI pollock trawl fisheries, by gear and target, 1996.

Species	Nonpelagic Trawls		Pelagic Trawls		Total
	bottom pollock	midwater pollock	bottom pollock	midwater pollock	
Pollock catch	11,156	4,276	79,800	973,958	1,069,190
Pacific cod	1,274	68	4,385	8,694	14,421
Yellowfin sole	284	16	510	906	1,716
Gr. turbot	0	0	20	37	57
Arrowtooth	161	4	525	1,049	1,739
Rock sole	770	20	509	532	1,833
Flathead sole	169	8	1,118	1,786	3,081
Other flatfish	126	3	232	618	978
Sablefish	0	0	4	3	7
True POP	0	0	36	274	310
Other POP	0	0	25	6	32
Sharp/North	0	0	0	0	0
Short/Rough	0	0	0	2	2
Other rockfish	0	0	1	7	9
Atka mackerel	0	0	312	72	384
Squid	0	0	390	682	1,073
Other species	281	5	702	499	1,487
TOTAL (non-pollock)	3,065	126	8,769	15,168	27,128

Table 9. Target catch of pollock, and incidental catch (mt) of other groundfish in BSAI pollock trawl fisheries, by gear and target, 1997.

Species	Nonpelagic Trawls		Pelagic Trawls		Total
	bottom pollock	midwater pollock	bottom pollock	midwater pollock	
Pollock catch	14,337	25,324	27,751	923,796	991,208
Pacific cod	1,256	137	1,136	5,551	8,079
Yellowfin sole	206	5	315	80	606
Gr. turbot	3	3	16	96	118
Arrowtooth	408	22	103	562	1,095
Rock sole	389	41	212	879	1,520
Flathead sole	248	64	328	1,705	2,345
Other flatfish	34	12	11	725	781
Sablefish	0	0	0	2	2
True POP	17	10	206	389	622
Other POP	0	0	0	0	0
Sharp/North	1	0	0	0	1
Short/Rough	1	0	0	1	2
Other rockfish	0	0	0	0	0
Atka mackerel	0	0	173	37	210
Squid	1	31	337	1,078	1,446
Other species	190	20	95	476	780
TOTAL (non-pollock)	2,755	344	3,004	11,587	17,690

Table 10. Target catch of pollock and incidental catch (mt) of other groundfish in GOA pollock trawl fisheries, by gear and target, 1996.

Species	Nonpelagic Trawls		Pelagic Trawls		Total
	bottom pollock	midwater pollock	bottom pollock	midwater pollock	
Pollock catch	2,517	1,048	1,763	41,833	47,160
Pacific cod	425	10	123	286	844
Arrowtooth	429	12	68	78	587
Rex sole	7	0	0	1	8
Flathead sole	14	0	0	21	36
Shallow flatfish	131	0	25	19	174
Deep flatfish	3	0	0	0	3
Sablefish	0	0	0	0	0
POP	0	0	0	1	2
Northern rockfish	1	0	0	1	2
Pelagic rockfish	1	0	0	0	1
Demersal rockfish	0	0	0	0	0
Short/Rougheye	0	0	0	0	0
Atka mackerel	0	0	176	3	180
Other species	30	5	16	42	94
TOTAL (non-pollock)	1,042	27	409	453	1,932

Table 11. Target catch of pollock and incidental catch (mt) of other groundfish in GOA pollock trawl fisheries, by gear and target, 1997.

Species	Nonpelagic Trawls		Pelagic Trawls		Total
	bottom pollock	midwater pollock	bottom pollock	midwater pollock	
Pollock catch	2,162	528	1,761	81,678	86,129
Pacific cod	300	12	48	398	758
Arrowtooth	167	4	35	309	515
Rex sole	14	0	1	1	16
Flathead sole	28	1	6	68	103
Shallow flatfish	47	0	16	128	191
Deep flatfish	1	0	0	0	1
Sablefish	0	0	0	0	0
POP	0	0	0	10	10
Northern rockfish	1	0	0	2	3
Pelagic rockfish	4	0	0	7	11
Demersal rockfish	0	0	0	0	0
Short/Rougheye	0	0	0	14	14
Atka mackerel	0	0	0	3	3
Other species	83	3	31	124	241
TOTAL (non-pollock)	646	21	137	1,066	1,870

Table 12. Bycatch of halibut (mt), salmon (#), crab (#), and herring (mt) in pollock trawl fisheries (based on target definition) by area and target, 1996. CDQ data included. Note that the 1996 BSAI data have been revised from previous drafts, based on updated catch and bycatch figures (data run 5/5/98).

Fishery Target and Gear	Pollock catch (mt)	Halibut mortality	C. bairdi crab	O. tanner crab	Red king crab	Herring (mt)	Chinook salmon	Other salmon
Bering Sea/Aleutians								
Nonpelagic trawls								
Bottom Pollock	11,653	57	14,248	16,307	1,034	0.2	743	2
Midwater Pollock	5,568	3	164	589	1	3.9	186	61
subtotal	17,221	60	14,412	16,307	1,035	4.1	929	63
Pelagic trawls								
Bottom Pollock	82,322	62	56,613	4,762	2,328	73.5	4,442	2,748
Midwater Pollock	1,063,552	198	18,391	41,740	2,571	1,164.2	50,252	74,424
subtotal	1,145,873	261	75,004	46,502	4,899	1,237.7	54,693	77,173
TOTAL	1,163,095	321	89,416	62,809	5,934	1,241 8	55,622	77,236
Gulf of Alaska								
Nonpelagic trawls								
Bottom Pollock	2,517	8	1,050	37	0	0	1,537	7
Midwater Pollock	1,048	0	1	0	0	0.1	453	55
subtotal	3,565	8	1,051	37	0	0.1	1,199	62
Pelagic trawls								
Bottom Pollock	1,763	6	129	98	0	0	233	1,165
Midwater Pollock	41,833	4	27	1	0	3.1	9,052	1,444
subtotal	43,596	10	155	99	0	3.1	9,285	2,609
TOTAL	47,161	18	1,207	136	0	3.2	11,275	2,671

Table 13. Bycatch of halibut (mt), salmon (#), crab (#), and herring (mt) in pollock trawl fisheries (based on target definition) by area and target, 1997. CDQ data included.

Fishery Target and Gear	Pollock catch (mt)	Halibut mortality	C. bairdi crab	O. tanner crab	Red king crab	Herring (mt)	Chinook salmon	Other salmon
Bering Sea/Aleutians								
Nonpelagic trawls								
Bottom Pollock	17,353	42	11,112	74,069	334	0.3	280	840
Midwater Pollock	31,949	4	191	2,365	0	87	1,260	3,199
subtotal	49,302	46	11,303	76,434	334	87	1,540	4,039
Pelagic trawls								
Bottom Pollock	32,315	35	10,383	72,906	40	48	773	2,912
Midwater Pollock	1,016,261	126	6,468	86,495	3	978	42,230	59,660
subtotal	1,048,576	161	16,851	159,401	43	1,026	43,003	62,572
TOTAL	1,097,879	208	28,154	235,834	377	1,113	44,544	66,611
Gulf of Alaska								
Nonpelagic trawls								
Bottom Pollock	2,804	1	136	0	0	1.3	1,539	4
Midwater Pollock	547	0	1	0	0	0	134	39
subtotal	3,351	1	137	0	0	1.3	1,673	43
Pelagic trawls								
Bottom Pollock	1,897	1	594	278	0	0	22	3
Midwater Pollock	82,593	4	14	0	0	6	7,818	2,304
subtotal	84,490	5	608	278	0	6	7,840	2,307
TOTAL	87,841	6	745	278	0	7	9,513	2,350

Table 14. Bycatch rates of halibut (mt), salmon (#), crab (#), and herring (mt) in pollock trawl fisheries (based on target definition) by area and target, 1996. CDQ data included. Note that the 1996 BSAI data have been revised from previous drafts, based on updated catch and bycatch figures (data run 5/5/98).

Fishery Target and Gear	Pollock catch (mt)	Halibut mortality rate	C. bairdi crab rate	O. tanner crab rate	Red king crab rate	Herring (mt) rate	Chinook salmon rate	Other salmon rate
Bering Sea/Aleutians								
Nonpelagic trawls								
Bottom Pollock	11,653	0.0049	1.223	1.399	0.089	0.000	0.064	0.000
Midwater Pollock	5,568	0.0005	0.029	0.106	0.000	0.001	0.033	0.011
Pelagic trawls								
Bottom Pollock	82,322	0.0008	0.688	0.058	0.028	0.001	0.054	0.033
Midwater Pollock	1,063,552	0.0002	0.017	0.039	0.002	0.001	0.047	0.070
Gulf of Alaska								
Nonpelagic trawls								
Bottom Pollock	2,517	0.0032	0.417	0.015	0.000	0.000	0.611	0.003
Midwater Pollock	1,048	0.0000	0.001	0.000	0.000	0.000	0.432	0.052
Pelagic trawls								
Bottom Pollock	1,763	0.0034	0.073	0.056	0.000	0.000	0.132	0.661
Midwater Pollock	41,833	0.0001	0.001	0.000	0.000	0.000	0.216	0.035

Table 15. Bycatch rates of halibut (mt), salmon (#), crab (#), and herring (mt) in pollock trawl fisheries (based on target definition) by area and target, 1997. CDQ data included.

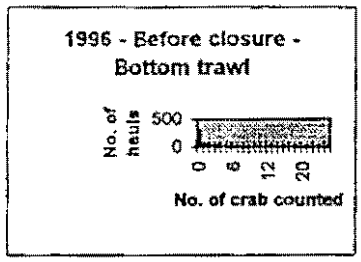
Fishery Target and Gear	Pollock catch (mt)	Halibut mortality rate	C. bairdi crab rate	O. tanner crab rate	Red king crab rate	Herring (mt) rate	Chinook salmon rate	Other salmon rate
Bering Sea/Aleutians								
Nonpelagic trawls								
Bottom Pollock	17,353	0.0024	0.640	4.268	0.019	0.016	0.016	0.048
Midwater Pollock	31,949	0.0001	0.006	0.074	0.000	2.730	0.039	0.100
Pelagic trawls								
Bottom Pollock	32,315	0.0011	0.321	2.256	0.001	1.494	0.024	0.090
Midwater Pollock	1,016,261	0.0001	0.006	0.085	0.000	0.962	0.042	0.059
Gulf of Alaska								
Nonpelagic trawls								
Bottom Pollock	2,804	0.0004	0.048	0.000	0.000	0.463	0.549	0.001
Midwater Pollock	547	0.0000	0.002	0.000	0.000	0.100	0.245	0.071
Pelagic trawls								
Bottom Pollock	1,897	0.0005	0.313	0.146	0.000	0.047	0.012	0.002
Midwater Pollock	82,593	0.0000	0.000	0.000	0.000	0.078	0.095	0.028

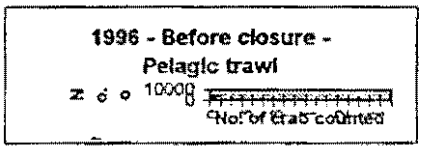
Table 16. Bycatch rates of halibut (mt), salmon (#), crab (#), and herring (mt) in the observed BSAI pollock target fisheries by gear and season, 1996-1997. CDQ data not included. (5/11/98 data run).

Season and Gear	Halibut bycatch rate	C. bairdi crab rate	O. tanner crab rate	Red king crab rate
1996				
A season				
Pelagic gear	0.1642	0.0065	0.0015	-
Nonpelagic gear	2.8283	0.3725	0.1223	0.0001
B season				
Pelagic gear (before 9/11)	0.0844	0.0153	0.0155	0.0013
Pelagic gear (after 9/11)	0.1853	0.0019	0.0024	0.0000
Nonpelagic gear (before 9/11)	1.3131	2.0160	4.4990	1.4202
Nonpelagic gear (after 9/11)	0.6265	-	0.0006	-
1997				
A season				
Pelagic gear	0.1387	0.0027	0.0024	-
Nonpelagic gear	2.5852	0.1374	0.1830	0.0226
B season				
Pelagic gear (before 9/7)	0.2437	0.0004	0.0486	-
Pelagic gear (after 9/7)	0.1432	0.0001	0.0023	-
Nonpelagic gear (before 9/7)	1.8879	0.0950	1.9915	-
Nonpelagic gear (after 9/7)	0.2840	0.0161	0.1627	-

Table 17. - The frequency histograms of crab count (number of crab actually counted by an observer) and number of hauls with each count.
1996 pollock target hauls (haul-by-haul determination) from the Bering Sea trawl fisheries, before the non-pelagic gear closure of 7-Sep-96. 1 = Bottom trawl; 2 = Pelagic trawl.

gear	crab_no	no_of_hauls
1	0	294
1	1	63
1	2	36
1	3	24
1	4	17
1	5	10
1	6	10
1	7	10
1	8	2
1	9	4
1	10	6
1	11	2
1	12	6
1	13	6
1	14	1
1	15	3
1	16	3
1	17	1
1	20	3
1	24	1
1	25	2
1	26	2
1	53	1
		507

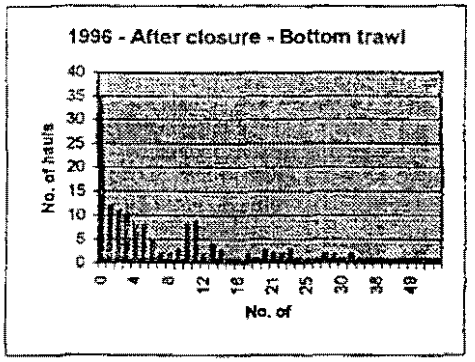




gear	crab_no	no_of_hauls
2	0	5407
2	1	38
2	2	9
2	3	1
2	4	4
2	5	2
2	6	3
2	8	1
2	9	1
2	16	1
2	22	1
2	25	1
2	26	1
2	27	1
2	53	1
2	147	1
2	149	1
		5474

Table 18. - The frequency histograms of crab count (number of crab actually counted by an observer) and number of hauls with each count.
1996 pollock target hauls (haul-by-haul determination) from the Bering Sea trawl fisheries, after the non-pelagic gear closure of 7-Sep-96. 1 = Bottom trawl; 2 = Pelagic trawl.

gear	crab_no	no_of_hauls
1	0	35
1	1	12
1	2	11
1	3	10
1	4	8
1	5	8
1	6	5
1	7	2
1	8	2
1	9	3
1	10	8
1	11	9
1	12	2
1	13	4
1	14	3
1	15	1
1	16	1
1	18	2
1	19	1
1	20	3
1	21	2
1	22	2
1	23	3
1	24	1
1	25	1
1	26	1
1	27	2
1	28	2
1	30	1
1	34	2
1	35	1
1	37	1
1	38	1
1	39	1
1	40	1
1	44	1
1	49	1
1	53	1
1	67	1
1	81	1
		157



gear	crab_no	no_of_hauls
2	0	913
2	1	73
2	2	14
2	3	1
2	4	4
2	5	2
2	10	2
2	13	1
2	16	1
2	17	1
2	24	1
2	28	1
2	49	1
2	58	1
		1016

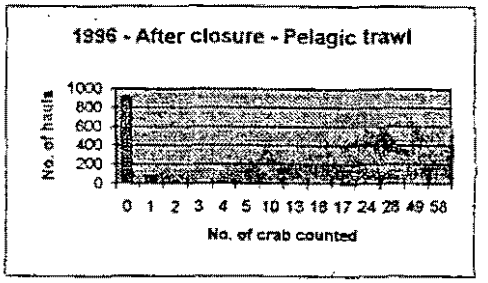
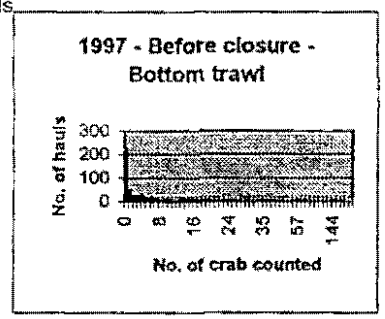
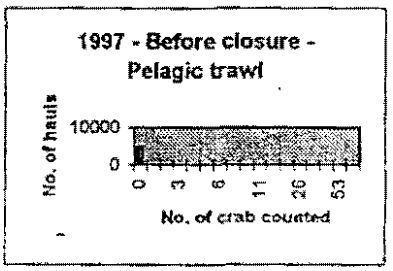


Table 19. - The frequency histograms of crab count (number of crab actually counted by an observer) and number of hauls with each count.
1997 pollock target hauls (haul-by-haul determination) from the Bering Sea trawl fisheries, before the non-pelagic gear closure of 11-Sep-96. 1 = Bottom trawl; 2 = Pelagic trawl.

gear	crab_no	no_of_hauls
1	0	229
1	1	51
1	2	27
1	3	21
1	4	29
1	5	16
1	6	21
1	7	10
1	8	5
1	9	7
1	10	4
1	11	4
1	12	4
1	13	11
1	14	5
1	15	5
1	16	2
1	17	3
1	18	2
1	19	5
1	20	4
1	21	1
1	22	4
1	23	3
1	24	1
1	25	3
1	27	2
1	28	1
1	30	2
1	32	4
1	33	1
1	34	1
1	35	1
1	36	2
1	37	2
1	40	1
1	44	2
1	46	1
1	50	1
1	53	1
1	57	1
1	58	1
1	59	1
1	61	1
1	62	1
1	64	1
1	92	1
1	133	1
1	144	1
1	189	1
1	190	1
1	192	1
1	793	1
		512

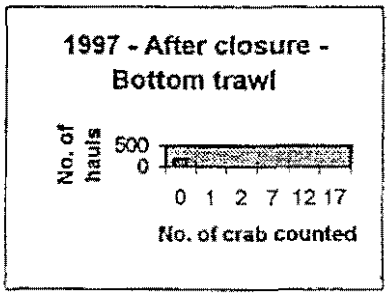




gear	crab_no	no_of_hauls
2	0	4793
2	1	61
2	2	19
2	3	13
2	4	6
2	5	2
2	6	3
2	8	3
2	9	3
2	11	1
2	19	1
2	22	1
2	26	1
2	30	1
2	40	1
2	53	1
2	90	1
		4911

Table 20. - The frequency histograms of crab count (number of crab actually counted by an observer) and number of hauls with each count.
1997 pollock target hauls (haul-by-haul determination) from the Bering Sea trawl fisheries, after the non-pelagic gear closure of 11-Sep-96. 1 = Bottom trawl; 2 = Pelagic trawl.

gear	crab_no	no_of_hauls
1	0	204
1	1	1
1	2	1
1	7	1
1	12	1
1	17	1
		209



gear	crab_no	no_of_hauls
2	0	3709
2	1	65
2	2	9
2	3	5
2	4	3
2	8	1
2	38	1
		3793

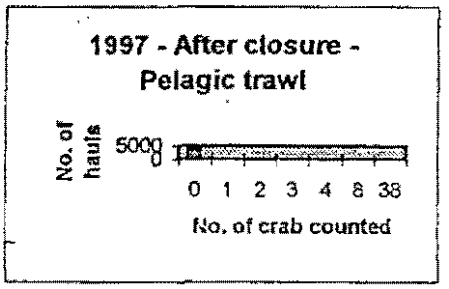


Table 21. -Crab counts, extrapolated whole haul crab numbers and halibut weights, and crab and halibut incidence rates, for 1996 and 1997 Bering Sea trawl fisheries. Taken from observer data, sampled hauls only, in which pollock made up the largest proportion of the haul, during the period when pollock fishing was open in the Bering Sea/Aleutian Island region. By year, gear type, performance-based definition (> or <= 20 crab), and before or after the bottom trawl closure (BTR). Closure dates were 7-SEP-96 and 11-SEP-97. Counted crab# = actual number of crab counted by observer. Total crab# = number of crab extrapolated up to whole haul. OTC_t = official total catch of groundfish in tons.

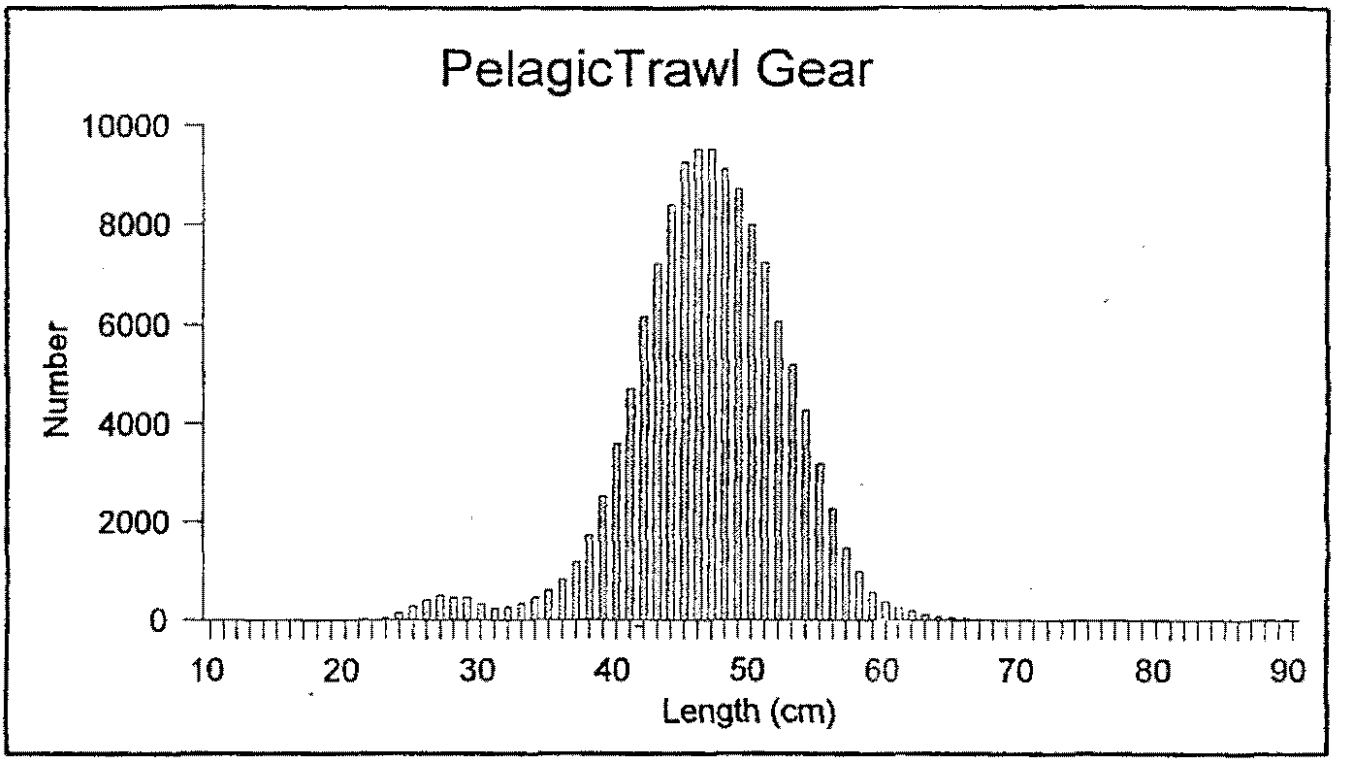
Year	Trawl gear	Count	BTR Closure	Counted crab#	Total crab#	Halibut_kg	OTC_t	Counted crab#/t	Tot crab#/t	halibut_kg/t
1996	bottom trawl	<= 20 crab	before closure	923.00	69,773.53	108,408.24	16,277.10	0.06	4.29	6.66
1996	bottom trawl	<= 20 crab	after closure	666.00	74,679.93	4,503.09	4,370.86	0.15	17.09	1.03
1996	bottom trawl	> 20 crab	before closure	179.00	10,201.72	2,816.23	106.59	1.68	95.71	26.42
1996	bottom trawl	> 20 crab	after closure	921.00	104,031.55	8,300.84	958.73	0.96	108.51	8.66
1996	pelagic trawl	<= 20 crab	before closure	136.00	4,459.55	49,987.01	381,466.65	< 0.005	0.01	0.13
1996	pelagic trawl	<= 20 crab	after closure	183.00	1,181.68	49,565.58	342,353.27	< 0.005	< 0.005	0.14
1996	pelagic trawl	> 20 crab	before closure	449.00	1,280.88	163.69	287.09	1.56	4.46	0.57
1996	pelagic trawl	> 20 crab	after closure	272.00	274.21	182.62	203.52	1.34	1.35	0.90
1997	bottom trawl	<= 20 crab	before closure	1,377.00	129,820.42	83,315.53	20,782.59	0.07	6.25	4.01
1997	bottom trawl	<= 20 crab	after closure	39.00	2,998.13	1,538.93	11,297.50	< 0.005	< 0.005	0.14
1997	bottom trawl	> 20 crab	before closure	3,166.00	151,434.27	12,230.52	2,046.30	1.55	74.00	5.98
1997	bottom trawl	> 20 crab	after closure							
1997	pelagic trawl	<= 20 crab	before closure	271.00	11,665.12	51,121.35	398,191.64	< 0.005	0.03	0.13
1997	pelagic trawl	<= 20 crab	after closure	118.00	478.46	35,678.87	245,523.32	< 0.005	< 0.005	0.15
1997	pelagic trawl	> 20 crab	before closure	261.00	9,325.44	800.95	298.71	0.87	31.22	2.68
1997	pelagic trawl	> 20 crab	after closure	38.00	38.00	111.18	45.10	0.84	0.84	2.47

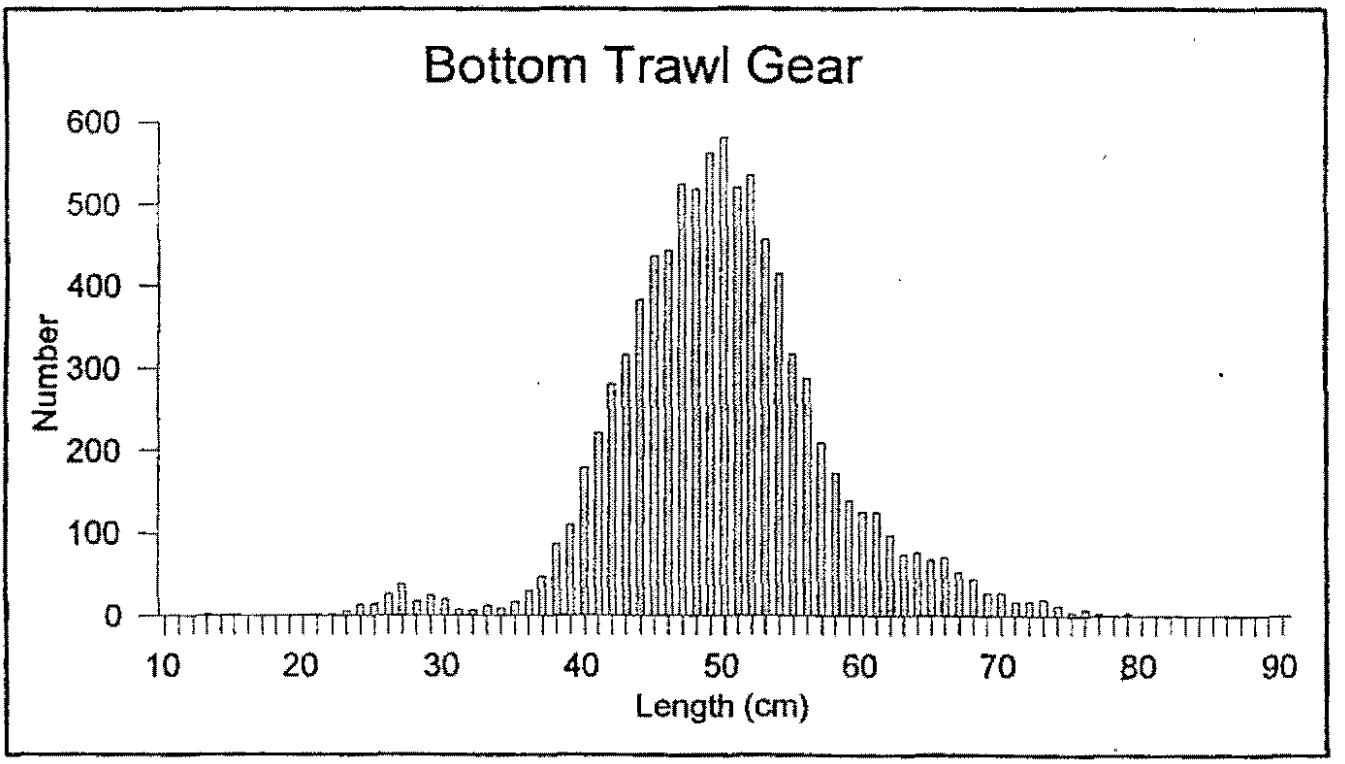
Table 22. Bycatch rates of halibut (mt), salmon (#), crab (#), and herring (mt) in groundfish fisheries by gear and target, 1996.

Fishery Target and Gear	Halibut mortality rate	C. bairdi crab rate	O. tanner crab rate	Red king crab rate	Herring (mt) rate	Chinook salmon rate	Other salmon rate
Bering Sea/Aleutians							
Hook and Line							
Sablefish	n/a	0.001	0.108	0.023	0.000	0.000	0.001
Pacific cod	0.007	0.160	0.814	0.013	0.000	0.000	0.001
Turbot	0.022	0.003	0.140	0.004	0.000	0.000	0.000
Rockfish	0.054	0.000	0.078	0.005	0.000	0.000	0.000
Pot							
Pacific cod	0.001	7.796	5.280	2.205	0.000	0.000	0.000
Trawl							
Bottom pollock	0.001	0.636	0.208	0.047	0.001	0.045	0.033
Pelagic pollock	0.000	0.009	0.035	0.000	0.001	0.047	0.069
Sablefish	0.010	0.000	1.899	0.000	0.000	0.000	0.000
Pacific cod	0.014	1.523	0.933	0.028	0.000	0.054	0.002
Arrowtooth	0.052	7.550	2.287	0.000	0.000	0.000	1.108
Flathead sole	0.012	11.826	42.273	0.016	0.000	0.000	0.004
Rock sole	0.013	8.838	3.636	0.208	0.000	0.011	0.000
Turbot	0.008	1.411	7.249	0.000	0.000	0.000	0.000
Yellowfin sole	0.004	4.279	11.348	0.035	0.001	0.000	0.001
Other flatfish	0.005	13.544	31.121	0.023	0.001	0.001	0.000
Rockfish	0.003	0.027	0.007	0.000	0.000	0.022	0.009
Atka mackerel	0.001	0.005	0.001	0.046	0.000	0.004	0.001
Gulf of Alaska							
Hook and Line							
Sablefish	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Pacific cod	n/a	0.010	0.027	0.000	0.000	0.000	0.000
Turbot	n/a	0.000	0.091	0.000	0.000	0.000	0.000
Rockfish	n/a	0.000	0.000	0.000	0.000	0.000	0.000
Pot							
Pacific cod	0.001	5.821	0.141	0.001	0.000	0.000	0.000
Trawl							
Bottom pollock	0.002	0.026	0.017	0.000	0.000	0.344	0.209
Pelagic pollock	0.000	0.001	0.000	0.000	0.000	0.217	0.036
Sablefish	0.024	0.043	0.122	0.000	0.000	0.187	0.000
Pacific cod	0.006	1.615	0.002	0.000	0.000	0.019	0.006
Arrowtooth	0.028	4.568	0.004	0.000	0.000	0.012	0.004
Flathead sole	0.025	0.880	0.000	0.016	0.000	0.068	0.025
Rex sole	0.019	0.092	0.000	0.000	0.000	0.171	0.035
Deep Flatfish	0.038	0.353	0.203	0.000	0.000	0.027	0.029
Shallow Flats	0.043	1.233	0.010	0.009	0.000	0.008	0.004
Rockfish	0.009	0.222	0.032	0.000	0.000	0.014	0.008
Atka mackerel	0.006	0.000	0.000	0.000	0.000	0.000	0.113

Area 509

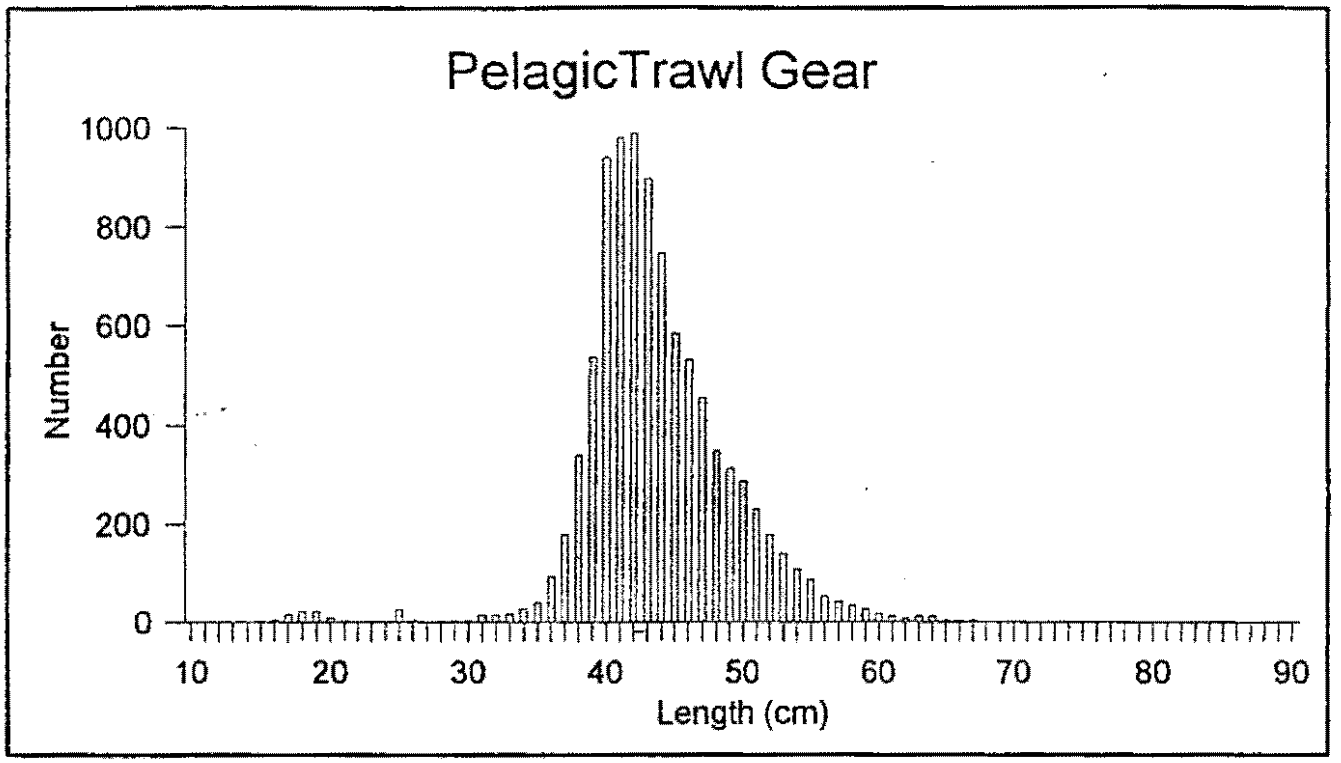
Figure 1. Length frequency of pollock taken with pelagic and bottom trawl gear in 1997, Area 509.

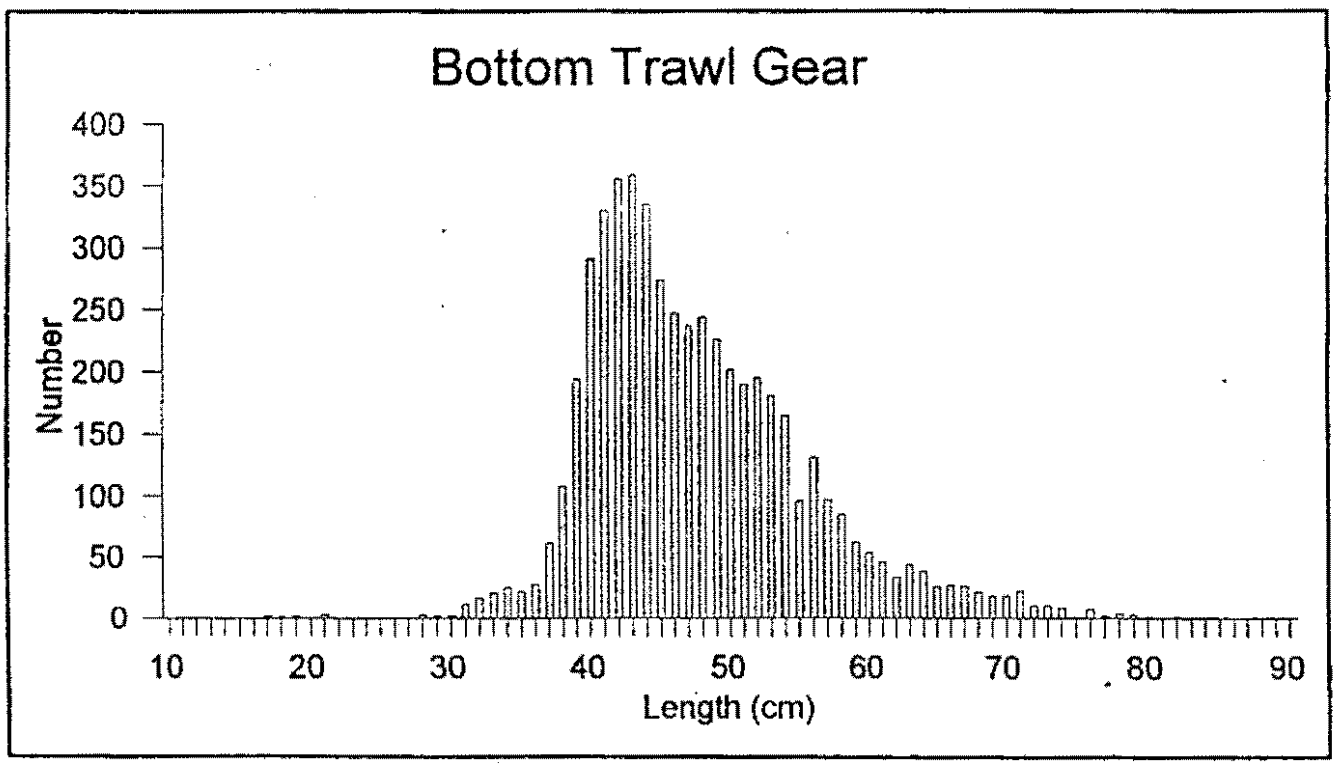




Area 513

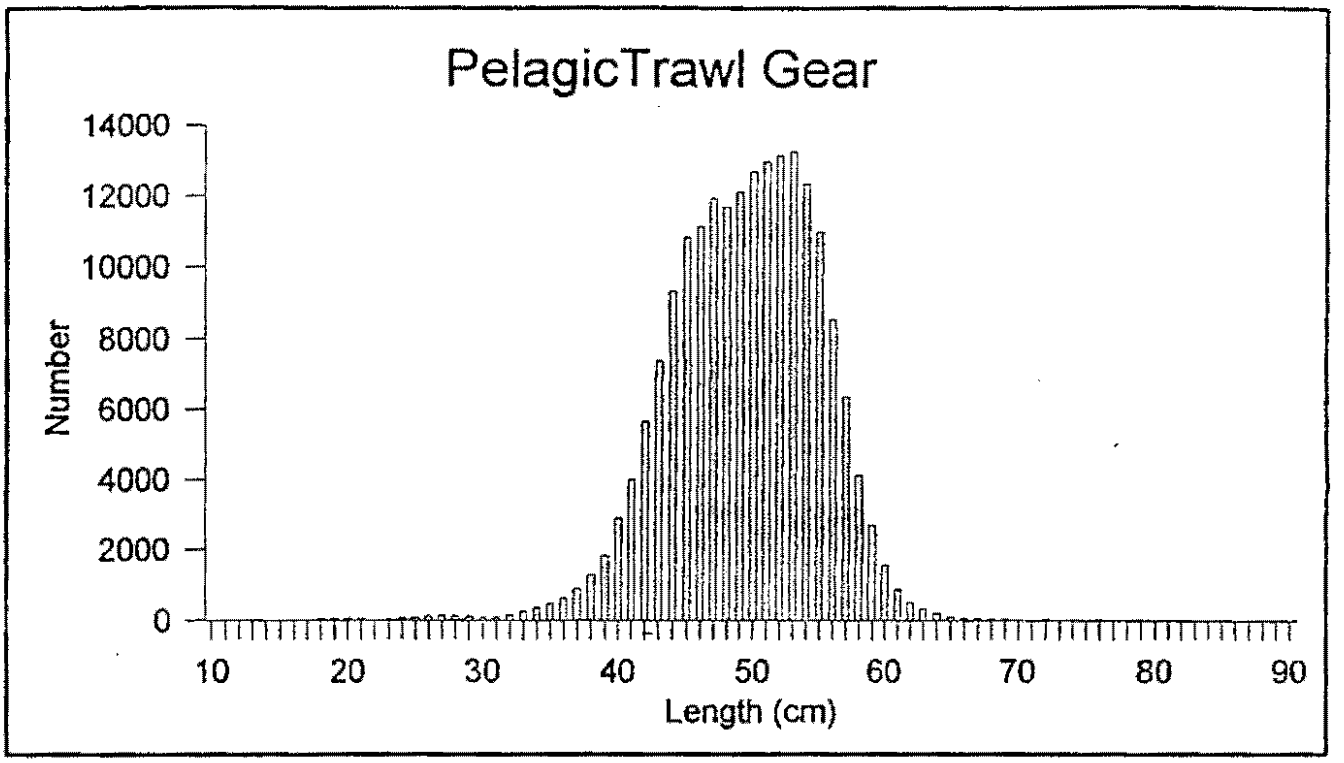
Figure 2. Length frequency of pollock taken with pelagic and bottom trawl gear in 1997, Area 513.

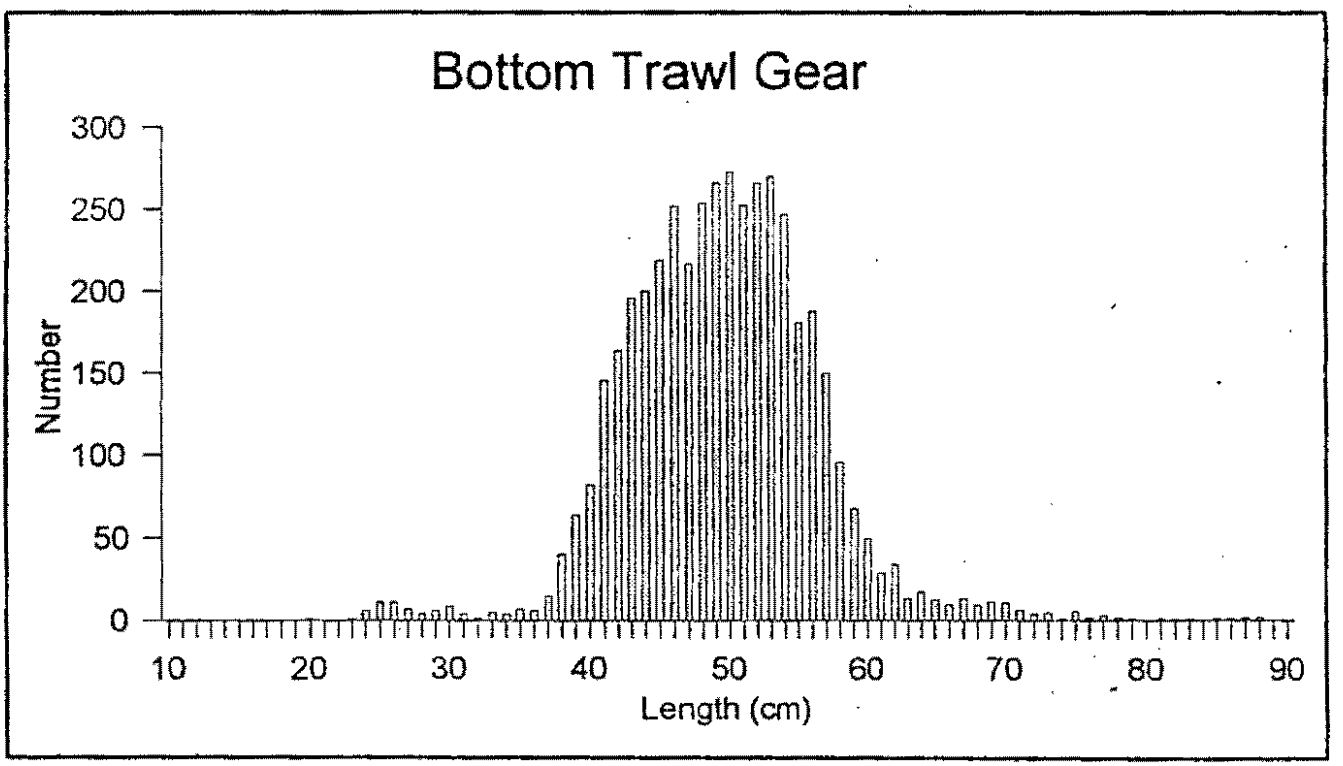




Area 517

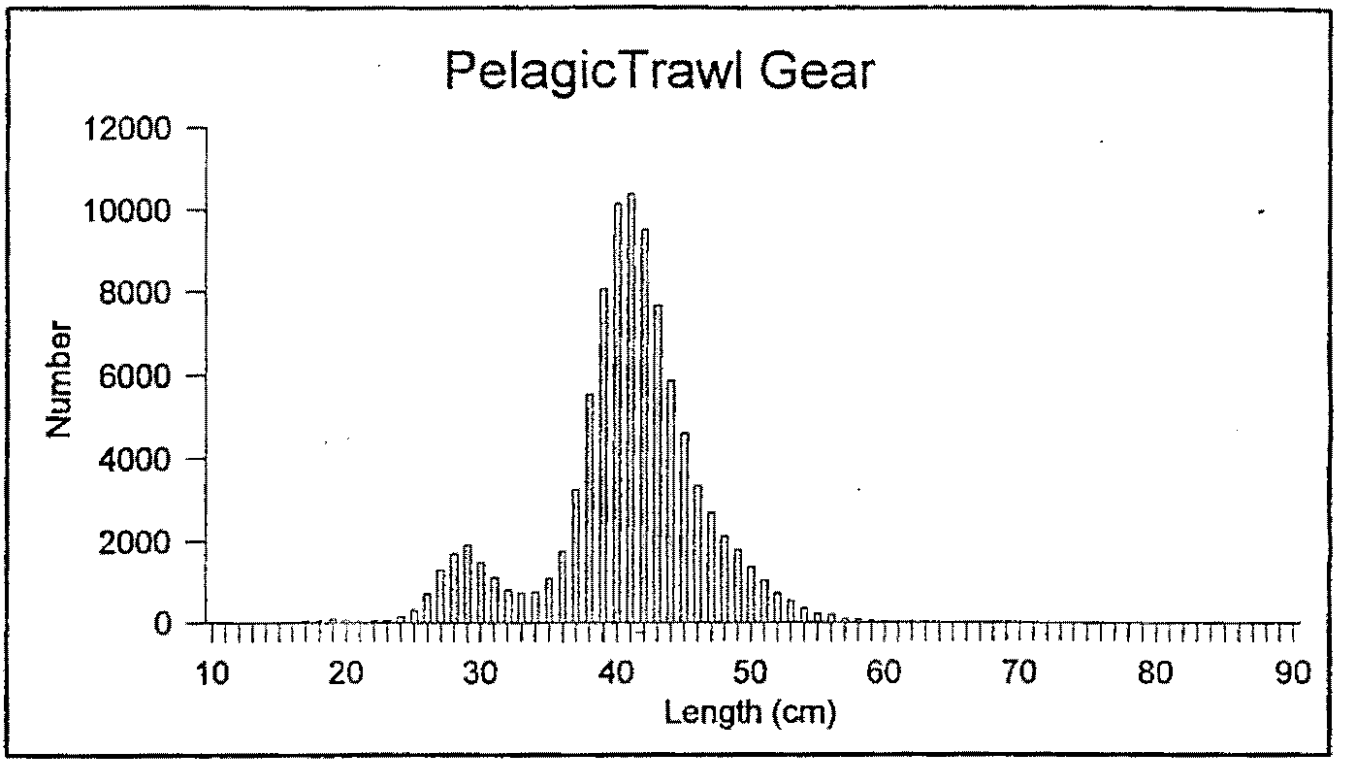
Figure 3. Length frequency of pollock taken with pelagic and bottom trawl gear in 1997, Area 517.

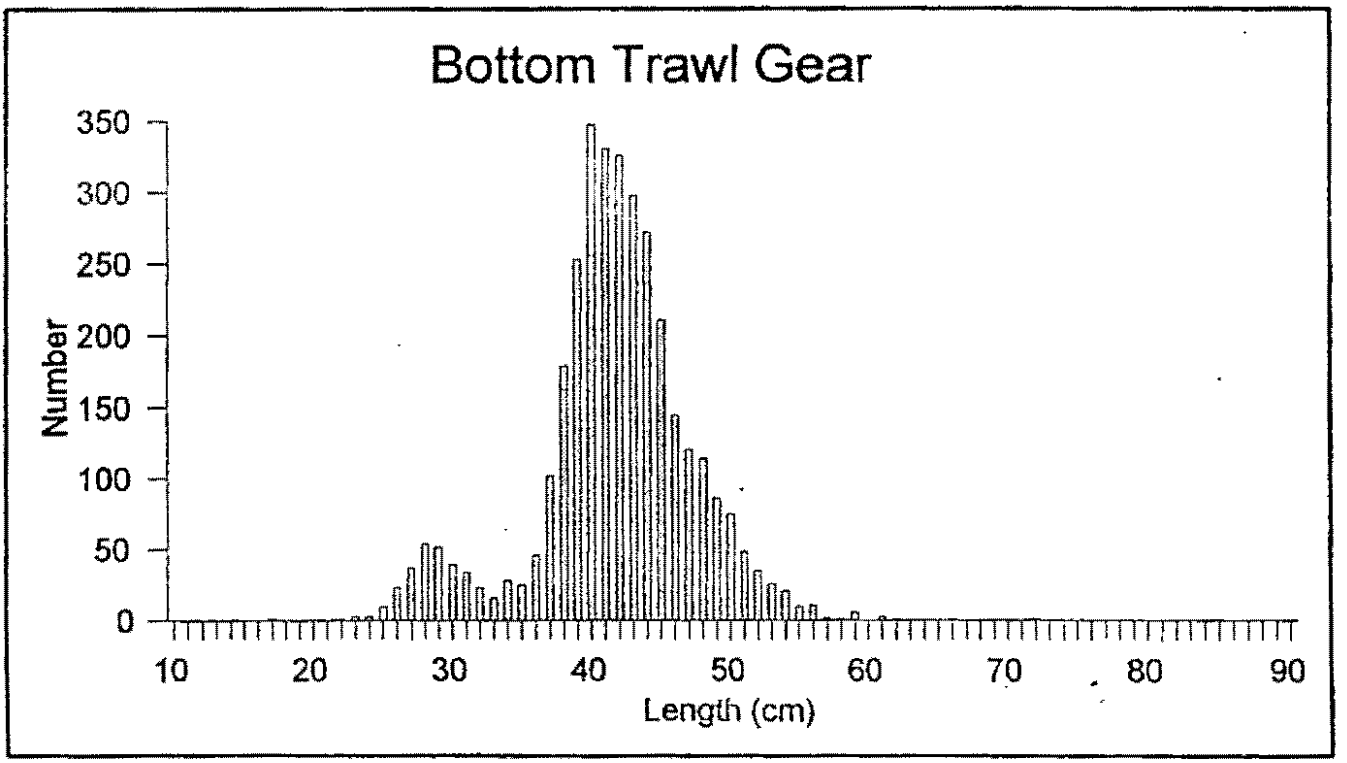




Area 531

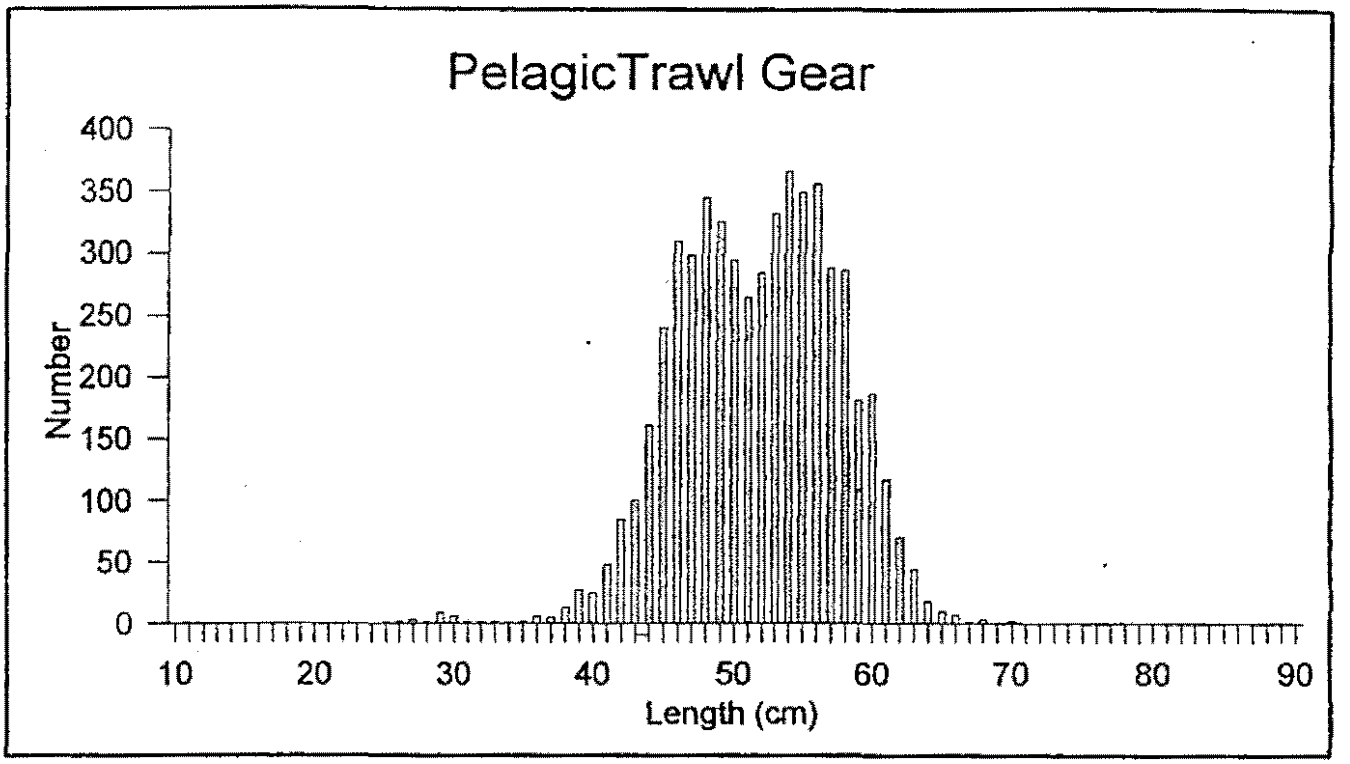
Figure 4. Length frequency of pollock taken with pelagic and bottom trawl gear in 1997, Area 531.

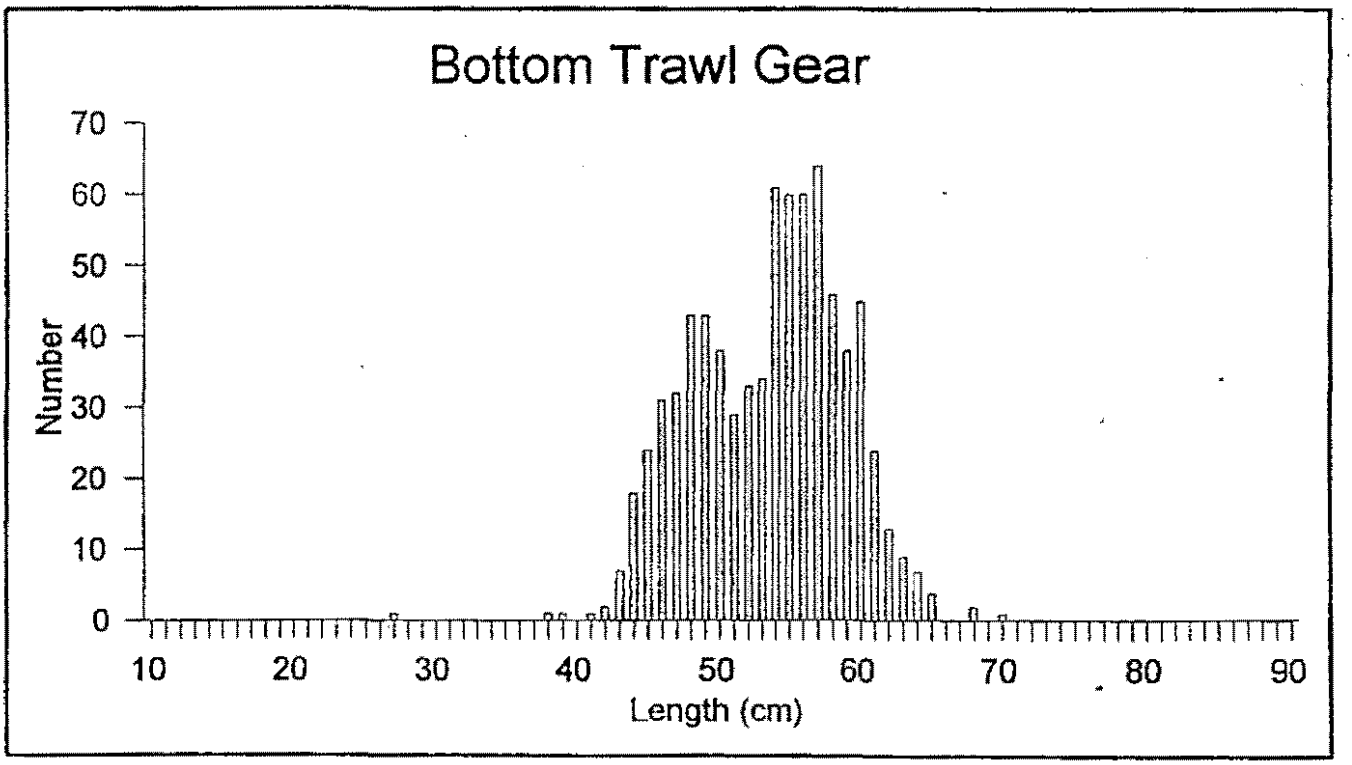




Area 541

Figure 5. Length frequency of pollock taken with pelagic and bottom trawl gear in 1997, Area 541.





2.0 ENVIRONMENTAL IMPACTS OF THE ALTERNATIVES

An environmental assessment (EA) is required by the National Environmental Policy Act of 1969 (NEPA) to determine whether a proposed action would be likely to have a significant impact on the human environment. This determination of significance is based upon the environmental analysis in the EA . The analysis must include an estimation of the expected intensity or severity of the proposed action, and of its significance for society as a whole and for the affected region and interest groups. If the analysis leads to a determination that the action will not have a significant impact, the EA and resulting finding of no significant impact (FONSI) would be the final environmental documents required by NEPA. If a determination is made that a major Federal action will have a significant impact on the human environment, an environmental impact study (EIS) must be prepared.

An EA must include a brief discussion of the need for the proposal, the alternatives considered, the environmental impacts of the proposed action and the alternatives, and a list of document preparers. The purpose and alternatives were discussed in Sections 1.1 and 1.2, and the list of preparers is in Section 8. Section 2.1, following, contains the discussion of the environmental impacts of the alternatives, including impacts on habitat, on threatened and endangered species, and on marine mammals. Thus, besides satisfying NEPA, the section complies with the EFH mandate in the Magnuson-Stevens Act, with the Endangered Species Act, and with the Marine Mammal Protection Act.

Three main types of environmental impacts are generally associated with fishery management actions. The first of these are the effects of the fish harvest itself, which can include a decrease in the food supply of predators that eat the targeted species, changes in the population structure of the targeted species, and concomitant alterations in the structure of the benthic community. The second type of impacts are those which occur to the physical and biological structure of the benthic environment as a result of fishing practices. Fishing with gear that alters the environment is a prime example, but other fishing practices, such as discarding waste from fish processing, can also affect the environment. The third type of impact is the entanglement or entrapment of non-target organisms in active or inactive fishing gear. A more detailed discussion of the effects of groundfish fishing, and of setting annual groundfish total allowable catch amounts, on the biological environment,-and of associated impacts on marine mammals, seabirds, and other threatened or endangered species, can be found in the SEIS (NMFS 1998).

2.1 PSC Bycatch Reduction

2.1.1 Impacts of the Proposed Plan Amendment on PSC Bycatch Reduction

Alternative 2 to the status quo requires that PSC limits be reduced based on the estimated decrease in bycatch from implementing this alternative. This reduction in bycatch may result in increased food availability to predators of these species, and hence is considered in the environmental assessment as well as the economic assessment.

The reduction in PSC limits is based on predicted savings in bycatch, which can be estimated from observed bycatch rates. However, estimates may differ dramatically depending upon how the data are analyzed. For this analysis, two separate methodologies were used. In the first method, bycatch savings were determined strictly based on observed rates by gear type, regardless of season or implementation of the performance-based standard. In the second method, bycatch savings were estimated based on observed rates for pelagic trawl gear when the performance-based standard was in effect.

Method 1- Gear only method

If we assume that all pollock catch which would have been taken by bottom trawl gear is taken instead by pelagic trawls in the corresponding target fisheries (e.g., pollock that had been taken by bottom trawl in a

midwater target would be taken by pelagic trawl in a midwater target), the calculations are straightforward. For example, for halibut bycatch, we would estimate bycatch "savings" in the following manner:

Step 1: generate a bycatch rate for the pelagic trawl gear in the bottom target category;
Step 2: apply this rate to the amount of pollock taken by bottom trawls in the bottom target category;
Step 3: add the number calculated above to the observed halibut mortality from pelagic gear in the bottom target category;
Step 4: repeat steps 1-3 for the midwater pollock category;
Step 5: add estimates of bottom target and midwater target;
Step 6: estimate "savings" by subtracting the new estimate from the observed estimate.

The table below shows the estimated saving for each year examined (1996 and 1997) for all BSAI PSC species, based on the above methodology. An average "savings" for the two years was used to generate the PSC reduction levels, which were rounded to significant digits. Note that these results differ slightly from what was previously estimated. This occurred because the 1996 BSAI catch and bycatch data have been revised since Council staff were originally provided with the data, in May 1997. No significant revisions to the 1997 data have been made.

Estimated "savings", under Alternative 2, of halibut (mt), salmon (#), crab (#), and herring (mt) in pollock trawl fisheries (based on target definition) based on 1996 and 1997 data. CDQ data included.

Fishery Year	Halibut mortality	C. bairdi crab	O. tanner crab	Red king crab	Herring (mt)	Chinook salmon	Other salmon
1996	51	6,302	15,414	1,142	-12	36	-715
1997	24	5,524	34,564	312	31	-202	600
Average	37	5,913	24,989	727	9	-83	-57
Rounded Average	50	5,000	25,000	1,000	10	-100	-100

Based on this method, a prohibition on nonpelagic trawling for BSAI pollock, under Alternative 2, would reduce PSC bycatch by about 50 mt of halibut mortality, 5,000 bairdi crabs, 25,000 opilio crabs, and 1,000 red king crabs. The options under Alternative 2 include reducing the overall PSC limits for these species accordingly. Hence, under Option 1, the overall BSAI halibut bycatch limit would be reduced from 3,775 mt to 3,725 mt. Under Option 2, PSC limits for crab would also be reduced. Crab PSC limits would be first determined by crab abundance, as currently regulated, and then reduced by the numbers indicated above. For example, if this regulation had been in place for 1998, the PSC limit for zone 1 red king crab would have been 99,000 animals.

Method 2 - Gear and performance method

Bycatch rates may vary seasonally, due to implementation of the performance-based standard for pelagic trawls. Note that a performance-based standard for pelagic trawls is triggered when nonpelagic trawling is prohibited due to PSC attainment. When the pollock fishery nears its allocation of halibut PSC, NMFS closes that fishery to nonpelagic gear. This occurred in the Bering Sea during the 'B' season in 1996 (September 11) and 1997(September 7). Bycatch rates of crab and halibut before and after the closure to nonpelagic gear were shown in **Table 16**.

One can estimate bycatch savings by applying the catch of pollock by the corresponding bycatch rates in **Table 16**. For example, in 1996, pollock catch in directed fisheries was 1,163,094 mt. The bycatch rate of C. bairdi in the pelagic gear pollock fishery after the performance-based standard went into effect was 0.0019 crabs per mt. Based on this rate, an estimated 2,210 bairdi crabs would be caught in a pelagic gear only pollock fishery. Now, because 89,416 crabs were actually taken in 1996 pollock fisheries, the estimate of savings is 89,416 - 2,210 = 87,206 bairdi crabs. Halibut bycatch estimates were converted to bycatch mortality savings by applying the midwater target pollock fishery bycatch mortality rates (88% in 1996, 79% in 1997).

Method 2 - Estimated "savings", under Alternative 2, of halibut (mt), salmon (#), crab (#), and herring (mt) in pollock trawl fisheries (based on performance standard rates) based on 1996 and 1997 data. CDQ data included. (data run 5/11/98).

Fishery Year	Halibut mortality	C. bairdi crab	O. tanner crab	Red king crab
1996	131	87,206	60,018	5,934
1997	86	28,046	233,352	377
Average	108	57,626	146,685	3,156
Rounded Average	100	50,000	150,000	3,000

Based on method 2, a prohibition on nonpelagic trawling for BSAI pollock would reduce PSC bycatch by about 100 mt of halibut mortality, 50,000 bairdi crabs, 150,000 opilio crabs, and 3,000 red king crabs. Option 3 to Alternative 2 would reduce the overall PSC limits for these species accordingly.

Method 2 may provide more realistic estimates of bycatch savings if alternative 2 is adopted. Data indicated that fishermen were clearly able to alter their behavior by fishing off the bottom and catching fewer crabs and halibut. Because Alternative 2 would include a performance-based standard as part of the pelagic trawl only regulation, these rates are likely indicative of what the fleet can accomplish with a pelagic only fishery.

2.1.2 Impacts of the Proposed Regulatory Amendment

This document also analyzes a regulatory amendment to split the pollock/Atka mackerel/other species category for purposes of allocating the PSC limits among fisheries. Two alternatives were analyzed for dealing with the bycatch of halibut and crab caught incidentally, if the plan amendment's preferred alternative is adopted, prohibiting nonpelagic trawling in the BSAI directed pollock fishery. First is to simply keep the categories the same (status quo), and hence no split. PSC taken by pelagic trawl pollock fisheries would accrue towards the overall cap, as is done now for the pollock fisheries. Pelagic trawl pollock fisheries would continue to be exempted from being shut down when PSC limits are reached. Maintaining the status quo would allow this fishery to be relatively unrestricted by PSC limits.

The second alternative would be to adopt the proposed regulatory amendment under which pollock would be split out from the pollock/Atka mackerel/other species category. Any PSC taken in pollock fisheries would accrue towards a PSC limit for the pelagic pollock fisheries (as is done now for herring). This idea of using a separate category for pollock seems to offer a straightforward method of accounting for bycatch, but it could prove very costly, as detailed in section 3. In 1998 for example, the pollock/Atka mackerel/other species category was allocated 350 mt of halibut, 155 mt of herring, 7,500 red king crabs, 29,408 bairdi in zone 1, and 470,000 bairdi in zone 2. Herring is also apportioned separately to the pelagic trawl pollock fishery (1,239 mt). Under Alternative 2 for the plan amendment, option 2, a split of the category would mean that the pollock fishery could be allocated PSC based on what was predicted for a pelagic trawl only fishery. PSC limits for the pollock fishery would then be on the order of 175 mt of halibut, 30,000 bairdi, and 1,500 red king crabs. PSC limits for Atka mackerel/other species could be reduced correspondingly to 125 mt of halibut (350 current limit − 175 needed for pelagic trawl pollock − 50 mt savings = 125 mt), 5,000 red king crabs (7,500 − 1,500 − 1,000 = 5,000), and 489,408 bairdi (both zones combined).

2.1.3 Groundfish Bycatch Reduction Estimate

Another potential effect of the plan amendment's Alternative 2 is a reduction in the catch of groundfish other than pollock in directed pollock fisheries. Much of this groundfish catch would be available to other fisheries, and hence the reduction would not be expected to have significant environmental effects. Reallocation of this bycatch may have some minor positive economic impacts on fishermen targeting non-pollock species. Nevertheless, some portion would be small animals that would not be captured, and would remain in the ecosystem.

Analysis suggests that under Alternative 2, a total of 1,581 mt of groundfish would not be harvested incidental to BSAI pollock fisheries (see adjacent table). Most of this unused catch would be composed of Pacific cod, with smaller amounts of rock sole, arrowtooth flounder, yellowfin sole, and other species. On the other hand, adoption of Alternative 2 would be expected to result in higher incidental catches of Greenland turbot, POP, Atka mackerel, and squid in the BSAI pollock fishery.

"Savings" of incidental catch (mt) of other groundfish in BSAI pollock trawl fisheries, under Alternative 2.

Species	1996	1997	Average
Pacific cod	691	653	672
Yellowfin sole	225	46	135
Gr. turbot	-3	-5	-4
Arrowtooth	87	361	224
Rock sole	719	295	507
Flathead sole	13	96	54
Other flatfish	93	19	56
Sablefish	-1	0	0
True POP	-6	-90	-48
Other POP	-3	0	-1
Sharp/North	0	1	1
Short/Rough	0	1	0
Other rockfish	1	0	0
Atka mackerel	-44	-90	-67
Squid	-57	-173	-115
Other species	186	147	166
Total	1,901	1,262	1,581

2.2 Impacts on Essential Fish Habitat

The Magnuson-Stevens Act requires that Federal agencies consult with respect to any action "authorized, funded, or undertaken, by such agency that may adversely affect any essential fish habitat identified under this Act" (Section 305(b)(2)). EFH is defined in the Magnuson-Stevens Act as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity."

The area affected by the proposed action has been identified as EFH for all of the FMP managed species in the BSAI. EFH is described and identified in five FMP amendments which were approved January 20, 1999. These are: Amendment 55 to the FMP for the Groundfish Fishery of the Bering Sea and Aleutian Islands Area; Amendment 55 to the FMP for Groundfish of the Gulf of Alaska; Amendment 8 to the FMP for the Commercial king and Tanner Crab Fisheries in the Bering Sea/Aleutian Islands; Amendment 5 to the FMP for Scallop Fisheries off Alaska; and Amendment 5 to the FMP for the Salmon Fisheries in the Exclusive Economic Zone off the Coast of Alaska.

The Council's primary goal for this proposed action is reduction of bycatch. However, the prohibition on nonpelagic trawl gear in the Bering Sea pollock fishery would also have a direct physical effect on habitat. Nonpelagic trawl gear has been shown in a number of studies to reduce the complexity of bottom habitat and to have other effects on EFH (see section 1.5.1). The effects are not simple, and vary for different species depending on their ecosystem requirements. Some life stages of some species may benefit while others are harmed: for example, if smoothing results in fewer depressions for a predator fish to hide in, that may benefit the prey while harming the predator. This rule will not eliminate nonpelagic trawl gear in the BSAI, since it applies only to the pollock fishery. However, to the extent that the rule succeeds in reducing the use of nonpelagic trawl gear in the BSAI, there may be less disturbance to EFH.

The effect of this reduction in disturbance is not easy to quantify, and will vary depending on the cumulative effect of previous fishing effort in an area, on the level of natural disturbances in an area, and on the type

of bottom. Some evidence exists that the effect of trawling on both bedforms and invertebrates who live on them is cumulative, (as mentioned in section 1.5.1 of this EA. Some studies (e.g., Prena et al. 1999) indicate that invertebrate "habitat organisms" become more patchy and decrease in abundance with multiple trawls. The smoothing caused by multiple trawls removes patchy biogenic depressions (it also moves boulders, but these are not an important characteristic in the Eastern Bering Sea). These depressions are important habitat features for juvenile fish. Multiple trawls in an area also pack down and lower the complexity of the substrate, which is likely to reduce the exchange capacity and may lead to less species diversity (Jones 1992, Kaiser and Spencer 1996b, Reise 1982). The probability of a particular spot being dragged over by a full net might also increase in a densely trawled area. Finally, multiple trawls in an area could increase the cumulative effect of the winnowing phenomenon described in Section 1.5.1.

In sum, although much has been learned about the complex effects of trawling on fish habitat and the ecosystem generally, much is still not understood about the consequences of these effects to different managed species. Adopting the preferred alternative, which would prohibit nonpelagic trawling in the Bering Sea pollock trawl fishery, is not expected to have an adverse impact on essential fish habitat and might have some beneficial effects.

2.3 Impacts on Endangered or Threatened Species

The ESA provides for the conservation of endangered and threatened species of fish, wildlife, and plants. The program is administered jointly by the Department of Commerce (NMFS) for most marine species, and the Department of Interior (FWS) for terrestrial and freshwater species.

The ESA procedure for identifying or listing imperiled species involves a two-tiered process, classifying species as either threatened or endangered, based on the biological health of a species. Threatened species are those likely to become endangered in the foreseeable future [16 U.S.C. §1532(20)]. Endangered species are those in danger of becoming extinct throughout all or a significant portion of their range [16 U.S.C. §1532(20)]. The Secretary, acting through NMFS, is authorized to list marine mammal and fish species. The Secretary of Interior, acting through the FWS, is authorized to list all other organisms.

Concurrently with listing a new species under the ESA, its critical habitat must be designated, to the "maximum extent prudent and determinable" [16 U.S.C. §1533(b)(1)(A)]. The ESA defines critical habitat as those specific areas that are essential to the conservation of a listed species and that may be in need of special consideration. The primary benefit of designating critical habitat (aside from the advantages of establishing good information on the listed species' habitat requirements), is that Federal agencies are required to consult with NMFS on any Federal action that may affect a designated area. Some species, primarily the cetaceans, listed in 1969 under the Endangered Species Conservation Act and carried forward as endangered under the ESA, have not received critical habitat designations.

Twenty-three species occurring in the GOA and/or BSAI groundfish management areas are currently listed as endangered or threatened under the ESA (Table 12). The group includes great whales, pinnipeds, Pacific salmon and steelhead, and seabirds.

ESA Listed Species. The following species are currently listed as endangered or threatened under the ESA and occur in the GOA and/or BSAI groundfish management areas.

Common Name	Scientific Name	ESA Status
Northern Right Whale	*Balaena glacialis*	Endangered
Bowhead Whale [1]	*Balaena mysticetus*	Endangered
Sei Whale	*Balaenoptera borealis*	Endangered
Blue Whale	*Balaenoptera musculus*	Endangered
Fin Whale	*Balaenoptera physalus*	Endangered
Humpback Whale	*Megaptera novaeangliae*	Endangered
Sperm Whale	*Physeter macrocephalus*	Endangered
Snake River Sockeye Salmon	*Onchorynchus nerka*	Endangered
Short-tailed Albatross	*Phoebaotria albatrus*	Endangered
Steller Sea Lion	*Eumetopias jubatus*	Endangered and Threatened [2]
Snake River Fall Chinook Salmon	*Onchorynchus tshawytscha*	Threatened
Snake River Spring/Summer Chinook Salmon	*Onchorynchus tshawytscha*	Threatened
Puget Sound Chinook Salmon	*Onchorynchus tshawytscha*	Threatened
Lower Columbia River Chinook Salmon	*Onchorynchus tshawytscha*	Threatened
Upper Willamette River Chinook Salmon	*Onchorynchus tshawytscha*	Threatened
Upper Columbia River Spring Chinook Salmon	*Onchorynchus tshawytscha*	Endangered
Upper Columbia River Steelhead	*Onchorynchus mykiss*	Endangered
Snake River Basin Steelhead	*Onchorynchus mykiss*	Threatened
Lower Columbia River Steelhead	*Onchorynchus mykiss*	Threatened
Upper Willamette River Steelhead	*Onchorynchus mykiss*	Threatened
Middle Columbia River Steelhead	*Onchorynchus mykiss*	Threatened
Spectacled Eider	*Somateria fishcheri*	Threatened
Steller Eider	*Polysticta stelleri*	Threatened

[1] The bowhead whale is present in the Bering Sea area only.

[2] Steller sea lion are listed as endangered west of Cape Suckling and threatened east of Cape Suckling.

Of the species listed under the ESA and present in the action area , some may be negatively affected by groundfish fishing. NMFS is the expert agency for ESA listed marine mammals. The USFWS is the expert agency for ESA listed seabirds. The proposed 2000 TAC specifications rule must be in compliance with the ESA.

Section 7 consultations have been done for all the above listed species, some individually and some as groups. See section 3.8 of the NMFS 1998 SEIS, for summaries of all previous section 7 consultations and Biological Opinions (NMFS 1998a). Harvest at the proposed TAC specifications is not expected to have an impact on endangered or threatened species in any way that has not already been considered in previous Section 7 consultations.

Status of Section 7 Consultations

Section 7 consultations have been done for all the above listed species, some individually and some as groups. See the section 3.8 of the NMFS 1998 SEIS, for summaries of all previous section 7 consultations and Biological Opinions. NMFS currently is consulting on the 2000 groundfish fisheries, but has not yet concluded that process. The final EA prepared for the 2000 harvest specifications will incorporate the determinations of this Section 7 consultation.

Below are summaries of completed consultations prepared after the SEIS.

Biological Opinion, Authorization of the Pollock and Atka Mackerel Fisheries for 1999-2002

On December 3, 1998, the Office of Protected Resources of the National Marine Fisheries Service (NMFS) issued a Biological Opinion (BiOp) on three Federal actions proposed for 1999 to 2002. The actions were to authorize the Atka mackerel fishery of the BSAI, and the pollock fisheries in the BSAI and the GOA. The BiOp concluded that the Atka mackerel fishery was not likely to jeopardize the continued existence of the western population of Steller sea lions or adversely modify its critical habitat. However, the BiOp also concluded that both of the pollock fisheries, as they had been proposed in 1998, were likely to cause jeopardy and adverse modification. This decision was based primarily on the premise that the two pollock fisheries would compete with Steller sea lions by removing prey items from important foraging areas at crucial times of the year.

To avoid the likelihood of causing jeopardy and adverse modification, NMFS developed a framework of reasonable and prudent alternatives (RPAs) based on three objectives: (1) temporally disperse fishing effort, (2) spatially disperse fishing effort, and (3) provide full protection from fisheries competition in waters adjacent to rookeries and important haulouts. The RPAs contained guidelines for management measures which would achieve these principles. The Council initially provided recommendations for management measures at its December, 1998 meeting. NMFS evaluated those recommendations and incorporated them into the RPAs on December 16, 1998. The RPAs were implemented by emergency interim rule for the first half of 1999, published on January 22, 1999 (64 FR 3437), amended on February 17, 1999 (64 FR 7814) and February 25, 1999 (64 FR 9375). The Council met again in February, April, and June 1999, to consider recommendations for extending the emergency rule for the second half of 1999, and at its June meeting, voted to extend the emergency rule (with modifications to the Bering Sea B and C seasons) until December 31, 1999 (July 21, 1999, 64 FR 39087; technical amendment August 10, 1999, 64 FR 43297).

The BiOp was challenged in the United States District Court for the Western District of Washington by Greenpeace, the American Oceans Campaign, and the Sierra Club. On July 9, 1999 (amended July 13, 1999), the Court upheld the no-jeopardy conclusion for the Atka mackerel fishery and the jeopardy conclusion for the pollock fisheries. However, the Court also found that "the Reasonable and Prudent Alternatives . . . were arbitrary and capricious . . . because they were not justified under the prevailing legal standards and because the record does not support a finding that they were reasonably likely to avoid jeopardy." On August 6, 1999, the Court remanded the BiOp back to NMFS for further analysis and explanation.

To comply with the Court's Order, NMFS conducted additional analyses and considered recommendations from the Council to develop RFRPAs (October 1999). NMFS intends to initiate rulemaking to implement these conservation measures for 2000 and beyond.

NMFS 1998 Biological Opinion, Authorization of the BSAI and GOA Groundfish Fisheries for 1999

Pursuant to the ESA, NMFS prepared a section 7 consultation Biological Opinion on the TAC specified for the 1999 BSAI and GOA groundfish fisheries. The Biological Opinion examined the 1999 proposed TAC specifications for the BSAI and GOA and the effect of this action on ESA listed species and critical habitat. The Biological Opinion concluded that mitigation measures recommended by the Council and modified by NMFS, for the BSAI and GOA pollock fisheries and the BSAI Atka mackerel fisheries, are sufficient to avoid jeopardizing the continued existence of the western population of Steller sea lions and avoid adverse modification to its critical habitat. This conclusion required that NMFS, implement the recommended revised reasonable and prudent alternatives before the scheduled regulatory start of the 1999 BSAI and GOA trawl fisheries (see discussion above regarding Atka mackerel and pollock mitigation measures). NMFS Biological Opinion concluded that implementation of the BSAI and GOA groundfish fisheries at 1999 TAC levels, as outlined under the FMPs and amended by the Steller sea lion mitigation measures for pollock and Atka mackerel, would not jeopardize the continued existence of Steller sea lions or other ESA listed marine mammals.

Biological Opinion on Potential Impacts of BSAI and GOA Groundfish Fisheries on ESA Listed Salmon
In a letter dated December 1, 1998, Mr. William W. Stelle (NMFS 1998d) concluded under an informal section 7 consultation that the continued implementation of the BSAI and GOA groundfish FMPs were unlikely to significantly impact endangered salmon species. Additional chinook and chum salmon were listed and some are thought to range into the EEZ waters off Alaska (Table 13).

USFWS Biological Opinion on the BSAI Trawl and Hook-and-Line Fisheries
A Biological Opinion on the BSAI hook-and-line groundfish fishery and the BSAI trawl groundfish fishery for the ESA listed short-tailed albatross was issued by the USFWS for 1999-2000 (USFWS 1999). The conclusion continued the no jeopardy determination and the incidental take statement expressing the requirement to immediately reinitiate consultations if incidental takes exceed four short-tailed albatross over two years' time.

2.4 Impacts on Marine Mammals

Marine mammals not listed under the ESA that may be present in the BSAI include cetaceans, [minke whale (*Balaenoptera acutorostrata*), killer whale (*Orcinus orca*), Dall's porpoise *(Phocoenoides dalli*), harbor porpoise (*Phocoena phocoena*), Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), and the beaked whales (e.g., *Berardius bairdii* and *Mesoplodon spp.*)] as well as pinnipeds [northern fur seals (*Callorhinus ursinus*), and Pacific harbor seals (*Phoca vitulina*)] and the sea otter (*Enhydra lutris*).

None of the alternatives would affect takes of marine mammals. Actions taken to prohibit the use of bottom trawls in the pollock fishery will not alter the harvested amount of groundfish. Reducing the PSC limits for crab and halibut may have a very minor positive impact on marine mammals utilizing these species for forage, but the reduction would be extremely small relative to the total amount of crab and halibut available. Therefore, none of the alternatives are expected to have a significant impact on marine mammals.

2.5 Coastal Zone Management Act

Implementation of each of the alternatives would be conducted in a manner consistent, to the maximum extent practicable, with the Alaska Coastal Management Program within the meaning of Section 30(c)(1) of the Coastal Zone Management Act of 1972 and its implementing regulations.

2.6 Conclusions or Finding of No Significant Impact

For the reasons discussed above, none of the alternatives, including the preferred alternative to prohibit the use of nonpelagic trawl gear in the directed fishery for BSAI pollock, are likely to significantly affect the quality of the human environment. Therefore, the preparation of an environmental impact statement for the proposed action is not required by Section 102(2)(C) of the National Environmental Policy Act or its implementing regulations.

Penelope D. Dalton
Assistant Administrator for Fisheries, NOAA

3/8/00
Date

3.0 REGULATORY IMPACT REVIEW: ECONOMIC AND SOCIOECONOMIC IMPACTS OF THE ALTERNATIVES

This section provides information about the economic and socioeconomic impacts of the alternatives, including identification of the individuals or groups that may be affected by the action, the nature of these impacts, quantification of the economic impacts if possible, and discussion of the tradeoffs between qualitative and quantitative benefits and costs.

The requirements for all regulatory actions specified in E.O. 12866 are summarized in the following statement from the order:

> In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and benefits shall be understood to include both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that are difficult to quantify, but nevertheless essential to consider. Further, in choosing among alternative regulatory approaches, agencies should select those approaches that maximize net benefits (including potential economic, environment, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach.

E.O. 12866 requires agencies to provide adequate information to determine whether a proposed regulatory action is "significant" under E.O. 12866. Proposed actions that are determined to be significant must be reviewed by the Office of Management and Budget. A "significant regulatory action" is one that is likely to:

> (1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;
>
> (2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
>
> (3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
>
> (4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

A regulatory program is "economically significant" if it is likely to result in the effects described above. The RIR is designed to provide information to determine whether the proposed regulation is likely to be "economically significant."

3.1 Alternative 1: Status Quo

The benefit offered by this alternative is that it allows some flexibility to adapt to changes in year-class strength of the pollock stock. The Council and NMFS maintain the flexibility under Amendment 16A to allocate BSAI pollock TAC among pelagic and nonpelagic gear types during the annual specification process. In years when the population is dominated by older year-classes, fishermen would have the ability to utilize bottom trawl gear that is better able to catch the large fish found close to the bottom. However, as noted in public testimony, pelagic gear is often fished close to or in direct contact with the bottom, and hence may also be able to catch these larger pollock. If the status quo were maintained, the costs and benefits would be the same as those for Alternative 2 in any year that Amendment 16A was used to prohibit nonpelagic gear. It is worth noting that the option of allocating the BSAI pollock TAC between the two gear types was exercised only once, in 1990, when 88% was allocated to pelagic gear. The cost of maintaining the status quo is that less bycatch will be saved over time, since even if the Council begins exercising the option to prohibit nonpelagic gear more often, it is not likely to do so every year. The decisionmaking process requires an annual analysis, and an annual debate among interested parties. There are no economic impacts from maintaining the status quo so long as Amendment 16A is not used, but maintaining the status quo also fails to obtain the Magnuson-Stevens objective of reducing bycatch.

3.2 Alternative 2: Prohibit the use of nonpelagic trawl gear for pollock fisheries.

Option 3, the preferred option under Alternative 2, proposes reducing the PSC limit for halibut by 100 mt in order to capture the bycatch savings from eliminating nonpelagic trawling for pollock in the BSAI. This amounts to a savings of about 1-2.5% of the total trawl halibut bycatch limit (currently 3,775 mt) in the BSAI area. Options 1 and 2 would instead reduce the limit by 50 mt.

Reducing the PSC limit for halibut would potentially benefit halibut fishermen in two ways: most importantly in the long run, because the biomass of halibut would increase; and in the short run because some of the bycatch saved might be reallocated by the International Pacific Halibut Commission (IPHC) to the longline halibut fishery. Each year when the IPHC sets its annual catch limit, it takes into account the previous year's bycatch mortality, which is subtracted from the "constant estimated yield," the yield which it is estimated can be taken from the biomass by all sources, including the commercial, sport, and subsistence halibut fisheries and all fisheries which take halibut as bycatch. In dealing with the bycatch mortality figures from the previous year, the IPHC also takes into account the percentage of legal-sized halibut[8] that each fishery takes.[9] In the 1997 bottom target pollock survey, for example, 6% of the halibut caught were of legal size, and in the midwater pollock trawl survey, 12% of the halibut were of legal size (NMFS 1999). In setting its annual catch limits, the IPHC looks at actual bycatch mortality figures from the previous year, not at caps placed by management. Therefore, the 100 mt reduction of the halibut PSC cap would not be used by the IPHC to calculate a direct reallocation to the commercial halibut fishery. However, if this rule is successful in bringing about a bycatch reduction, it could translate to a direct increase in the legal halibut catch.

Estimating what that increase would be worth to halibut fishermen cannot be done precisely since there are so many variables. However, if we assume from the NMFS viability data that about 10% of the halibut caught in the pollock trawl fishery are of legal size,[10] the 100 mt halibut bycatch reduction

[8]Legal size in the commercial halibut fishery is 32 inches (82 cm).

[9]These figures were derived by IPHC analysts from viability data supplied by the NMFS observer program (NMFS 1999, p.605).

incorporated in this rule theoretically could result in a direct increase to the halibut fishery of about 10 mt.

Ten mt is not a huge savings to the halibut fishery; it is only 0.04% of the 1999 commercial halibut catch limit in waters off Alaska of 61,000,000 lbs. (March 15, 1999; 64 FR 13519). At $1.75 per pound[11] this means about $40,000 to the commercial halibut fishery.

What is more likely to be significant to the halibut industry is the expected increase in biomass from the bycatch savings, which would bring more legal halibut into the fishery each year. Here the variables are numerous. They include the percentage of legal-sized halibut caught in the pollock fishery, price of halibut, natural mortality rate, growth rate, reproduction rate, and unpredictable changes in the ecosystem. It must therefore be emphasized that what follows is a very rough estimate. But let us assume a five-year average time before the sublegal fish is caught, a 20% annual natural mortality rate, and a sixfold increase (from an average size of 3.5 kg. for halibut caught in the 1997 BSAI pollock trawl fisheries to 20.8 kg for the average halibut caught in the halibut fishery).[12] This latter assumption is made instead of trying to estimate a growth rate, which brings in a can of worms that is not needed for this analysis (and would add an insignificant amount of biomass to the ecosystem). Assume also that 90 mt of sublegal sized halibut is saved because of the reduction in bycatch resulting from this rule. Then the halibut biomass would grow to about 180 mt. At our assumed $1.75 price, savings resulting from this regulation could result in (very) roughly a $700,000 (U.S. dollars) ex-vessel, gross revenue benefit to U.S. and Canadian halibut fishermen.[13] This estimate does not take into account additional increases that could accrue over the years due to reproduction of the fish that got away, which would add to the figure. On the other hand, we may have overstated how many of the "saved" halibut will eventually be caught.

The benefits of saving halibut and crab bycatch would need to be weighed against possible increased bycatch of other PSC species, including salmon and herring, which are more common in midwater. Bycatches of salmon and herring are variable, by area, year, and season, due to a number of exogenous factors (e.g., ocean conditions, run size) and cannot be readily predicted. Therefore, estimates of these potentially offsetting bycatch losses cannot be provided at this time. If the proposed action is adopted, the possible trade-offs between bycatches of various PSC species should be monitored for future evaluation.

Costs would also be incurred by the groundfish trawl and processing industry. The costs would not include buying new gear, as very few if any vessels in the BSAI directed pollock fishery use bottom trawl gear exclusively (see table on page 56). It has been asserted in public testimony that vessels with lower horsepower cannot use pelagic gear with as much versatility as the larger vessels and might have to upgrade their engines or leave the fishery. However, these vessels are not expected to qualify as future participants in the BSAI pollock fishery under the American Fisheries Act, recently signed into law by the President, which limits participation in the BSAI pollock fishery to 20 factory trawlers and to catcher vessels that qualify by having caught at least 250 mt of pollock in 1995, 1996, or 1997. Since the vessels in question will, with possibly a few exceptions, be excluded from BSAI pollock fishery by statute, they will be unaffected by the prohibition on the use of nonpelagic trawl gear.

Catcher-processor vessels may, however, incur unquantifiable but possibly substantial costs. As noted by Pereyra (1995), people harvesting pollock for fillet production prefer larger pollock found near the

---

[11]Estimated 1999 price, Pers. Comm., June 11, 1999. Gregg Williams, biologist with International Pacific Halibut Commission.

[12]Pers. Comm, Nov. 16, 1998 Gregg Williams, biologist with International Pacific Halibut Commission.

[13]Some of these fish would go to sport and subsistence fishermen.

bottom, which yield larger fillets of greater value and involve lower production costs. Total revenues for the pollock fleet could be affected, depending on market conditions, by the prohibition on use of nonpelagic trawl gear-- for example, total revenues could decrease if surimi prices were relatively low and fillet prices were relatively high, and if use of pelagic gear made larger fish less accessible. The question is to what extent the proposed rule would affect the size of fish taken. Although this EA analysis shows that larger pollock, on average, have been taken with bottom trawl gear, modern pelagic gear can be fished close to or on the bottom, with less disruption of habitat, and in the absence of bottom trawls would be used more frequently to catch some of the larger fish currently taken with nonpelagic trawl gear.

Alternative 2 has been chosen as the preferred alternative because in light of the Magnuson-Stevens mandate to reduce bycatch, the costs to the BSAI pollock trawl fishery of switching entirely to gear which has a substantially lower bycatch rate for halibut and crab seems reasonable in that the fleet will still be able to catch the same quantity of pollock and has demonstrated that it can adapt to the use of pelagic gear.

3.3 Interactions with IR/IU Program and American Fisheries Act

Improved Retention / Improved Utilization (IR/IU) programs may have some effect on the use of nonpelagic gear types. The IR/IU program adopted for BSAI fisheries mandates 100% retention of all pollock, Pacific cod as of January 1, 1998, and rock sole and yellowfin sole as of January 3, 2003. As discussed previously, nonpelagic trawls tend to have higher incidental catch rates of these species. An argument can be made that a possible clash exists between the nonpelagic trawl prohibition and IR/IU. Under the current regulations, as long as the directed pollock fishery is open, vessels fishing with bottom trawls targeting cod (or some other species) are required to retain 100% of their pollock catch. However, if bottom trawling for pollock is prohibited, then pollock would be on bycatch status for this gear type. Hence, vessels would be required to retain pollock only up to 20% of the total of all combined species retained per fishing trip, and if they caught over 20% could end up discarding pollock that they might have been required to retain under current regulations. This problem is unlikely to materialize however, since vessels which target other species are not equipped to process pollock, are likely to try to avoid pollock, and have no incentive to reach or surpass the 20% maximum retainable bycatch limit. Furthermore, the question has become moot with passage of the American Fisheries Act, under which the pollock fishery will be a closed entry fishery open only to 20 factory trawlers and certain catcher vessels which meet the qualifying criteria. Under the AFA no other boat will be able to fish for pollock in the BSAI, or retain more than 20% pollock, regardless of IR/IU or the nonpelagic trawl prohibition.

3.4 Impacts of Splitting the Pollock/Atka Mackerel/Other Species PSC Category

The major drawback of splitting the pollock fishery into its own category is that if PSC limits were reached, the pollock fishery would be shut down, entailing major economic consequences which must be weighed carefully against the benefit of potential bycatch savings.

The value of the halibut bycatch to the pollock fishery can be estimated based on the ex-vessel price of pollock, the amount of pollock harvested by the directed pollock trawl fisheries, and the quantity of halibut bycatch mortality used. The 1996 ex-vessel price of pollock harvested by trawl gear in the BSAI was $0.089 per pound, round weight (Kinoshita et al. 1997). Hence, pollock is valued at $196/mt, ex-vessel, to BSAI trawl fisheries. (Pollock harvested in the 'A' season are generally worth more, due to the added value of roe products.)

As shown in the adjacent table, the pollock fishery generates about $844,000 (U.S.) per metric ton of halibut mortality used. This equates to about $383 per pound of halibut. For comparison purposes, the ex-vessel revenue per pound of halibut in directed halibut fisheries is about $2 per pound (although the juvenile halibuts will have grown by the time they are caught and be worth more; see discussion in Section 3.2). No estimates were made for other PSC species (crab, herring, salmon) because attainment of the PSC limit for these species closes only specified areas, rather than the entire BSAI.

Estimated ex-vessel value of halibut PSC to directed pollock fisheries. Price/mt of pollock used was $196/mt.

Year	Pollock catch (mt)	Total value ($)	Halibut bycatch (mt)	Revenue ($) per mt of halibut	Revenue ($) per pound of halibut
1996	1,069,190	209,561,000	321	652,838	296
1997	1,097,879	215,184,000	208	1,034,538	469

Using the same methodology described for the pollock fishery above, one can estimate the value of halibut bycatch for other fisheries. The table below shows the revenue generated per pound of halibut for other groundfish target fisheries. This includes catches of species in target fisheries, so an apples-and-apples comparison can be made with the halibut assigned to each specific target fishery. Clearly, the best use of halibut bycatch, in terms of revenue, is generated by the pollock fishery. The directed pollock fishery generates about $382 per pound of halibut versus less than $50 per pound for other groundfish fisheries examined. Note that these values are ex-vessel values, and are significantly lower than ex-processor values generated for halibut in previous assessments (e.g., P. Cod Allocation, Amendment 46).

Estimated ex-vessel value of halibut PSC to BSAI groundfish fisheries, 1996. Data from Kinoshita et al. 1997.

Fishery	Directed catch (mt)	Total value ($)	Halibut bycatch (mt)	Revenue ($) per mt of halibut	Revenue ($) per pound of halibut
P. cod trawl	69,700	23,504,000	1,640	14,331	6.50
P. cod longline	94,700	55,310,000	788	70,191	31.85
Yellowfin sole	112,100	37,307,000	920	40,551	18.40
Other flatfish	27,200	9,052,000	683	13,253	6.01
Rockfish trawl	14,700	4,568,000	50	91,364	41.45

Thus, there may be very large costs associated with implementing the proposed regulatory amendment to split out pollock from the pollock/Atka mackerel/other species category and close the pollock fishery when PSC limits are reached. As discussed above, about $844,000 of pollock revenue is generated for each metric ton of halibut bycatch. If the pollock fishery is shut down because halibut bycatch limits are reached, the costs could run into the millions of dollars for vessels participating in this fishery. For example, if the fishery was allocated 175 mt of halibut (as suggested by this analysis), but in fact required 200 mt to harvest the TAC, foregone revenue to the fleet could be on the order of $21 million, all else being equal. These costs could be even higher if pollock TACs are increased in the future.

These results should be viewed with caution. The relevant comparison is the incremental pollock revenue lost due to a reduction of halibut bycatch by one ton. This cannot be easily or accurately estimated by use of average figures. Because the pollock fishery is constrained by multiple quotas, including the pollock TAC and crab bycatch, the incremental value of an additional halibut to the pollock target fishery will under some circumstances be zero. For example, if the fishery takes the TAC without the halibut catch constraint being binding, another ton of halibut allocated as bycatch would make no difference to pollock revenue. In that case, the incremental worth of a ton of halibut to the pollock fishery would be zero, although the halibut bycatch might have value to other fisheries. A problem could occur here if managers apportioned more PSC to the pollock category than their estimates warranted in order to avoid risking the possibility of having to close the pollock fishery. In that case, the PSC for other groundfish fisheries would be correspondingly lower, and therefore amount to a cost to those fisheries which would not have occurred if the fishery were not split.

3.5 Administrative, Enforcement and Information Costs

Only minimal additional administration costs are expected from implementing the preferred alternative closing the BSAI directed pollock fishery to nonpelagic trawl gear. Some costs could be incurred for prosecuting cases for violations of the regulations. Information costs will be minimal, since observers already present on trawl vessels will be able to monitor compliance with the performance-based standard. Maintaining the status quo (Alternative 1) would incur somewhat higher administrative costs since it requires an annual review of the need to allocate pollock TAC between gears. The 'preferred alternative' for the regulatory amendment, under consideration herein, is retention of the 'status quo' and, therefore, would result in no additional administrative, enforcement, or information costs.

4.0 INITIAL REGULATORY FLEXIBILITY ANALYSIS

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 agencies' awareness and understanding of the impact of their regulations on small business, (2) to require that agencies communicate and explain their findings to the public, and (3) to encourage agencies to use flexibility and to provide regulatory relief to small entities. The RFA emphasizes predicting impacts on small entities as a group distinct from other entities and on the consideration of alternatives that may minimize the impacts while still achieving the stated objective of the action.

On March 29, 1996, President Clinton signed the Small Business Regulatory Enforcement Fairness Act. Among other things, the new law amended the RFA to allow judicial review of an agency's compliance with the RFA. The 1996 amendments also updated the requirements for a final regulatory flexibility analysis, including a description of the steps an agency must take to minimize the significant economic impact on small entities. Finally, the 1996 amendments expanded the authority of the Chief Counsel for Advocacy of the Small Business Administration (SBA) to file *amicus* briefs in court proceedings involving an agency's violation of the RFA.

4.1 Requirement to Prepare an IRFA

The central focus of the IRFA should be on the economic impacts of a regulation on small entities and on the alternatives that might minimize the impacts and still accomplish the statutory objectives. The level of detail and sophistication of the analysis should reflect the significance of the impact on small entities. Under 5 U.S.C., Section 603(b) of the RFA, each IRFA is required to address:

- A description of the reasons why action by the agency is being considered;
- A succinct statement of the objectives of, and the legal basis for, the proposed rule;
- A description and, where feasible, an estimate of the number of small entities to which the proposed rule will apply (including a profile of the industry divided into industry segments, if appropriate);
- A description of the projected reporting, recordkeeping and other compliance requirements of the proposed rule, including an estimate of the classes of small entities that will be subject to the requirement and the type of professional skills necessary for preparation of the report or record;

- An identification, to the extent practicable, of all relevant Federal rules that may duplicate, overlap or conflict with the proposed rule;

- A description of any significant alternatives to the proposed rule that accomplish the stated objectives of the Magnuson-Stevens Act and any other applicable statutes and that would minimize any significant economic impact of the proposed rule on small entities. Consistent with the stated objectives of applicable statutes, the analysis shall discuss significant alternatives, such as:

    1. The establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;

    2. The clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;

    3. The use of performance rather than design standards;

    4. An exemption from coverage of the rule, or any part thereof, for such small entities.

4.2 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 form 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 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 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 under the following conditions: (1) If a person owns or controls, or has the power to control, 50% 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, that person is considered an affiliate of the firm; (2) If two or more persons each owns, controls or has the power to control less than 50% 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 a "small organization" as any nonprofit enterprise that is independently owned and operated and not dominant in its field.

Small governmental jurisdictions. The RFA defines a "small governmental jurisdictions" as a city, county, town, township, village, school district, or special district with a population of fewer than 50,000.

4.3 Small Entities in the BSAI Pollock Fishery

Six types of entities participate in the BSAI pollock fishery: (1) inshore processors, (2) inshore catcher boats, (3) offshore catcher boats, (4) offshore catcher/processors, (5) motherships, and (6) CDQ groups. While available data on ownership and affiliation patterns in the BSAI pollock fishery are not sufficiently detailed to discern whether each individual business concern meets the definition of "small entity," data collected by the Council for the Inshore/Offshore 3 (NPFMC 1998b) analysis do allow some general conclusions on the number of small entities in each industry component. The Council's Inshore/Offshore 3 analysis concluded that the CDQ groups and approximately 63 independent catcher vessels are the only small entities participating in the BSAI pollock fishery. These general conclusions are displayed in Table 4.1 for the year 1996.

Participating Entities

1. Inshore processors. Four of the 8 inshore processors operating in the BSAI pollock fishery are either wholly owned subsidiaries or close affiliates of Japanese multi-national corporations. Due to their affiliation with large foreign entities with more than 500 employees worldwide, none of these processors is a small entity. Of the remaining 4 inshore processors, 3 are owned by US companies that employ more than 500 persons in all their affiliated operations, and therefore cannot be considered small entities. The remaining inshore processor has been identified as closely affiliated with its 5 delivering catcher-boats

and the gross annual receipts of the affiliated entities taken together (the processor and its 5 affiliated catcher-boats) exceed the $3 million criterion for fish harvesting operations. Therefore, none of the inshore processors in the BSAI pollock fishery are small entities.

2. Inshore catcher-boats. The sector profiles compiled for the Inshore/Offshore 3 analysis (NPFMC 1998b) identify 119 catcher-boats altogether: 69 operate in the inshore sector exclusively, 28 operate in the offshore sector exclusively, and 22 operate in both sectors. Of the 91 catcher boats that operate exclusively or partly in the inshore sector, the ownership data in the sector profiles identify 26 vessels owned in whole or part by inshore processors. These 26 vessels may be considered to be affiliated with their respective inshore processor owners and cannot therefore be considered small entities because none of the inshore processors in the BSAI pollock fishery themselves are small entities. An additional 5 catcher boats have been identified as closely affiliated with an inshore floating processor and these 5 catcher boats taken together with their affiliated processor exceed the $3 million criterion for fish harvesting operations and are therefore not believed to be small entities. Furthermore, an additional 20 catcher-boats have ownership affiliations with other catcher-boats or catcher/processors. The gross annual receipts of each of these groups of affiliated catcher boats is believed to exceed the $3 million criterion for small entities when all their fisheries earnings are taken as a whole. The remaining 40 catcher boats operating exclusively or partly in the inshore sector are believed to be small entities.

3. Offshore catcher-boats. Twenty-eight catcher boats operate in the offshore sector exclusively and 22 operate in both sectors, for a total of 50 offshore catcher boats. Of these, 13 have ownership affiliations with large inshore or offshore processors and, therefore, do not meet the $3 million criterion for small entities. An additional 13 catcher boats have ownership affiliations with other vessels or operations that taken together with their affiliated entities are believed to exceed the $3 million gross receipts criterion for small entities when all their fisheries earnings are taken as a whole. The remaining 24 catcher boats operating exclusively or partly in the offshore sector are believed to qualify as small entities.

4. Offshore processors. To qualify as a small entity, a catcher/processor must be independently owned and operated, have no more than 49% foreign ownership, and have gross annual receipts of less than $3 million. None of the offshore catcher/processors operating in the BSAI pollock fishery meet the criteria for small entities. Estimated gross annual receipts for the offshore companies participating in the BSAI pollock fishery are estimated to range between $10 million and $3 billion.

5. Motherships. Three motherships operate in the offshore sector. All three motherships have ownership or business affiliations with large Japanese-owned processing companies, and are further affiliated with some of their delivering catcher boats. Taken together with their affiliated entities, none of the motherships in the BSAI pollock fishery are small entities.

6. CDQ groups. The 6 CDQ groups participating in the BSAI pollock fishery are the only small organizations that have been identified as directly affected by regulations that affect the BSAI pollock fishery. Under the preferred alternative, vessels fishing for pollock under the CDQ program would be exempted from the prohibition on nonpelagic trawling. The CDQ Program, which currently receives a 7.5 % allocation of each PSC species, would continue to receive a 7.5 % allocation of the reduced PSC allowances.

Table 4.1 Estimated numbers and types of small entities participating in the BSAI pollock fishery in 1996

Industry component or type of entity	*Small entity*	*Large entity*	*Total*
Inshore sector			
Inshore processors	0	8	8
Catcher-boats < 125' LOA	37	15	52
Catcher-boats ≥ 125' LOA	2	15	17
Offshore sector			
Motherships	0	3	3
Catcher/processors	0	31	31
Catcher-boats < 125' LOA	21	5	26
Catcher-boats ≥ 125' LOA	2	0	2
Vessels delivering to both sectors			
Catcher-boats < 125' LOA	1	13	14
Catcher-boats ≥ 125' LOA	0	8	8
Small organizations (CDQ groups)	6	0	6

4.4 Impacts of the Preferred Alternative on Small Entities

Analysis of catch data from 1996 and 1997 indicate that very few vessels will be adversely affected by the Council's preferred alternative with respect to buying and using new gear because most vessels currently fish with pelagic gear. The adjacent table shows the number of vessels that participated in the BSAI pollock fishery in 1996 and 1997. In 1996, five small catcher vessels used bottom trawl gear only. This number dropped to two vessels in 1997. Total pollock harvests by the few catcher vessels using only bottom trawl gear averaged 85 mt per year during 1996-1997 for an ex-vessel value of $17,000 or about $5,000 per vessel per year. This is likely to be a very small portion (<5%) of the annual gross revenues for the vessels in question. The few catcher vessels that use only bottom trawl gear in the BSAI pollock fishery tend to be small vessels that concentrate on other fisheries such as Pacific cod, flatfish, and in some cases salmon. For these vessels, pollock represents a fishery of opportunity, that is sometimes targeted when other fisheries are closed, but it is not their

Number of vessels participating in BSAI pollock trawl fisheries, by gear type, 1996-1997.

GEAR	1996	1997
Bottom Trawl	40	24
Pelagic Trawl	122	123
Both Gears	35	23
Bottom Trawl Only	5	2

primary source of income. In addition, none of these vessels are believed to qualify as future participants in the BSAI pollock fishery under the American Fisheries Act, recently signed into law by the President, which limits participation in the BSAI pollock fishery to those vessels that caught at least 250 mt of pollock in 1995, 1996, or 1997. Under the American Fisheries Act, the small vessels in question are excluded from BSAI pollock fishery by statute and will, therefore, be unaffected by the prohibition on the use of nonpelagic trawl gear in the non-CDQ fisheries. Although these small vessels are not precluded by the AFA from participating in the pollock CDQ fisheries, NMFS believes that it is unlikely that they will participate in the future. They have not, to date, participated in the pollock CDQ fisheries. The catcher vessels that have harvested pollock CDQ thus far are larger catcher vessels that are owned by the shoreside processors that are CDQ partners. Therefore, the prohibition on the use of nonpelagic trawl gear in the pollock CDQ fisheries also is not expected to impact these small vessels.

Of the approximately 120 catcher vessels that are expected to remain in the BSAI pollock fishery under the American Fisheries Act, approximately 60 are small entities, and these vessels fish for pollock almost exclusively with pelagic trawl gear. Some catcher/processors that target on larger pollock for fillet processing do use bottom trawl gear for pollock under certain circumstances and these vessels may face impacts if the nonpelagic trawl gear is prohibited. However, none of the catcher/processors in the pollock fishery are small entities under the RFA. The crab performance standard may pose some unquantifiable inconvenience to vessels with pelagic gear, as it is intended to discourage them from trawling on the bottom. The reductions in overall PSC limits for halibut, red king crab, Tanner crab, and snow crab are not expected to cause significant impacts to small entities, because analysis has indicated that the reduction would not affect the fishery's ability to harvest the pollock TAC with pelagic trawl gear. In other words, the reduction in PSC limits is not expected to constrain fishing activity.

The CDQ groups would be exempted from the prohibition on nonpelagic trawl gear under the preferred alternative, as there is currently no definition of directed fishing for pollock in the CDQ fisheries . The CDQ groups would not be effected very much by this exemption, as they primarily use pelagic gear to fish for pollock. In 1998, for example, only 2 % of the approximately 85,000 mt of pollock harvested under the CDQ program was harvested using bottom trawl gear. CDQ groups have a built-in incentive to minimize bycatch. Once a group has reached its allocation of any PSC species, all of its member vessels must stop fishing and forego any remaining CDQ allocations of groundfish species for the season. Under the preferred alternative, CDQ groups would continue to receive 7.5 % of all PSC limits, which, since the overall limits would be reduced, would result in reduced Prohibited Species Quota (PSQ) allocations to CDQ groups. These reductions could result in some cost to the CDQ groups, in that it constitutes an added incentive to improve their techniques for minimizing bycatch. It is possible, but not likely, that these reductions, which are small in proportion to the total PSQ allocations, could result in loss of CDQ groundfish. This could happen if a group reached one of itsPSQ allocations before it otherwise would have, and therefore was required to stop fishing for CDQ groundfish species.

For the reasons outlined above, it seems reasonable to conclude that there will not be a significant impact on a substantial number of small entities from the preferred alternative. However, the data available do not allow the agency to state this with certainty. That is why this initial regulatory flexibility analysis was prepared.

A substantial number of small entities could be affected by Alternative 2 of the proposed regulatory amendment, which would remove pollock from the pollock/Atka mackerel/other species category. As shown above, over 125 vessels fished for BSAI pollock in 1996, catching 1.07 million tons of pollock worth about $210 million ex-vessel. Significant impacts on small entities may occur under proposed regulatory amendment Alternative 2, which would close the BSAI pollock fishery when PSC limits are reached. The analysis indicated that about $844,000 million in pollock revenue is associated with each metric ton of halibut mortality in directed pollock fisheries. The magnitude of such an impact would depend on how much pollock TAC remains unharvested when halibut bycatch limits are reached. No

such impacts would be expected under Alternative 1 of the regulatory amendment, which is the Council's preferred alternative.

4.5 Summary of Initial Regulatory Flexibility Analysis

The requirements of Section 603(b) of the RFA as set forth on pp. 47-48 have been addressed by this analysis, together with earlier sections of the EA/RIR, as follows: (1) The Council and NMFS have proposed this action in order to address the Magnuson-Stevens Act mandate to reduce bycatch in the nation's fisheries. The legal basis for the action is explained in Section 1.1. (2) The small entities which would be affected by the rule are described, by industry segments, in Section 4.3. (3) Relevant Federal rules that may duplicate, overlap or conflict with the proposed rule include IR/IU and the American Fisheries Act, addressed in Sections 3.3 and 4.6. (4) A description of the reporting and compliance costs of the action is in Section 3.5. (5) A description of significant alternatives is in Section 3.1. The analysis concluded that Alternative 1, which would have lower costs to industry, would not be sufficient to accomplish the objectives of the Magnuson-Stevens Act. The cost of Alternative 2, in terms of loss of flexibility in targeting larger pollock for fillets, will be borne by catcher/processors, which do not qualify as small entities. In analyzing the proposed regulatory amendment to split pollock from the pollock/Atka mackerel/other species category, the Council determined that the cost to the pollock industry, including the catcher vessels which qualify as small entities, would be unreasonably high and therefore this amendment is not being recommended as part of this action.

The proposed rule, under any of the three options considered, does not constitute a "significant regulatory action" as defined in E.O. 12866. The analysis of potential effects on small entities concludes that although the rule is unlikely to have a significant effect on a substantial number of small entities, this cannot be stated with certainty, and therefore an Initial Regulatory Flexibility Analysis was prepared.

5.0 SUMMARY AND CONCLUSIONS

A prohibition on using nonpelagic trawl gear in the BSAI pollock fishery, combined with a performance-based standard limiting crab bycatch to no more than 20 crabs onboard a vessel at one time, is expected to result in a substantial reduction in bycatch of halibut and crab. This reduction would be reflected in a reduced PSC catch limit for affected species. The prohibition on nonpelagic trawling would help to fulfill the mandate of the 1996 Magnuson-Stevens Act amendments to limit bycatch in the nation's fisheries. Three options were considered in the EA in terms of reduction of the PSC catch limit. The preferred alternative reduces the PSC limit for three species of crab, as well as halibut, by an amount based on estimated savings using data from pelagic gear used while the performance-based standard was in effect.

The EA considered the impact of the rule on the human environment, as required by the National Environmental Policy Act of 1969. The analysis found that the prohibition on nonpelagic trawls will not be likely to significantly affect the human environment, and therefore does not require preparation of an Environmental Impact Statement. The effect of the proposed rule on EFH will not be adverse and may be beneficial. The rule is not expected to have a significant impact on endangered, threatened, or candidate species, nor to affect takes of marine mammals, under any of the options considered. The harvest level of groundfish, scallops, and salmon will not be affected, even though the incidental bycatch of halibut (and crab under Options 2 and 3), will be reduced.

6.0 REFERENCES

Alaska Fisheries Science Center (AFSC). 1999. Bottom trawl impact studies. *Quarterly Report*, Jan-Feb-March 1999 (available on Web at http://www.afsc.noaa.gov/Quarterly/jfm99/jfm99qrt).

Anderson, F. E. and L. M. Meyer. 1986. The interaction of tidal currents on a disturbed intertidal bottom with a resulting change in particulate matter quantity, texture and food quality. *Estuarine Coastal and Shelf Science*. 22:19-29.

Auster, P. J. and R. W. Langton. 1999. The effects of fishing on fish habitat. In: L. Benaka (ed), *Fish habitat: Essential Fish Habitat and Rehabilitation*. American Fisheries Society. Bethesda, MD.

Auster, P. J., R. W. Langton, L. Watling, L., P. C. Valentine, C. L. S. Donalson, E. W. Langton, A. N. Shepard, and I. G. Barr. 1996. The impacts of mobile fishing gear on seafloor habitats in the Gulf of Maine (Northwest Atlantic): Implications for conservation of fish populations. *Reviews in Fisheries Science*. 4:185-202.

Brylinsky, M., J. Gibson and D. C. Gordon, Jr. 1994. Impacts of flounder trawls on the intertidal habitat and community of the Minas Basin, Bay of Fundy. *Canadian Journal of Fisheries and Aquatic Science*.. 51:650-661.

Caddy, J. F. 1973. Underwater observations on tracks of dredges and trawls and some effects of dredging on a scallop ground. *Journal of the Fisheries Research Board of Canada* 30: 173-180.

Churchill, J. H. 1989. The effect of commercial trawling on sediment resuspension and transport over the Middle Atlantic Bight continental shelf. *Continental Shelf Research*. 9:841-864.

Donaldson, W.E. 1990. Determination of experimentall induced non-observable mortality on red king crab. Alaska Dept. of Fish and Game Regional Information Report 4K90-13.

Fish and Wildlife Service (FWS). 1989. Endangered Species Act. Section 7 Consultation on the Effects of the Groundfish Fisheries Conducted under the Bering Sea and Aleutian Islands and Gulf of Alaska Fishery Management Plans of the North Pacific Fishery Management Council. (Seabirds; Biological Opinion.) USDI FWS, 605 West 4th Avenue, Room 62, Anchorage, AK 99501.

FWS. 1993. Alaska Seabird Management Plan. Report of the US Fish and Wildlife Service. Anchorage: USDI FWS.

FWS. 1995. Endangered Species Act. Section 7. Reinitiation of Consultation on the Effects of the Groundfish Fisheries Conducted under the Bering Sea and Aleutian Islands and Gulf of Alaska Fishery Management Plans of the North Pacific Fishery Management Council. (Seabirds; amended Biological Opinion from July 3, 1989). Anchorage: USDI FWS

FWS. 1997. Letter from Ann G. Rappoport to Steven Pennoyer, February 19, 1997, on effects of the 1997 Total Allowable Catch Specifications and Environmental Assessment for groundfish fisheries in the Gulf of Alaska and Bering Sea-Aleutian Islands on short-tailed albatrosses.

International Council for the Exploration of the Sea. 1988. Report of the Study Group on the Effects of Bottom Trawling. In CM 1988/B International Council for the Exploration of the Sea.

Jones, J. B. 1992. Environmental impact of trawling on the seabed: a review. *New Zealand Journal of Marine and Freshwater Research*. 26:59-67.

Kaiser, M. J. and Spencer, B. E.. 1994. Fish scavenging behaviour in recently trawled areas. *Marine Ecology Progress Series* 112: 41-49.

Kaiser, M. J. and Spencer, B. E. 1996a. Behavioural responses of scavengers to beam trawl disturbance. In: Greenstreet SPR, Tasker ML (eds), *Aquatic Predators and their Prey*. Blackwell Scientific, Oxford, p. 117-123.

Kaiser, M. J. and Spencer, B. E. 1996b. The effects of beam-trawl disturbance on infaunal communities in different habitats. *Journal of Animal Ecology*. 65:348-358.

Krost, P. 1993. The consequences of bottom trawl fisheries for the sediment and its exchange processes as well as for the benthic communities of Kiel Bight. *Arbeiten Des Deutschen Fischerei-Verbandes* 57: 43-60.

Krost, P., M. Bernhard, F. Werner, and W. Hukriede. 1990. Otter trawl tracks in Kiel Bay (Western Baltic) mapped by side-scan sonar. Meereforschung 32: 344-353

Kinoshita, R. K., A. Grieg and J. M. Terry. 1997. Economic status of groundfish fisheries off Alaska, 1996. In *NOAA Technical memorandum NMFS-AFSC-85* Department of Commerce, NOAA

McConnaughey, R. A., K. L. Mier and C. B. Dew. 1999. An examination of chronic trawling effects on soft-bottom benthos of the eastern Bering Sea. *ICES J. Mar. Sci.*, in press.

Messieh, S. N., T. W. Rowell, D. L. Peer and P. J. Cranford. 1991. The effects of trawling, dredging and ocean dumping on the eastern Canadian continental shelf. *Cont. Shelf Res.* 11:1237-1263.

National Marine Fisheries Service (NMFS). 1991. Endangered Species Act. Section 7. Biological Opinion--Fishery Management Plan for the Bering Sea and Aleutian Islands and Gulf of Alaska Groundfish Fisheries and the Total Allowable Catch Specification and its effects to Steller Sea Lions. NMFS Alaska Region, P.O. Box 21668, Juneau, Alaska, April 18, 1991.

NMFS. 1992. Endangered Species Act. Section 7. Biological Opinion--Amendment 18 to the Fishery Management Plan for the Groundfish Fishery of the Bering Sea and Aleutian Islands (Steller Sea Lions). NMFS Alaska Region, P.O. Box 21668, Juneau, Alaska, March 4, 1992.

NMFS. 1994. Endangered Species Act Section 7. Biological Opinion--Pacific Salmon. Reinitiation of Consultation on the Effects of the Groundfish Fisheries Conducted under the Bering Sea and Aleutian Islands and Gulf of Alaska Fishery Management Plans of the North Pacific Fishery Management Council. (Pacific Salmon) NMFS Northwest Region, 7600 Sand Point Way, NE, BIN 15700, Seattle, Washington, January 14, 1994.

NMFS. 1995. Endangered Species Act. Section 7. Reinitiation of Consultation on the Effects of the Groundfish Fisheries Conducted under the Bering Sea and Aleutian Islands and Gulf of Alaska Fishery Management Plans of the North Pacific Fishery Management Council. (Pacific salmon; amended Biological Opinion from January 14, 1994) NMFS Northwest Region, 7600 Sand Point Way, NE, BIN 15700, Seattle, Washington, December 7, 1995.

NMFS. 1996. Endangered Species Act. Section 7. Biological Opinion--Fishery Management Plan for the Bering Sea and Aleutian Islands and Gulf of Alaska Groundfish Fisheries and the Total Allowable Catch Specification and its effects to Steller Sea Lions. NMFS-Alaska Region, P.O. Box 21668, Juneau, Alaska 99802-1668, January 26, 1966.

NMFS. 1997. Final Environmental Assessment for 1996 Total Allowable Catch Specifications. NMFS-Alaska Region, P.O. Box 21668, Juneau, Alaska 99802.

NMFS. 1998a. Supplemental Environmental Impact Statement for Groundfish Total Allowable Catch Specifications and Prohibited Species Catch Limits 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. NMFS-Alaska Region, P.O. Box 21668, Juneau, Alaska 99802-1668.

NMFS. 1998b. Endangered Species Act. Section 7. Consultation on Authorization of an Atka mackerel fishery under the BSAI groundfish Fishery Management Plan between 1999 and 2002; Authorization of a walleye pollock fishery under the Bering Sea-Aleutian Island groundfish Fishery Management Plan between 1999 and 2002; and Authorization of a walleye pollock fishery under the Gulf of alaska groundfish Fishery Management Plan between 1999 and 2002. NMFS-Alaska Region, P.O. Box 21668, Juneau, Alaska 99802-1668, Dec. 03, 1998.

North Pacific Fisheries Management Council (NPFMC) 1996. Environmental Assessment/Regulatory Impact Review for Amendment 46 to the BSAI FMP, Pacific Cod Allocations. May 10, 1996. NPFMC, 605 W. 4th Ave. Anchorage, AK 99501.

NPFMC. 1998a. Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Bering Sea/Aleutian Islands Regions. Compiled by the Plan Team for the Groundfish Fisheries. Anchorage: NPFMC

NPFMC. 1998b. Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis for Inshore/Offshore-3 (Amendments 51/51). Anchorage: NPFMC

NPFMC. 1999. Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Bering Sea/Aleutian Islands Regions. Compiled by the Plan Team for the Groundfish Fisheries. Anchorage: NPFMC.

National Research Council (NRC). 1996. The Bering Sea ecosystem. National Academic Press, Washington, D.C. 306 pp.

Pereyra, W. 1995. Midwater trawls and the Alaska pollock fishery: A management perspective. pp. 91-94. In: Solving Bycatch: Considerations for Today and Tomorrow. Alaska Sea Grant College Program Report No. 96-03, University of Alaska Fairbanks.

Riemann, B. and Hoffmann E. 1991. Ecological consequences of dredging and bottom trawling in the Limfjord, Denmark. Marine Ecology Progress Series 69(1-2): 171-178.

Reise, K. 1982. Long-term changes in the macrobenthic invertebrate fauna of the Wadden Sea: are polychaetes about to take over? *Netherlands Journal of Sea Research.* 16:29-36.

Rumohr, H. and P. Krost. 1991. Experimental evidence of damage to benthos by bottom trawling with special reference to *Artica islandica. Meeresforschung.* 33:340-345.

Sadorus, L., and G. H. Williams. 1997. The 1997 groundfish fishery off Alaska: Groundfish catches, halibut bycatches, and bycatch rates. International Pacific Halibut Commission, p. 213-232.

Schwinghammer, P., J. Y. Guigne, and W. C. Siu. 1996. Quantifying the impact of trawling on benthic habitat structure using high resolution acoustics and chaos theory. *Canadian Journal Fishery and Aquatic Science* 53: 288-296.

Williams, G. H. 1997a. Mean weight and length of halibut bycatch in the 1996 groundfish fisheries off Alaska. In: *Report of Assessment and Research Activities 1997.* International Pacific Halibut Commission, p. 285-286.

Williams, G. H. 1997b. Incidental catch and mortality of Pacific Halibut 1962-1997. In: *Report of Assessment and Research Activities 1997.* International Pacific Halibut Commission, p. 233-242.

Thrush, S. F., J. E. Hewitt, V. J. Cummings, P. K. Dayton, M. Cryer, S. J. Turner, G. A. Funnell, R. G. Budd, C. J. Milburn, and M. R. Wilkinson. 1998. Disturbance of the marine benthic habitat by commercial fishing: impacts at the scale of the fishery. *Ecological Applications*, 8(3), pp. 866-879.

7.0 AGENCIES AND INDIVIDUALS CONSULTED

Kent Lind, Mary Furuness
NMFS-AKRO

Ren Narita, Joe Terry
NMFS-AFSC

Steve Ganey, Fran Bennis
Alaska Marine Conservation Council

Darrell Brannan
NPFMC

Gregg Williams
International Pacific Halibut Commission

NPFMC Scientific and Statistical Committee
NPFMC Advisory Panel

8.0 LIST OF PREPARERS

David Witherell
North Pacific Fishery Management Council

Kent Lind
Nina Mollett
National Marine Fisheries Service

Appendix 1: Walleye Pollock - A species profile

Biology: Pollock (*Theragra chalcogramma*) is the most abundant groundfish species in the BSAI . Pollock begin to recruit to the fishery at age 4 and many survive 10 years or more. Females reach 50% maturity at 39 cm (about 4 years old) and produce 60,000 to 400,000 pelagic eggs. Spawning occurs in April in the Eastern Bering Sea (EBS). Annual natural mortality of adults has been estimated to be about 25% (M = 0.30). Seasonal migrations occur from overwintering areas along the outer shelf to shallow waters (90-140 m) to spawn. Pollock are found throughout the water column from the surface down to 500 m. Pollock feed on copepods, euphausiids, and fish (primarily juvenile pollock), and are in turn prey for other fish, marine mammals, and seabirds.

Stock Assessment: The current assessment includes several separate estimators of stock abundance, including combined hydroacoustic and bottom trawl surveys, a CAGEAN model, a Synthesis model, and a standard cohort analysis. B_{msy} (6 million mt) and F_{msy} (0.38) have been estimated for the EBS stock. Beginning in 1997, OFL and ABC rates are based on tiers defined under Amendment 44. Under this definition, OFL is based on a tier 2 fishing mortality rate where $F_{OFL} = F_{MSY} \times F_{30\%} / F_{40\%}$ (=0.58). ABC is based on a tier 2 harvest strategy where $F_{ABC} = F_{40\%}$ (=0.30).

Population Status: The overall population has remained above the Bmsy level. For 1998, exploitable biomass (age 3+) in the Eastern Bering Sea was projected to be 5.8 million mt. Catch specifications were the following: OFL=2,060,000 mt , ABC=1,110,000 mt, TAC=1,110,000 mt. There are early indications of a strong 1996 year class, which would begin to enter the fishery in 2000.

Fishery: Pollock are targeted by trawl gear, but small numbers are also taken as bycatch by longline gear. Participants in the 1995 BSAI fishery included 84 trawl vessels delivering onshore and 102 offshore vessels. The 1995 directed pollock fishery was prosecuted by the inshore sector from January 20-March 1, and August 15-Sept 23. The offshore fishery occurred from January 26-February 21, August 15-September 20, and October 20-23. Most pollock fishing has occurred in the area between Unimak Island and the Pribilofs during the A season, extending north and west of the Pribilof Islands during the B season.

Management: The BSAI Pollock fishery is regulated under the BSAI Groundfish FMP. The FMP controls the fishery through permits and limited entry, catch quotas (TACs), seasons, in-season adjustments, gear restrictions, closed waters, bycatch limits and rates, allocations, regulatory areas, record keeping and reporting requirements, and observer monitoring. Pollock TAC is allocated into a roe season ("A" season) and non-roe season ("B" season). Seven and one-half percent of the TAC is allocated to CDQ groups. The remaining TAC is divided between inshore and offshore harvesters, with 35% to inshore processors, and 65% to offshore processors. Further, a catcher vessel operational area (CVOA) is defined for the pollock B season, within which only catcher vessels may operate.

Economics: Two-thirds of the total ex-vessel value of groundfish in the BSAI is from pollock. In 1995, 1,265,000 mt of pollock was caught in the Eastern Bering Sea, of which about 95% was retained. Average ex-vessel price was about $0.08 per pound. Primary products produced are surimi, fillets, meal, and to a lesser extent mince, roe, and other products.

Catch History: With the decline in yellowfin sole abundance in the early 1960's, and the development of surimi processing, fishing effort in the BSAI shifted to pollock. Catches increased to over 1 million mt from 1970-1976. The fishery was prosecuted primarily by Japan (80% of the catch), and to a lesser extent the USSR. Korean vessels began participating in this fishery in 1976. Joint ventures of the early 1980's were phased out by domestic fleet by 1991. Catches have remained over one million mt since 1984.

Exploitable biomass (mt, hindcast from November 1997 stock assessment), pre-season pre-season catch specifications (mt), and total catches (mt, including discards) of pollock in the EBS, 1980-1998.

Year	EBS Biomass	EBS ABC	EBS TAC	EBS Catch
1980	4,660,000	1,300,000	1,000,000	958,279
1981	9,266,000	1,300,000	1,000,000	973,505
1982	10,625,000	1,300,000	1,000,000	955,964
1983	11,685,000	1,300,000	1,000,000	982,363
1984	11,173,000	1,300,000	1,200,000	1,098,783
1985	13,031,000	1,300,000	1,200,000	1,179,759
1986	11,966,000	1,300,000	1,200,000	1,188,449
1987	12,116,000	1,300,000	1,200,000	1,237,597
1988	11,162,000	1,500,000	1,300,000	1,228,000
1989	9,330,000	1,340,000	1,340,000	1,230,000
1990	7,341,000	1,450,000	1,280,000	1,353,000
1991	5,787,000	1,676,000	1,300,000	1,268,360
1992	9,799,000	1,490,000	1,300,000	1,384,376
1993	12,659,000	1,340,000	1,300,000	1,301,574
1994	11,224,000	1,330,000	1,330,000	1,362,694
1995	10,606,000	1,250,000	1,250,000	1,264,578
1996	8,663,000	1,190,000	1,190,000	1,189,296
1997	7,057,000	1,130,000	1,130,000	1,112,810
1998	5,820,000	1,110,000	1,110,000	

Appendix 2: Excerpts from the PSC Bycatch Regulations (50 CFR 679.21)

§ 679.21 Prohibited species bycatch management.

(a) Applicability.

(1) This section applies to all vessels required to have a Federal fisheries permit under § 679.4.

(2) Except as otherwise provided, this section also applies to all motherships and shoreside processors that receive groundfish from vessels required to have a Federal fisheries permit under § 679.4.

(b) General

(1) Definition. Prohibited species, for the purpose of this part, means any of the species of Pacific salmon (Oncorhynchus spp.), steelhead trout (Oncorhynchus mykiss), halibut, Pacific herring (Clupea harengus pallasi), king crab, and Tanner crab caught by a vessel regulated under this part while fishing for groundfish in the BSAI or GOA, unless retention is authorized by other applicable laws, including the annual management measures published in the Federal Register pursuant to § 300.62 of chapter III of this title.

(2) Prohibited species catch restrictions. The operator of each vessel engaged in directed fishing for groundfish in the GOA or BSAI must:

(i) Minimize its catch of prohibited species.

(ii) Sort its catch as soon as possible after retrieval of the gear and, except as provided under paragraph (c) of this section or § 679.26, must return all prohibited species or parts thereof to the sea immediately, with a minimum of injury, regardless of its condition, after allowing for sampling by an observer if an observer is aboard.

(3) Rebuttable presumption. Except as provided under paragraph (c) of this section, it will be a rebuttable presumption that any prohibited species retained on board a fishing vessel regulated under this part was caught and retained in violation of this section.

(4) Prohibited species taken seaward of the EEZ off Alaska. No vessel fishing for groundfish in the GOA or BSAI may have on board any species listed in this paragraph (b) that was taken in waters seaward of these management areas, regardless of whether retention of such species was authorized by other applicable laws.

(c) Salmon taken in BSAI trawl fishery

(1) Salmon discard. Except as provided in paragraph (c)(3) of this section, the operator of a vessel and the manager of a shoreside processor must not discard any salmon or transfer or process any salmon under the SDP at § 679.26, if the salmon were taken incidental to a directed fishery for BSAI groundfish by vessels using trawl gear until the number of salmon has been determined by an observer and the collection of any scientific data or biological samples from the salmon has been completed.

(2) Salmon retention and storage.

(i) Operators of vessels carrying observers aboard and whose fishing operations allow for sorting of BSAI groundfish catch for salmon must retain all salmon bycatch from each haul in a separate bin or other location that allows an observer free and unobstructed physical access to the salmon to count each fish and collect any scientific data or biological samples. Salmon from different hauls must be retained separately in a manner that identifies the haul from which the salmon were taken.

(ii) Operators of vessels not carrying observers aboard or whose fishing operations do not allow for sorting of BSAI groundfish catch for salmon must ice, freeze, or store in a refrigerated saltwater tank all salmon taken as bycatch in trawl operations for delivery to the processor receiving the vessel's BSAI groundfish catch.

(iii) Processors receiving BSAI groundfish harvested in a directed fishery for groundfish using trawl gear must retain all salmon delivered by each trawl vessel during a weekly reporting period in separate bins marked with the vessel's name and ADF&G fish ticket number(s) for each delivery until a NMFS-certified observer has counted each salmon and collected any scientific data or biological samples from the salmon delivered to the processor by that vessel. Processors without an observer present must store whole salmon in an iced or frozen state until an observer is available to count each fish. Salmon must be stored at a location that allows an observer free and unobstructed physical access to each salmon.

(3) Exemption. Motherships and shoreside processors that are not required to obtain observer coverage during a month under § 679.50(c) and (d) are not required to retain salmon.

(4) Assignment of crew to assist observer. Operators of vessels and managers of shoreside processors that are required to retain salmon under paragraph (c)(1) of this section must designate and identify to the NMFS-certified observer aboard the vessel or at the shoreside processor a crew person or employee to be responsible for sorting, retention, and storage of salmon. Upon request of the NMFS-certified observer, the designated crew person or employee also is responsible for counting salmon and taking biological samples from retained salmon under the direction of the observer.

(5) Release of salmon. Salmon must be returned to Federal waters as soon as is practicable, with a minimum of injury, regardless of condition, following notification by a NMFS-certified observer that the number of salmon has been determined and the collection of any scientific data or biological samples has been completed.

(d) GOA halibut PSC limits. This section is applicable for vessels engaged in directed fishing for groundfish in the GOA.

(1) Notification

(i) Proposed and final limits and apportionments. NMFS will publish annually in the Federal Register proposed and final halibut PSC limits and apportionments thereof in the notification required under § 679.20.

(ii) Modification of limits. NMFS, by notification in the Federal Register, may change the halibut PSC limits during the year for which they were specified, based on new information of

the types set forth in this paragraph (d)(1).

(2) Public comment. NMFS will accept public comment on the proposed halibut PSC limits, and apportionments thereof, for a period of 30 days from the date of publication in the Federal Register. NMFS will consider comments received on proposed halibut limits and, after consultation with the Council, will publish notification in the Federal Register specifying the final halibut PSC limits and apportionments thereof.

(3) Trawl gear proposed halibut limit

(i) Notification. After consultation with the Council, NMFS will publish notification in the Federal Register specifying the proposed halibut PSC limit for vessels using trawl gear.

(ii) Bycatch allowance. The halibut PSC limit specified for vessels using trawl gear may be further apportioned as bycatch allowances to the fishery categories listed in paragraph (d)(3)(iii) of this section, based on each category's proportional share of the anticipated halibut bycatch mortality during a fishing year and the need to optimize the amount of total groundfish harvest under the halibut PSC limit. The sum of all bycatch allowances will equal the halibut PSC limit established under this paragraph (d).

(iii) Trawl fishery categories. For purposes of apportioning the trawl halibut PSC limit among fisheries, the following fishery categories are specified and defined in terms of round-weight equivalents of those GOA groundfish species for which a TAC has been specified under § 679.20:

(A) Shallow-water species fishery. Fishing with trawl gear during any weekly reporting period that results in a retained aggregate catch of pollock, Pacific cod, shallow-water flatfish, flathead sole, Atka mackerel, and "other species" that is greater than the retained aggregate amount of other GOA groundfish species or species group.

(B) Deep-water species fishery. Fishing with trawl gear during any weekly reporting period that results in a retained catch of groundfish and is not a shallow-water species fishery as defined under paragraph (d)(3)(iii)(A) of this section.

(4) Hook-and-line and pot gear fisheries

(i) Notification. After consultation with the Council, NMFS will publish notification in the Federal Register specifying the proposed and final halibut PSC limits for vessels using hook-and-line gear. The notification also may specify a halibut PSC limit for the pot gear fisheries.

(ii) Halibut bycatch allowance. The halibut PSC limit specified for vessels using hook-and-line gear may be further apportioned, as bycatch allowances, to the fishery categories listed in paragraph (d)(4)(iii) of this section, based on each category's proportional share of the anticipated halibut bycatch mortality during a fishing year and the need to optimize the amount of total groundfish harvest under the halibut PSC limit. The sum of all bycatch allowances will equal the halibut PSC limit established under this paragraph (d).

(iii) Hook-and-line fishery categories. For purposes of apportioning the hook-and-line halibut PSC limit among fisheries, the following fishery categories are specified and defined in terms of round-weight equivalents of those GOA groundfish species for which a TAC has been specified under § 679.20.

(A) Demersal shelf rockfish in the Southeast Outside District. Fishing with hook-and-line gear in the Southeast Outside District of the GOA Eastern Regulatory Area (SEEO) during any weekly reporting period that results in a retained catch of demersal shelf rockfish that is greater than the retained amount of any other fishery category defined under this paragraph (d)(4)(iii).

(B) Sablefish fishery. Fishing with hook-and-line gear during any weekly reporting period that results in a retained catch of sablefish that is greater than the retained amount of any other fishery category defined under this paragraph (d)(4)(iii).

(C) Other hook-and-line fishery. Fishing with hook-and-line gear during any weekly reporting period that results in a retained catch of groundfish and is not a demersal shelf rockfish fishery or a sablefish fishery defined under paragraphs (d)(4)(iii)(A) and (B) of this section.

(5) Seasonal apportionments

(i) General. NMFS, after consultation with the Council, may apportion each halibut PSC limit or bycatch allowance specified under this paragraph (d) on a seasonal basis.

(ii) Factors to be considered. NMFS will base any seasonal apportionment of a halibut PSC limit or bycatch allowance on the following types of information:

(A) Seasonal distribution of halibut.

(B) Seasonal distribution of target groundfish species relative to halibut distribution.

(C) Expected halibut bycatch needs, on a seasonal basis, relative to changes in halibut biomass and expected catches of target groundfish species.

(D) Expected variations in bycatch rates throughout the fishing year.

(E) Expected changes in directed groundfish fishing seasons.

(F) Expected start of fishing effort.

(G) Economic effects of establishing seasonal halibut allocations on segments of the target groundfish industry.

(iii) Unused seasonal apportionments. Unused seasonal apportionments of halibut PSC limits specified for trawl, hook-and-line, or pot gear will be added to the respective seasonal apportionment for the next season during a current fishing year.

(iv) Seasonal apportionment exceeded. If a seasonal apportionment of a halibut PSC limit specified for trawl, hook-and-line, or pot gear is exceeded, the amount by which the seasonal apportionment is exceeded will be deducted from the respective apportionment for the next season during a current fishing year.

(6) Apportionment among regulatory areas and districts. Each halibut PSC limit specified under this paragraph (d) also may be apportioned among the GOA regulatory areas and districts.

(7) Halibut PSC closures.

(i) Trawl gear fisheries. If, during the fishing year, the Regional Administrator determines that U.S. fishing vessels participating in either of the trawl fishery categories listed in paragraph (d)(3)(iii)(A) or (B) of this section will catch the halibut bycatch allowance, or apportionments thereof, specified for that fishery category under paragraph (d)(1) of this section, NMFS will publish notification in the Federal Register closing the entire GOA or the applicable regulatory area or district to directed fishing with trawl gear for each species and/or species group that comprises that fishing category; provided, however, that when the halibut bycatch allowance, or seasonal apportionment thereof, specified for the shallow-water species fishery is reached, fishing for pollock by vessels using pelagic trawl gear may continue, consistent with other provisions of this part.

(ii) Hook-and-line fisheries. If, during the fishing year, the Regional Administrator determines that U.S. fishing vessels participating in any of the three hook-and-line gear fishery categories listed under paragraph (d)(4)(iii) of this section will catch the halibut bycatch allowance, or apportionments thereof, specified for that fishery category under paragraph (d)(1) of this section, NMFS will publish notification in the Federal Register closing the entire GOA or the applicable regulatory area or district to directed fishing with hook-and-line gear for each species and/or species group that comprises that fishing category.

(iii) Pot gear fisheries. If, during the fishing year, the Regional Administrator determines that the catch of halibut by operators of vessels using pot gear to participate in a directed fishery for groundfish will reach the halibut PSC limit, or seasonal apportionment thereof, NMFS will publish notification in the Federal Register prohibiting directed fishing for groundfish by vessels using pot gear for the remainder of the season to which the halibut PSC limit or seasonal apportionment applies.

(iv) nonpelagic trawl gear fisheries--(A) Continued fishing under specified conditions. When the vessels to which a halibut PSC limit applies have caught an amount of halibut equal to that PSC, the Regional Administrator may, by notification in the Federal Register, allow some or all of those vessels to continue to fish for groundfish using nonpelagic trawl gear under specified conditions, subject to the other provisions of this part.

(B) Factors to be considered. In authorizing and conditioning such continued fishing with bottom-trawl gear, the Regional Administrator will take into account the following considerations, and issue relevant findings:

(1) The risk of biological harm to halibut stocks and of socio-economic harm to authorized halibut users posed by continued bottom trawling by these vessels.

(2) The extent to which these vessels have avoided incidental halibut catches up to that point in the year.

(3) The confidence of the Regional Administrator in the accuracy of the estimates of incidental halibut catches by these vessels up to that point in the year.

(4) Whether observer coverage of these vessels is sufficient to assure adherence to the prescribed conditions and to alert the Regional Administrator to increases in their incidental halibut catches.

(5) The enforcement record of owners and operators of these vessels, and the confidence of the Regional Administrator that adherence to the prescribed conditions can be assured in light of available enforcement resources.

(c) BSAI PSC limits

(1) Trawl gear

(i) Red king crab in Zone 1. The PSC limit of red king crab caught by trawl vessels while engaged in directed fishing for groundfish in Zone 1 during any fishing year will be specified annually by NMFS, after consultation with the Council, based on abundance and spawning biomass of red king crab using the criteria set out under paragraphs (e)(1)(i)(A) through (C) of this section.

(A) When the number of mature female red king crab is at or below the threshold of 8.4 million mature crabs or the effective spawning biomass is less than or equal to 14.5 million lb (6,577 mt), the Zone 1 PSC limit will be 35,000 red king crabs.

(B) When the number of mature female red king crabs is above the threshold of 8.4 million mature crabs and the effective spawning biomass is greater than 14.5 but less than 55 million lb (24,948 mt), the Zone 1 PSC limit will be 100,000 red king crabs.

(C) When the number of mature female red king crabs is above the threshold of 8.4 million mature crabs and the effective spawning biomass is equal to or greater than 55 million lb, the Zone 1 PSC limit will be 200,000 red king crabs.

(ii) Tanner crab (C. bairdi). The PSC limit of C. bairdi crabs caught by trawl vessels while engaged in directed fishing for groundfish in Zones 1 and 2 during any fishing year will be specified annually by NMFS under paragraph (e)(6) of this section, based on total abundance of C. bairdi crabs as indicated by the NMFS annual bottom trawl survey, using the criteria set out under paragraphs (e)(1)(ii)(A) and (B) of this section.

(A) Zone 1. When the total abundance of C. bairdi crabs is:

(1) 150 million animals or less, the PSC limit will be 0.5 percent of the total abundance.

(2) Over 150 million to 270 million animals, the PSC limit will be 750,000 animals.

(3) Over 270 million to 400 million animals, the PSC limit will be 850,000 animals.

(4) Over 400 million animals, the PSC limit will be 1,000,000 animals.

(B) Zone 2. When the total abundance of C. bairdi crabs is:

(1) 175 million animals or less, the PSC limit will be 1.2 percent of the total abundance.

(2) Over 175 million to 290 million animals, the PSC limit will be 2,100,000 animals.

(3) Over 290 million to 400 million animals, the PSC limit will be 2,550,000 animals.

(4) Over 400 million animals, the PSC limit will be 3,000,000 animals.

(iii) C. opilio. The PSC limit of C. opilio caught by trawl vessels while engaged in directed fishing for groundfish in the COBLZ will be specified annually by NMFS under paragraph (e)(6) of this section, based on total abundance of C. opilio as indicated by the NMFS annual bottom trawl survey using the following criteria:

(A) PSC Limit. The PSC limit will be 0.1133 percent of the total abundance, unless;

(B) Minimum PSC Limit. If 0.1133 percent multiplied by the total abundance is less than 4.5 million, then the minimum PSC limit will be 4.5 million animals; or

(C) Maximum PSC Limit. If 0.1133 percent multiplied by the total abundance is greater than 13 million, then the maximum PSC limit will be 13 million animals.

(iv) Halibut. The PSC limit of halibut caught while conducting any trawl fishery for groundfish in the BSAI during any fishing year is an amount of halibut equivalent to 3,775 mt of halibut mortality.

(v) Pacific herring. The PSC limit of Pacific herring caught while conducting any domestic trawl fishery for groundfish in the BSAI is 1 percent of the annual eastern Bering Sea herring biomass. The PSC limit will be apportioned into annual herring PSC allowances, by target fishery, and will be published along with the annual herring PSC limit in the Federal Register with the proposed and final groundfish specifications defined in § 679.20.

(vi) Chinook salmon. The PSC limit of chinook salmon caught while conducting any trawl fishery for groundfish in the BSAI between January 1 and April 15 is 48,000 fish.

(vii) Non-chinook salmon. The PSC limit of non-chinook salmon caught by vessels using trawl gear during August 15 through October 14 in the CVOA is 42,000 fish.

(2) Nontrawl gear, halibut. The PSC limit of halibut caught while conducting any nontrawl fishery for groundfish in the BSAI during any fishing year is an amount of halibut equivalent to 900 mt of halibut mortality.

(3) PSC apportionment to PSQ. 7.5 percent of each PSC limit established by paragraphs (e)(1) and (e)(2) of this section is allocated to the groundfish CDQ program as PSQ reserve.

(4) PSC apportionment to trawl fisheries

(i) General. NMFS, after consultation with the Council, will apportion each PSC limit set forth in paragraphs (e)(1)(i) through (vii) of this section into bycatch allowances for fishery categories defined in paragraph (e)(3)(iv) of this section, based on each category's proportional share of the anticipated incidental catch during a fishing year of prohibited species for which a PSC limit is specified and the need to optimize the amount of total groundfish harvested under established PSC limits. The sum of all bycatch allowances of any prohibited species will equal its PSC limit.

(ii) Red king crab, C. bairdi, C. opilio, and halibut--(A) General. For vessels engaged in directed fishing for groundfish in the GOA or BSAI, the PSC limits for red king crabs, C. bairdi, C. opilio, and halibut will be apportioned to the trawl fishery categories defined in paragraphs (e)(3)(iv)(B) through (F) of this section.

(B) Red King Crab Savings Subarea (RKCSS). (1) The RKCSS is the portion of the RKCSA between 56°00' and 56°10' N. lat. Notwithstanding other provisions of this part, vessels using nonpelagic trawl gear in the RKCSS may engage in directed fishing for groundfish in a given year, if the ADF&G had established a guideline harvest level the previous year for the red king crab fishery in the Bristol Bay area.

(2) When the RKCSS is open to vessels fishing for groundfish with nonpelagic trawl gear under (e)(3)(ii)(B)(1) of this section, NMFS, after consultation with the Council, will specify an amount of the red king crab bycatch limit annually established under paragraph(e)(1)(i) of this section for the RKCSS. The amount of the red king crab bycatch limit specified for the RKCSS will not exceed an amount equivalent to 35 percent of the trawl bycatch allowance specified for the rock sole/flathead sole/"other flatfish" fishery category under this paragraph (e)(3) and will be based on the need to optimize the groundfish harvest relative to red king crab bycatch.

(C) Incidental catch in midwater pollock fishery. Any amount of red king crab, C. bairdi, C. opilio, or halibut that is incidentally taken in the midwater pollock fishery as defined in paragraph (e)(3)(iv)(A) of this section will be counted against the bycatch allowances specified for the pollock/Atka mackerel/"other species" category defined in paragraph (e)(3)(iv)(F) of this section.

(iii) Pacific herring. The PSC limit for Pacific herring will be apportioned to the BSAI trawl fishery categories defined in paragraphs (e)(3)(iv)(A) through (F) of this section.

(iv) Trawl fishery categories. For purposes of apportioning trawl PSC limits among fisheries, the following fishery categories are specified and defined in terms of round-weight equivalents of those groundfish species or species groups for which a TAC has been specified under § 679.20.

(A) Midwater pollock fishery. Fishing with trawl gear during any weekly reporting period that results in a catch of pollock that is 95 percent or more of the total amount of groundfish caught during the week.

(B) Flatfish fishery. Fishing with trawl gear during any weekly reporting period that results in a retained aggregate amount of rock sole, "other flatfish," and yellowfin sole that is greater than the retained amount of any other fishery category defined under this paragraph (e)(3)(iv).

(1) Yellowfin sole fishery. Fishing with trawl gear during any weekly reporting period that is defined as a flatfish fishery under this paragraph (e)(3)(iv)(B) and results in a retained amount of yellowfin sole that is 70 percent or more of the retained aggregate amount of rock sole, "other flatfish," and yellowfin sole.

(2) Rock sole/flathead sole/"other flatfish" fishery. Fishing with trawl gear during any weekly reporting period that is defined as a flatfish fishery under this paragraph (e)(3)(iv)(B) and is not a yellowfin sole fishery as defined under paragraph (e)(3)(iv)(B)(1) of this section.

(C) Greenland turbot/arrowtooth flounder/sablefish fishery. Fishing with trawl gear during any weekly reporting period that results in a retained aggregate amount of Greenland turbot, arrowtooth flounder, and sablefish that is greater than the retained amount of any other fishery category defined under this paragraph (e)(3)(iv).

(D)Rockfish fishery. Fishing with trawl gear during any weekly reporting period that results in a retained aggregate amount of rockfish species that is greater than the retained amount of any other fishery category defined under this paragraph (e)(3)(iv).

(E) Pacific cod fishery. Fishing with trawl gear during any weekly reporting period that results in a retained aggregate amount of Pacific cod that is greater than the retained amount of any other groundfish fishery category defined under this paragraph (e)(3)(iv).

(F) Pollock/Atka mackerel/"other species." Fishing with trawl gear during any weekly reporting period that results in a retained aggregate amount of pollock other than pollock harvested in the midwater pollock fishery defined under paragraph (e)(3)(iv)(A) of this section, Atka mackerel, and "other species" that is greater than the retained amount of any other fishery category defined under this paragraph (e)(3)(iv).

(5) Halibut apportionment to nontrawl fishery categories

(i) General. NMFS, after consultation with the Council, may apportion the halibut PSC limit for nontrawl gear set forth under paragraph (e)(2) of this section into bycatch allowances for nontrawl fishery categories defined under paragraph (e)(4)(ii) of this section, based on each category's proportional share of the anticipated bycatch mortality of halibut during a fishing year and the need to optimize the amount of total groundfish harvested under the nontrawl halibut PSC limit. The sum of all halibut bycatch allowances will equal the halibut PSC limit established in paragraph (e)(2) of this section.

(ii) Nontrawl fishery categories. For purposes of apportioning the nontrawl halibut PSC limit among fisheries, the following fishery categories are specified and defined in terms of round-weight equivalents of those BSAI groundfish species for which a TAC has been specified under § 679.20.

(A) Pacific cod hook-and-line fishery. Fishing with hook-and-line gear during any weekly reporting period that results in a retained catch of Pacific cod that is greater than the retained amount of any other groundfish species.

(B) Sablefish hook-and-line fishery. Fishing with hook-and-line gear during any weekly reporting period that results in a retained catch of sablefish that is greater than the retained amount of any other groundfish species.

(C) Groundfish jig gear fishery. Fishing with jig gear during any weekly reporting period that results in a retained catch of groundfish.

(D) Groundfish pot gear fishery. Fishing with pot gear under restrictions set forth in § 679.24(b) during any weekly reporting period that results in a retained catch of groundfish.

(E) Other nontrawl fisheries. Fishing for groundfish with nontrawl gear during any weekly reporting period that results in a retained catch of groundfish and does not qualify as a Pacific cod hook-and-line fishery, a sablefish hook-and-line fishery, a jig gear fishery, or a groundfish pot gear fishery as defined under paragraph (e)(4)(ii) of this section.

(6) Seasonal apportionments of bycatch allowances

(i) General. NMFS, after consultation with the Council, may apportion fishery bycatch allowances on a seasonal basis.

(ii) Factors to be considered. NMFS will base any seasonal apportionment of a bycatch allowance on the following types of information:

(A) Seasonal distribution of prohibited species;

(B) Seasonal distribution of target groundfish species relative to prohibited species distribution;

(C) Expected prohibited species bycatch needs on a seasonal basis relevant to change in prohibited species biomass and expected catches of target groundfish species;

(D) Expected variations in bycatch rates throughout the fishing year;

(E) Expected changes in directed groundfish fishing seasons;

(F) Expected start of fishing effort; or

(G) Economic effects of establishing seasonal prohibited species apportionments on segments of the target groundfish industry.

(iii) Seasonal trawl fishery bycatch allowances

(A) Unused seasonal apportionments. Unused seasonal apportionments of trawl fishery bycatch allowances made under this paragraph (e)(5) will be added to its respective fishery bycatch allowance for the next season during a current fishing year.

(B) Seasonal apportionment exceeded. If a seasonal apportionment of a trawl fishery bycatch allowance made under paragraph (d)(5) of this section is exceeded, the amount by which the seasonal apportionment is exceeded will be deducted from its respective apportionment for the next season during a current fishing year.

(iv) Seasonal nontrawl fishery bycatch allowances

(A) Unused seasonal apportionments. Any unused portion of a seasonal nontrawl fishery bycatch allowance made under this paragraph (e)(5) will be reapportioned to the fishery's remaining seasonal bycatch allowances during a current fishing year in a manner determined by NMFS, after consultation with the Council, based on the types of information listed under paragraph (e)(5)(ii) of this section.

(B) Seasonal apportionment exceeded. If a seasonal apportionment of a nontrawl fishery bycatch allowance made under this paragraph (e)(5) is exceeded, the amount by which the seasonal apportionment is exceeded will be deducted from the fishery's remaining seasonal bycatch allowances during a current fishing year in a manner determined by NMFS, after consultation with the Council, based on the types of information listed under paragraph (e)(5)(ii) of this section.

(7) Notification--(i) General. NMFS will publish annually in the Federal Register the annual red king crab PSC limit, and, if applicable, the amount of this PSC limit specified for the RKCSS, the annual C. bairdi PSC limit, the annual C. opilio PSC limit, the proposed and final PSQ reserve amounts, the proposed and final bycatch allowances, the seasonal apportionments thereof and the manner in which seasonal apportionments of non-trawl fishery bycatch allowances will be managed as required by paragraph (e) of this section.

(ii) Public comment. Public comment will be accepted by NMFS on the proposed annual red king crab PSC limit and, if applicable, the amount of this PSC limit specified for the RKCSS, the annual C. bairdi PSC limit, the annual C. opilio PSC limit, the proposed and final bycatch allowances, seasonal apportionments thereof, and the manner in which seasonal apportionments of nontrawl fishery bycatch allowances will be managed, for a period of 30 days from the date of publication in the Federal Register.

(8) Trawl PSC closures

(i) Exception. When a bycatch allowance, or seasonal apportionment thereof, specified for the pollock/Atka mackerel/"other species" fishery category is reached, only directed fishing for pollock is closed to trawl vessels using non-pelagic trawl gear.

(ii) Red king crab or C. bairdi Tanner crab, Zone 1, closure-- (A) General. Except as provided in paragraph (e)(7)(i) of this section, if, during the fishing year, the Regional Administrator determines that U.S. fishing vessels participating in any of the fishery categories listed in paragraphs (e)(3)(iv)(B) through (F) of this section will catch the Zone 1 bycatch allowance, or seasonal apportionment thereof, of red king crabs or C. bairdi Tanner crabs specified for that fishery category under paragraph (e)(3) of this section, NMFS will publish in the Federal Register the closure of Zone 1, including the RKCSS, to directed fishing for each species and/or species group in that fishery category for the remainder of the year or for the remainder of the season.

(B) RKCSS. If, during the fishing year the Regional Administrator determines that the amount of the red king crab PSC limit that is specified for the RKCSS under § 679.21(e)(3)(ii)(B) of this section will be caught, NMFS will publish in the Federal Register the closure of the RKCSS to directed fishing for groundfish with nonpelagic trawl gear for the remainder of the year.

(iii) C. bairdi Tanner crab, Zone 2, closure. Except as provided in paragraph (e)(7)(i) of this section, if, during the fishing year, the Regional Administrator determines that U.S. fishing vessels participating in any of the fishery categories listed in paragraphs (e)(3)(iv)(B) through (F) of this section will catch the Zone 2 bycatch allowance, or seasonal apportionment thereof, of C. bairdi Tanner crabs specified for that fishery category under paragraph (e)(3) of this section, NMFS will publish in the Federal Register the closure of Zone 2 to directed fishing for each species and/or species group in that fishery category for the remainder of the year or for the remainder of the season.

(iv) C. opilio, C. Opilio Bycatch Limitation Zone (COBLZ), closure--(A) C. opilio Bycatch Allowance. Except as provided in paragraph (e)(7)(i) of this section, if, during the fishing year, the Regional Administrator determines that U.S. fishing vessels participating in any of the fishery categories listed in paragraphs (e)(3)(iv)(B) through (F) of this section will catch the COBLZ bycatch allowance, or seasonal apportionment thereof, of C. opilio specified for that fishery category under paragraph (e)(3) of this section, NMFS will publish in the Federal Register the closure of the COBLZ, as defined in paragraph (e)(7)(iv)(B) of this section, to directed fishing for each species and/or species group in that fishery category for the remainder of the year or for the remainder of the season.

(B) C. Opilio Bycatch Limitation Zone. The C. Opilio Bycatch Limitation Zone is an area defined as that portion of the Bering Sea Subarea north of 56°30' N. lat. that is west of a line connecting the following coordinates in the order listed:

56°30' N. lat.,	165°00' W. long.
58°00' N. lat.,	165°00' W. long.
59°30' N. lat.,	170°00' W. long.

and north along 170°00' W. long. to its intersection with the U.S.-Russian Boundary.

(v) Halibut closure. Except as provided in paragraph (e)(7)(i) of this section, if, during the fishing year, the Regional Administrator determines that U.S. fishing vessels participating in any of the trawl fishery categories listed in paragraphs (e)(3)(iv)(B) through (F) of this section in the BSAI will catch the halibut bycatch allowance, or seasonal apportionment thereof, specified for that fishery category under paragraph (e)(3) of this section, NMFS will publish in the Federal Register the closure of the entire BSAI to directed fishing for each species and/or species group in that fishery category for the remainder of the year or for the remainder of the season.

(vi) Pacific herring

(A) Closure. Except as provided in paragraph (e)(7)(v)(B) of this section, if, during the fishing year, the Regional Administrator determines that U.S. fishing vessels participating in any of the fishery categories listed in paragraphs (e)(3)(iv)(A) through (F) of this section in the BSAI will catch the herring bycatch allowance, or seasonal apportionment thereof, specified for that fishery category under paragraph (e)(3) of this section, NMFS will publish in the Federal Register the closure of the Herring Savings Area as defined in Figure 4 of this part to directed fishing for each species and/or species group in that fishery category.

(B) **Exceptions**

(1) Midwater pollock. When the midwater pollock fishery category reaches its specified bycatch allowance, or seasonal apportionment thereof, the Herring Savings Areas are closed to directed fishing for pollock with trawl gear.

(2) Pollock/Atka mackerel/"other species". When the pollock/Atka mackerel/"other species" fishery category reaches its specified bycatch allowance, or seasonal apportionment thereof, the Herring Savings Areas are closed to directed fishing for pollock by trawl vessels using nonpelagic trawl gear.

(vii) Chum salmon

(A) If the Regional Administrator determines that 42,000 non-chinook salmon have been caught by vessels using trawl gear during August 15 through October 14 in the CVOA defined under § 679.22(a)(5), NMFS will prohibit fishing with trawl gear for the remainder of the period September 1 through October 14 in the Chum Salmon Savings Area as defined in paragraph (e)(7)(vi)(B) of this section.

(B) Chum Salmon Savings Area of the CVOA. The Chum Salmon Savings Area is an area defined by straight lines connecting the following coordinates in the order listed:

56°00' N. lat., 167°00' W. long.
56°00' N. lat., 165°00' W. long.
55°30' N. lat., 165°00' W. long.
55°30' N. lat., 164°00' W. long.
55°00' N. lat., 164°00' W. long.
55°00' N. lat., 167°00' W. long.
56°00' N. lat., 167°00' W. long.

(viii) Chinook salmon

(A) Closure. When the Regional Administrator determines that 48,000 chinook salmon have been caught by vessels using trawl gear in the BSAI during the time period from January 1 through April 15, NMFS will prohibit fishing with trawl gear for the remainder of that period within the Chinook Salmon Savings Area defined in paragraph (e)(7)(vii)(B) of this section.

(B) Chinook Salmon Savings Area. The Chinook Salmon Savings Area is defined in the following three areas of the BSAI:

(1) The area defined by straight lines connecting the following coordinates in the order listed:

56°30' N. lat., 171°00' W. long.
56°30' N. lat., 169°00' W. long.
56°00' N. lat., 169°00' W. long.
56°00' N. lat., 171°00' W. long.
56°30' N. lat., 171°00' W. long.

(2) The area defined by straight lines connecting the following coordinates in the order listed:

54°00' N. lat., 171°00' W. long.
54°00' N. lat., 170°00' W. long.
53°00' N. lat., 170°00' W. long.
53°00' N. lat., 171°00' W. long.
54°00' N. lat., 171°00' W. long.

(3) The area defined by straight lines connecting the following coordinates in the order listed:

56°00' N. lat., 165°00' W. long.
56°00' N. lat., 164°00' W. long.
55°00' N. lat., 164°00' W. long.
55°00' N. lat., 165°00' W. long.
54°30' N. lat., 165°00' W. long.
54°30' N. lat., 167°00' W. long.
55°00' N. lat., 167°00' W. long.
55°00' N. lat., 166°00' W. long.
55°30' N. lat., 166°00' W. long.
55°30' N. lat., 165°00' W. long.
56°00' N. lat., 165°00' W. long.

(9) Nontrawl halibut closures. If, during the fishing year, the Regional Administrator determines that U.S. fishing vessels participating in any of the nontrawl fishery categories listed under paragraph (e)(4) of this section will catch the halibut bycatch allowance, or seasonal apportionment thereof, specified for that fishery category under paragraph (e)(4)(ii) of this section, NMFS will publish in the Federal Register the closure of the entire BSAI to directed fishing with the relevant gear type for each species and/or species group in that fishery category.