

DRAFT for Initial Review

ENVIRONMENTAL ASSESSMENT/ REGULATORY IMPACT REVIEW/ INITIAL REGULATORY FLEXIBILITY ANALYSIS

For an Amendment to the Fishery Management Plan (FMP) for Groundfish of the Bering Sea and Aleutian Islands Management Area (BSAI) (#89), and regulatory amendments for Bering Sea Habitat Conservation

March 2007

Lead Agency: National Marine Fisheries Service
National Oceanic and Atmospheric Administration
Alaska Region

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Abstract: This Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis (EA/RIR/IRFA) evaluates alternatives to further conserve fish habitat in the Eastern Bering Sea (EBS). In February 2005, the Council took final action on the EFH environmental impact statement (EIS) to adopt a suite of measures to conserve EFH in the Gulf of Alaska and Aleutian Islands from potential impacts due to fishing. At the time of final action, the Council took no action to implement additional conservation measures in the EBS. Since that action more recent gear modification research has been completed. The Council and NMFS are now considering additional precautionary measures to minimize potential adverse effects of fishing in the EBS. This EA tiers off of the 2005 EFH EIS and considers open and closed areas as well as gear modifications for the non-pelagic trawl fishery.

EXECUTIVE SUMMARY

The purpose of this analysis is to evaluate impacts of alternatives to further conserve fish habitat in the Eastern Bering Sea. In February 2005, the Council took final action on the EFH EIS (NMFS 2006a) to adopt a suite of measures to conserve EFH in the GOA and AI from potential impacts due to fishing. At the time of final action, the Council took no action to implement additional conservation measures in the Eastern Bering Sea, as the analysis found such additional measures were neither required by law nor necessary or practicable measures. Further, the alternatives considered for Bering Sea habitat conservation required additional ‘fine-tuning’ before they could be considered as practicable measures. Alternatives to modify gear did not have sufficient research to understand what the scale of beneficial effects on habitat, and the alternatives for the open areas had left out historically important and lucrative fishing grounds, and included rotating closures that were found to have questionable merit. So to address these issues, the Council notified the public that it planned to take a more focused examination of potential measures to further conserve fish habitat, including EFH, in the Eastern Bering Sea by initiating a separate analysis that would tier off of the EFH EIS. This analysis provides an examination of a range of reasonable alternatives to conserve fish habitat in the Eastern Bering Sea.

The need for this analysis is the recognition that additional analysis beyond the EFH EIS is needed to consider measures for the conservation of fish habitat in the Bering Sea. New information on potential gear modifications to protect bottom habitat has become available since the EFH EIS and allows for a gear modification alternative that could not have been considered in the EFH EIS. The Council wishes to protect fish habitat in support of commercial fisheries and subsistence activities in the Eastern Bering Sea, ensuring consistency with national standard 8 of section 301 of the Magnuson-Stevens Fishery Conservation and Management Act. Thus, evaluation of additional measures, and possible implementation of them, provides a precautionary approach in light of incomplete knowledge of fish dependence upon habitat, and the effects of fisheries on that habitat. The problem statement adopted by the Council for this analysis is provided below:

Problem Statement: The Council intends to evaluate potential new fishery management measures to protect Essential Fish Habitat (EFH) in the Bering Sea. The analysis will tier off of the 2005 EFH Environmental Impact Statement and will consider as alternatives open and closed areas and gear modifications. The purpose of the analysis is to consider practicable and precautionary management measures to reduce potential adverse effects of fishing on EFH and to support the continued productivity of managed fish species.

This EA/RIR/IRFA evaluates the impacts of two primary alternatives to the status quo, along with several minor components which are considered as options to the alternatives. These options can be chosen in any combination with any of the alternatives. The alternatives and options are as follows:

Alternative 1: Status quo. No additional measures would be taken to conserve benthic habitat.

Alternative 2: Open area approach. This alternative would prohibit non-pelagic trawling outside of a designated ‘open area’. Non-pelagic trawling would be prohibited in the northernmost shelf area and the deepwater basin area of the Bering Sea. There is only one open area analyzed, which is based on the EFH EIS area, modified using non-pelagic trawl effort distribution data through 2005. Note that the open area approach will contain the boundaries for the Etolin Strait Area as negotiated by representatives of these coastal communities and the flatfish industry.

Alternative 3: Gear modifications. This alternative would require gear modifications for all non-pelagic trawl gear used in flatfish target fisheries. Specifically, this alternative would require discs on non-pelagic trawl sweeps to reduce seafloor contact and/or increase clearance between the sweep and substrate. A performance standard of at least 2.5 inches elevation of the sweep from the bottom would be required.

The options below could be selected in combination with any Alternative; more than one option can be chosen.

Option 1. Close the area around Saint Matthew to non-pelagic trawling. This area would be configured such that the area near St. Matthew Island is closed to conserve blue king crab habitat

Option 2. Close an area to non-pelagic trawling around Nunivak Island with the southern border extending along the nearshore portion of Etolin Strait. This area would be configured such that the area around Nunivak Island and Etolin Strait is closed to conserve nearshore habitats, and minimize potential interactions with community use and subsistence fisheries taking place in the nearshore areas.

Option 3. Close an area to non-pelagic trawling around Nunivak Island with the southern border extending along the nearshore portion of Etolin Strait and Kuskokwim Bay. This area would be configured such that the area in southern Etolin Strait and Kuskokwim Bay is closed to conserve nearshore habitat and minimize potential interactions with community use and subsistence fisheries taking place in the nearshore areas. The boundaries of this closure area are the result of negotiations by representatives of the flatfish industry and coastal communities.

Option 4: Close an area to non-pelagic trawling from the northern boundary line of the open area under Alternative 2, stretching from the Russian border around the southern end of St. Matthew Island to and around the southern portion of Nunivak Island and across Kuskokwim Bay to Cape Newenham and designate it as the Northern Bering Sea Experimental Fishing Area. The Council requests the NOAA/NMFS Alaska Fisheries Science Center design an adaptive management experiment in the closed northern area described under this option to study the effects of non-pelagic trawling in previously untrawled areas. The study should include open and closed areas and appropriate monitoring to study fishing impacts on benthic communities and ecological process, particularly as this relates to juvenile snow crab. The adaptive management experiment design will include review by the SSC. NMFS will provide the draft adaptive management experiment design to the Council for review within 18 months following the Federal Register publication of the final rule for this action.

Option 5: Close the area to non-pelagic trawling around St. Lawrence Island. This area would be configured such that the area around St. Lawrence Island is closed to non-pelagic gear to conserve blue king crab habitat and minimize potential interactions with community use and subsistence fisheries taking place in nearshore areas.

The analysis of direct, indirect and cumulative effects for the proposed action indicated no significant impacts on the human environment from the alternatives. None of the Alternatives place significant gross first wholesale revenues at risk that cannot easily be mitigated with minimal to no added cost to the primary affected head and gut catcher processor fleet sector. Some Western community concern has been presented and may need addressing in this analysis in terms of buffer zones for subsistence use close to villages or used shorelines. Ongoing discussions are occurring amongst the fishing industry and the communities on this issue. The separate options may address some of these concerns.

The status quo provides protection for vulnerable benthic habitat with existing trawl closures bottom trawl closures. The EFH EIS (NMFS 2006a) concluded that no additional measures were neither required by law nor necessary or practicable measures. Thus, Alternative 1 is not likely to result in any significant effects regarding habitat, target species, non-target resources, protected species or the ecosystem.

The impacts of Alternative 2 likely are similar in magnitude to Alternative 1 due to the slight size change of the open areas and the status quo given the recent and historic distribution of fishing effort. From an environmental perspective, Alternative 2 may have beneficial effects on Steller's Eiders and Spectacled Eiders and have insignificant short-term effects regarding habitat, target species, non-target resources, protected species or the ecosystem. Nevertheless, an open area approach may be a precautionary measure in terms habitat protection by preventing northward expansion of the bottom trawl fishery. Basically, Alternative 2 would set aside areas that

would remain in a relatively pristine condition in the future. Alternative 2 would have some economic costs to the fishery relative to options to protect communities as well as future northward fishery expansion in particular to the H&G catcher processor sector. Under the current fishery, however, these impacts are minor.

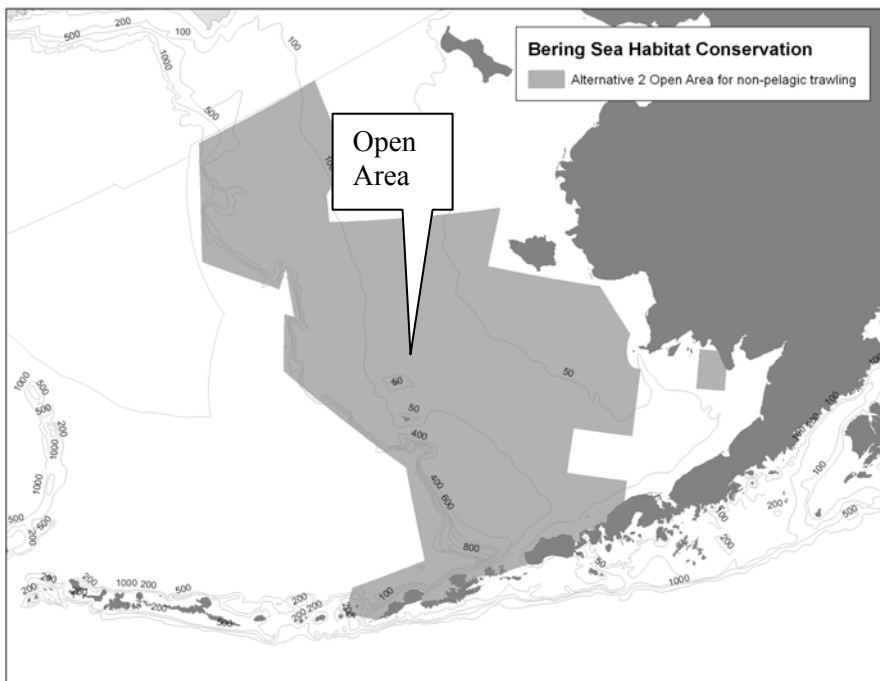


Figure ES- 1 Alternative 2. Open Area Approach for Bering Sea. This alternative would prohibit non-pelagic trawling outside of a designated ‘open area’. Non-pelagic trawling would be prohibited in the northernmost shelf area and the deepwater basin area of the Bering Sea.

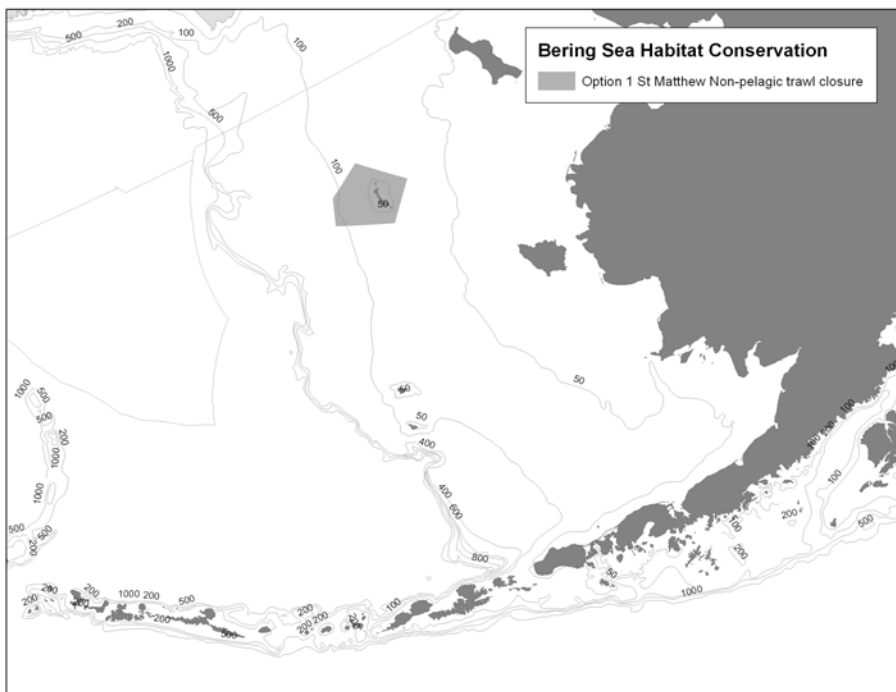


Figure ES- 2 Option 1. Close the area around Saint Matthew to non-pelagic trawling to conserve blue king crab habitat.

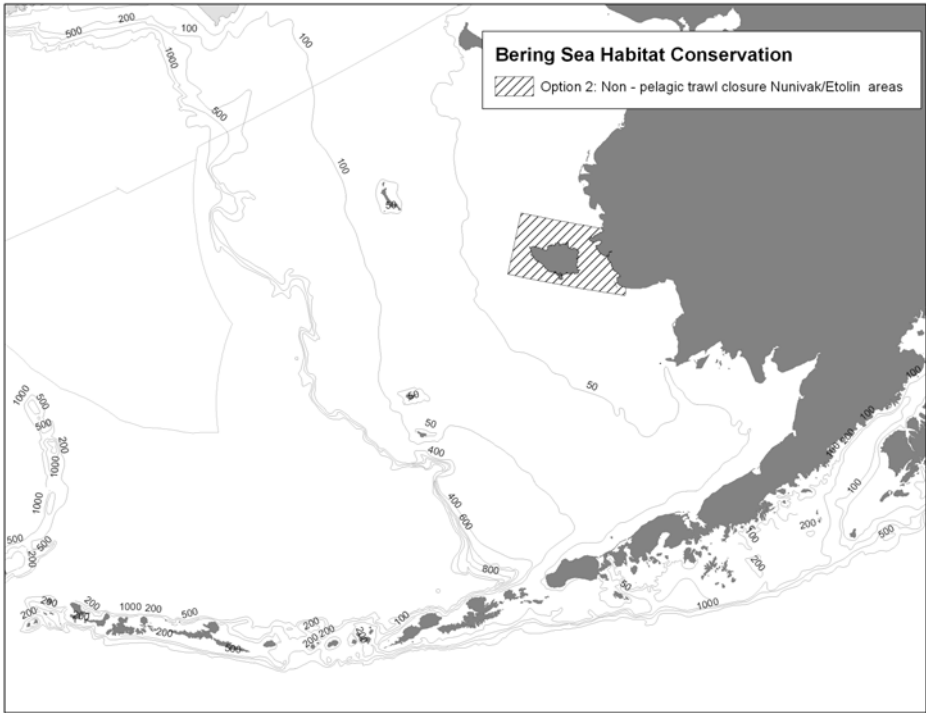


Figure ES- 3 Option 2. Close an area to non-pelagic trawling around Nunivak Island with the southern border extending along the nearshore portion of Etolin Strait such that the area is closed to conserve nearshore habitats, and minimize potential interactions with community use and subsistence fisheries taking place in the nearshore areas.

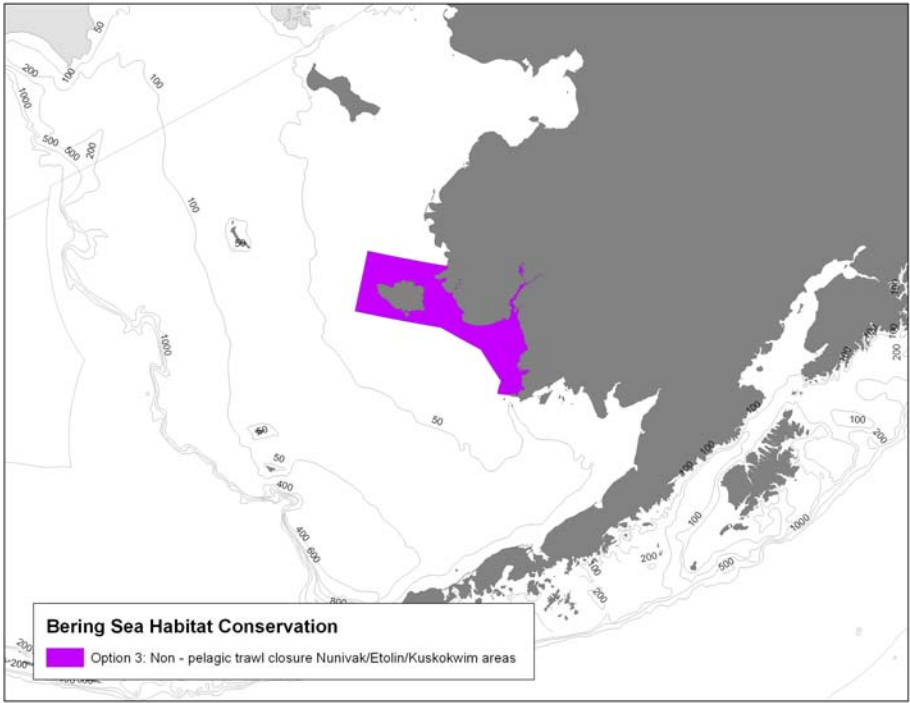


Figure ES- 4 Option 3. Close an area to non-pelagic trawling around Nunivak Island with the southern border extending along the nearshore portion of Etolin Strait and Kuskokwim Bay to conserve nearshore habitat and minimize potential interactions with community use and subsistence fisheries taking place in the nearshore areas.

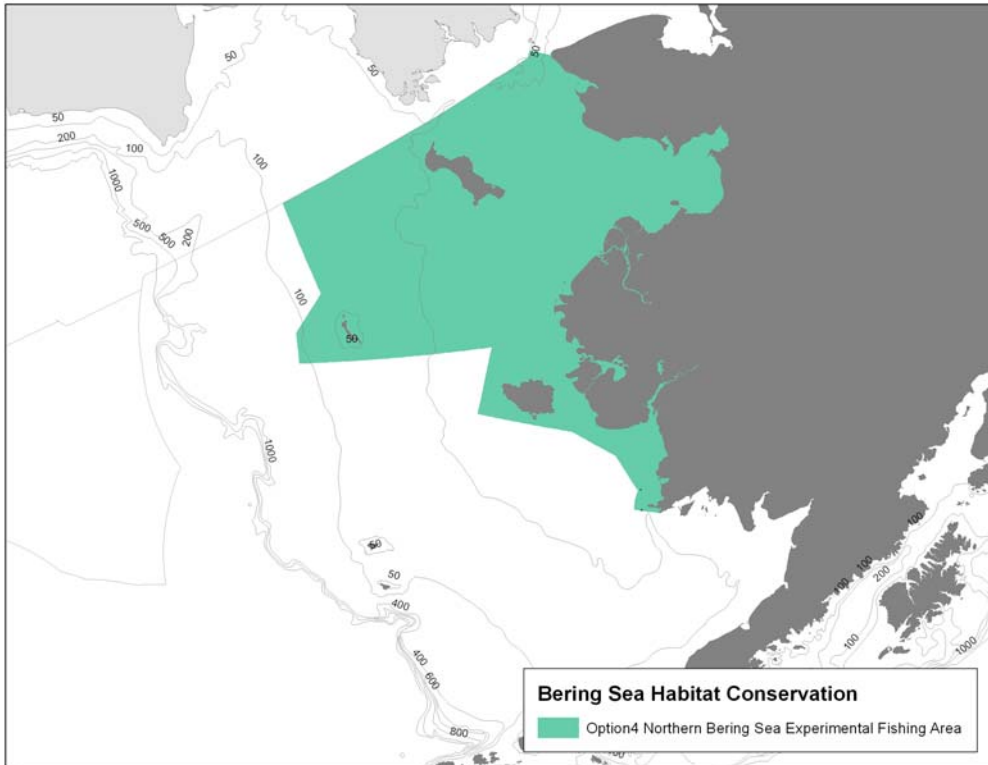


Figure ES- 5 Option 4. The Northern Bering Sea experimental fishing area would be closed to fishing with non-pelagic trawl gear.

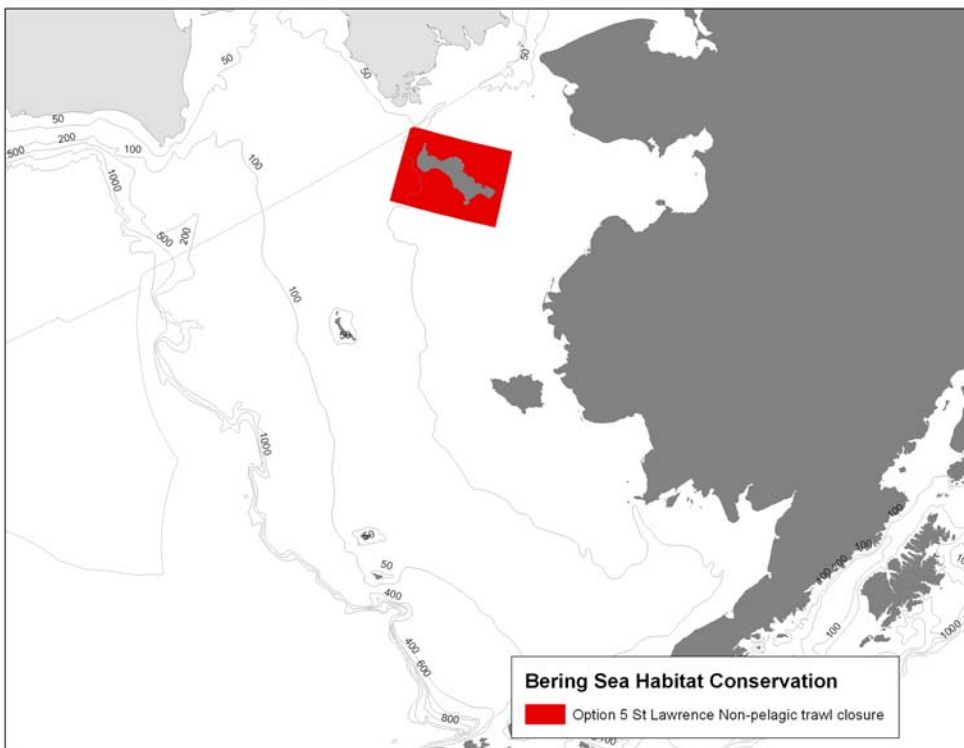


Figure ES- 6 Option 5. Close the area to non-pelagic trawling around St. Lawrence Island to conserve blue king crab habitat and minimize potential interactions with community use and subsistence fisheries taking place in nearshore areas.

The impacts of Alternative 3 result from reducing gear contact with the bottom. From an environmental perspective, Alternative 3 would have beneficial effects regarding habitat, and insignificant effects regarding target species, non-target resources, protected species or the ecosystem. There would be some minor costs associated with the gear modification; current estimates are less than \$3,000/ operating vessel. Alternative 3 has some economic costs to the fishery in particular to the H&G catcher processor sector 0.16% revenue at risk as a percent to status quo.

Option 1 would close the area around Saint Matthew to non-pelagic trawling to conserve blue king crab habitat. This option would provide some positive benefits to blue king crab habitat the area extends southwest to project juvenile, non-ovigerous female and male blue king crab habitat, and northeast to protect ovigerous females habitat. This crab stock is severely depleted and designated overfished. There has historically been some about of trawl effort, targeting Pacific cod and flatfish species just to the north of St. Matthew. Maps of fishing effort by Fritz et al. (1998) indicate that a strip of area immediately north of St. Matthew has been an area with very high CPUEs for Pacific cod and more recent observer data indicates high CPUEs of flatfish species. It is unknown at this time how many vessels, or how much fish has been harvested by non-pelagic trawls fishing this area. At a maximum, the number of vessels targeting groundfish, and the revenue at risk, would be the same as calculated for Option 4. There may be economic benefits of Option 1 to crab fishermen associated with reduced impacts on crab; however, these effects are likely to be minor given that blue king crab bycatch is thought to be low in this area (NMFS data review by crab plan team) and the area to the north does not seem as important to blue king crab as compared with the area to the south and area within State waters.

Option 2 would close an area to non-pelagic trawling around Nunivak Island with the southern border extending along the nearshore portion of Etolin Strait to conserve nearshore habitats, and minimize potential interactions with community use and subsistence fisheries. This option would provide some positive benefits to communities to minimize potential interactions with commercial fishing gear and provide protections to nearshore habitats for subsistence use and fisheries. Option 2 may have beneficial effects on Steller's Eiders. The area south of Nunivak Island and Etolin Strait has seen increasing effort by vessels targeting yellowfin sole in recent years, but should not be impacted by this option. There are opportunity costs, of course, associated with prohibiting vessels from fishing in other areas. Such impacts were previously discussed in general terms in the evaluation of Alternative 2.

Option 3 would close an area to non-pelagic trawling around Nunivak Island with the southern border extending along the nearshore portion of Etolin Strait and Kuskokwim Bay to conserve nearshore habitat and minimize potential interactions with community use and subsistence fisheries. Option 3 may have beneficial effects on Steller's Eiders. This option would provide some positive benefits to communities to minimize potential interactions with commercial fishing gear and provide protections to nearshore habitats for subsistence use and fisheries. Because the final boundaries of this closure area are the result of negotiations by representatives of the flatfish industry and coastal communities, it is difficult to quantify the economic impacts. Nonetheless, given the relatively limited amount of effort in the Etolin Strait portion of the closure, and virtually no effort in Kuskokwim Bay, the economic impacts would be relatively minor.

Option 4 would establish a Northern Bering Sea Experimental Fishing Area, which would be entirely closed to fishing with non-pelagic trawl gear at least in the short term, until an adaptive management experiment design was developed and approved. The option to provide a closure area in the Northern Bering Sea may be a precautionary measure in terms habitat protection by preventing northward expansion of the bottom trawl fishery, however research and an exempted fishing permit would still provide future access to the area. The option would close roughly 188,157 sq. km of BS shelf (shelf area to 1,000 m depth) or 23.8% of the 791,731 sq. km. of BS benthic habitat currently open to bottom trawling (shelf area to the 1,000 m depth contour). Table 5.7-3 provides the revenue and percent of baseline revenue at risk under this option. Over the three years of data analyzed, 2003-2005, the status quo gross first wholesale revenue for the H&G Trawl CP sector averaged \$201.73 million and ranged from an annual low of \$161.72 million in 2003 to a high of \$247.96 million in 2005. Gross first wholesale revenue at risk from the proposed Northern Bering Sea Research Area closure area under this option averaged \$0.33 million or 0.16% of the three year average status quo gross

revenue and ranged from a low of \$0.04 million or 0.01% of status quo gross revenue in 2005 to a high of \$0.69 million or 0.35% of status quo gross revenue in 2004. Flatfish, pollock and Pacific cod represented the largest first wholesale gross revenue at risk over the three year period but no one species exceeded \$0.40 million or 0.86% of status quo first wholesale gross revenue. The first wholesale gross revenue at risk under the proposed action could be mitigated by additional fishing effort in the area remaining open to NPT.

Option 5 would close the area to non-pelagic trawling around St. Lawrence Island to conserve blue king crab habitat and minimize potential interactions with community use and subsistence fisheries. Because there is currently no non-pelagic trawl effort as far north as St. Lawrence, there are no economic impacts to the trawl fleet given the current and historic distribution of target species. Potential future effects of a change in fish distribution were discussed under Option 4, although the impacts of Option 5 would be substantially smaller based on total area closed.

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Appendix A Report on Gear Modifications from Alaska Fisheries Science Center

Appendix B Descriptions of Essential Fish Habitat for Target Species in the Eastern Bering Sea

Appendix C An initial evaluation of methods to implement a program for gear modification

PURPOSE AND NEED FOR ACTION

1.1 Purpose and Need

The purpose of this analysis is to evaluate impacts of alternatives to further conserve fish habitat in the Eastern Bering Sea. In February 2005, the Council took final action on the EFH EIS (NMFS 2006a) to adopt a suite of measures to conserve EFH in the GOA and AI from potential impacts due to fishing. At the time of final action, the Council took no action to implement additional conservation measures in the Eastern Bering Sea, as the analysis found such additional measures were neither required by law nor necessary or practicable measures. Further, the alternatives considered for Bering Sea habitat conservation required additional 'fine-tuning' before they could be considered as practicable measures. Alternatives to modify gear did not have sufficient research to understand what the scale of beneficial effects on habitat, and the alternatives for the open areas had left out historically important and lucrative fishing grounds, and included rotating closures that were found to have questionable merit. So to address these issues, the Council notified the public that it planned to take a more focused examination of potential measures to further conserve fish habitat, including EFH, in the Eastern Bering Sea by initiating a separate analysis that would tier off of the EFH EIS. This analysis provides an examination of a range of reasonable alternatives to conserve fish habitat in the Eastern Bering Sea.

The need for this analysis is the recognition that additional analysis beyond the EFH EIS is needed to consider measures for the conservation of fish habitat in the Bering Sea. New information on potential gear modifications to protect bottom habitat has become available since the EFH EIS and allows for a gear modification alternative that could not have been considered in the EFH EIS. The Council wishes to protect fish habitat in support of commercial fisheries and subsistence activities in the Eastern Bering Sea, ensuring consistency with national standard 8 of section 301 of the Magnuson-Stevens Fishery Conservation and Management Act. Thus, evaluation of additional measures, and possible implementation of them, provides a precautionary approach in light of incomplete knowledge of fish dependence upon habitat, and the effects of fisheries on that habitat. The problem statement adopted by the Council for this analysis is provided below:

Problem Statement: The Council intends to evaluate potential new fishery management measures to protect Essential Fish Habitat (EFH) in the Bering Sea. The analysis will tier off of the 2005 EFH Environmental Impact Statement and will consider as alternatives open and closed areas and gear modifications. The purpose of the analysis is to consider practicable and precautionary management measures to reduce potential adverse effects of fishing on EFH and to support the continued productivity of managed fish species.

1.2 Decisions to Be Made and Proposed Schedule

Based on the analyses in this EA, the Council and NMFS will decide if additional actions should be taken to conserve fish habitat in the Eastern Bering Sea. The Council is scheduled to take a preliminary review of the analysis in February 2007, an initial review in March, and final action in June, 2007. If the Council takes final action in June 2007, FMP and regulatory amendments may be completed as early as 2008, pending approval by the Secretary of the Department of Commerce.

Organization of the EA

Three of the four required components of an environmental assessment (EA) are included below. These include brief discussions of: the need for the action (Section 1), the alternatives (Section 2), the status of the affected environment (Section 3), and the environmental impacts of the proposed action and alternatives (Section 4). A RIR/IRFA is presented in sections 5 & 6. A list of agencies and persons consulted is included later in this document in Section 7. References are included as Section 8.

Public Process

February 2007 Council Meeting: The preliminary draft EA/RIR/IRFA was reviewed at the February, 2007 Council meeting. The Council's Scientific and Statistical Committee and Advisory Panel reviewed this

document and provided comment to the Council regarding this action and the analysis. Public comment on the document was received by the Council during public testimony at the meeting. Additional opportunities for written and oral public comment will be provided at the Council meetings in March and in June, prior to the Council taking any action on the analysis. Public comment on the EA/RIR/IRFA also may be provided to NMFS during the proposed rule public comment period set forth in the Federal Register.

Relevant NEPA Documents

The NEPA documents listed below have detailed information on the groundfish fisheries, and on the natural resources and the economic and social activities and communities affected by those fisheries. These documents contain valuable background for the action under consideration in this EA/RIR/IRFA. The Council on Environmental Quality (CEQ) regulations encourages agencies preparing NEPA documents to incorporate by reference the general discussion from a broader EIS and concentrate solely on the issues specific to the environmental assessment subsequently prepared. According to the CEQ regulations, whenever a broader EIS has been prepared and a NEPA analysis is then prepared on an action included within the entire program or policy, the subsequent analysis shall concentrate on the issues specific to the subsequent action. The subsequent EA need only summarize the issues discussed and incorporate discussions in the broader EIS by reference (see 40 CFR 1502.20).

Alaska Groundfish Programmatic Supplemental EIS (PSEIS)

In June 2004, NMFS completed the PSEIS that disclosed the impacts from alternative groundfish fishery management programs on the human environment (NMFS 2004). The following provides information on the relationship between this EA/RIR/IRFA and the PSEIS. NMFS issued a Record of Decision on August 26, 2004, with the simultaneous approval of Amendments 74 and 81 to the FMPs, respectively. This decision implemented a policy for the groundfish fisheries management programs that is ecosystem-based and is more precautionary when faced with scientific uncertainty. For more information on the PSEIS, see the Alaska Region website at: <http://www.fakr.noaa.gov/sustainablefisheries/seis/default.htm>.

The PSEIS brings the decision-maker and the public up to date on the current state of the human environment, while describing the potential environmental, social, and economic consequences of alternative policy approaches and their corresponding management regimes for management of the groundfish fisheries off Alaska. In doing so, it serves as the overarching analytical framework that will be used to define future management policy with a range of potential management actions. Future amendments and actions will logically derive from the chosen policy direction set for the PSEIS' preferred alternative.

As stated in the PSEIS, any specific FMP amendments or regulatory actions proposed in the future will be evaluated by subsequent environmental assessments (EAs) or EISs that incorporate by reference information from the PSEIS but stand as case-specific NEPA documents and offer more detailed analyses of the specific proposed actions. As a comprehensive foundation for management of the GOA and BSAI groundfish fisheries, the PSEIS functions as a baseline analysis for evaluating subsequent management actions and for incorporation by reference into subsequent EAs and EISs that focus on specific Federal actions.

Draft Alaska Groundfish Harvest Specifications EIS

On August 30, 2006, NMFS released for public review and comment a draft EIS analyzing the impacts of various harvest strategies for the Alaska groundfish fisheries (NMFS 2006). Except for the no action alternative, the alternatives analyzed would implement the preferred management strategy contained in the PSEIS. This document contains an analysis of the effects of the alternative harvest strategies on target groundfish species, non-target species, prohibited species, marine mammal, seabirds, habitat, ecosystem relationships and social and economic concerns. The analysis is based on the latest information regarding the status of each of these environmental components and provides the most recent consideration of reasonably foreseeable future actions to consider in the cumulative effects analysis. The EIS provides the latest overall

analysis of the impacts of the groundfish fisheries on the environment and will provide a substantial amount of reference material for the purposes of this EA/RIR/IRFA.

Essential Fish Habitat EIS

In 2005, NMFS and the Council completed the EIS for Essential Fish Habitat Identification and Conservation in Alaska (EFH EIS, NMFS 2005). The EFH EIS provided a thorough analysis of alternatives and environmental consequences for amending the Council's FMPs to include EFH information pursuant to Section 303(a)(7) of the Magnuson-Stevens Act and 50 CFR 600.815(a). Specifically, the EFH EIS examined three actions: (1) describing and identifying EFH for Council managed fisheries, (2) adopting an approach to identify Habitat Areas of Particular Concern within EFH, and (3) minimizing to the extent practicable the adverse effects of fishing on EFH. The Council's preferred alternatives from the EFH EIS are implemented through Amendments 78/65 and 73/65 to the GOA and BSAI groundfish FMPs, respectively, Amendments 16 and 12 to the FMP for BSAI King and Tanner Crab, Amendments 9 and 7 to the FMP for the Scallop Fishery off Alaska and Amendments 7 and 8 to the FMP for Salmon Fisheries in the Exclusive Economic Zone off the Coast of Alaska. A Record of Decision was issued on August 8, 2005. NMFS approved the amendments on May 3, 2006. Regulations implementing the EFH/HAPC protection measures were effective July 28, 2006 (71 FR 36694, June 28, 2006). The Final EIS may be found on the NMFS AKR web site at: <http://www.fakr.noaa.gov/habitat/seis/efheis.htm>.

Several management analytical tools and measures are contained in appendices to the EFH EIS.

Appendix B - Evaluation of Fishing Activities that May Adversely Affect EFH. Appendix B addresses the requirement to conserve and protect fish habitats from adverse fishing activities. Appendix B includes a newly developed model completed by NMFS and reviewed by a panel of independent scientists. The model evaluates current fishing activities on areas specifically described as EFH, incorporates the most accurate and up-to-date fishing gear descriptions, and formulates an effects index. Index values provide a range of fishing gear effects on habitat.

Based on the best available scientific information, the EIS analysis concluded that despite persistent disturbance to certain habitats, the effects on EFH are minimal because the analysis finds no indication that continued fishing activities at the current rate and intensity would alter the capacity of EFH to support healthy populations of managed species over the long term. The EIS concluded that no Council managed fishing activities have more than minimal and temporary adverse effects on EFH for any FMP species, which is the regulatory standard requiring action to minimize adverse effects under the Magnuson-Stevens Act (50 CFR 600.815(a)(2)(ii)). Additionally, the analysis indicated that all fishing activities combined have minimal, but not necessarily temporary, effects on EFH.

Appendix F – Essential Fish Habitat Assessment Reports (HAR). Appendix F is the most recent compilation of habitat related information for each fishery stock by FMP. The HAR contains life history, reproductive traits, and predator/prey relationship information. Additionally, each species profile in the HAR contains a list of references and information sources used by stock assessment experts for that species.

EFH EIS, Section 3.4.1 Magnuson-Stevens Act Managed Fisheries. For each of the five FMPs (GOA Groundfish, BSAI Groundfish, BSAI Crab, Scallops, and Salmon), a subsection accurately describes the fisheries and gears used within that particular fishery. These descriptions are a product of a workshop held between fisheries managers and fishers regarding specific gear types currently used. This information was used in the fishing effects model to assess gear impacts on different habitat types.

Because the proposed action is a change to an EFH protection area, and the EFH EIS contains the latest information on fishing effects on habitat; the analysis contained in the EFH EIS will be referenced to describe the potential impacts on habitat by the proposed action analyzed in this EA.

Habitat Areas of Particular Concern EA/RIR/IRFA

The EA/RIR/IRFA was prepared two years ago to alternatives to designate and conserve Habitat Areas of Particular Concern. Habitat Areas of Particular Concern (HAPC), which are site-specific areas of Essential Fish Habitat (EFH) of managed species (NMFS 2006b). Identification of HAPCs provides focus for additional conservation efforts for those habitat sites that are ecologically important, sensitive to disturbance, exposed to development activities, or rare. This EA evaluates alternatives for designating HAPC sites in the Gulf of Alaska (GOA) and the Aleutian Islands (AI) and implementing associated fisheries management measures to provide additional conservation of specified HAPC areas.

The significance criteria used to evaluate the effects of the alternatives is applicable to the evaluation of effects of the alternatives in this EA. The criteria were used to evaluate the effects in discrete areas and for certain types of fishing restrictions, similar to the proposed action in this EA. Therefore the significance criteria from the HAPC EA are appropriate for this EA.

This EA will analyze alternatives to further conserve fish habitat in the Eastern Bering Sea. This proposed action derives from the policy established in the preferred alternatives in the PSEIS and in the EFH EIS. This EA incorporates by reference information from the NEPA documents described above, when applicable, to focus the analysis on the issues ripe for decision and eliminate repetitive discussions.

1.3 Action Area

The Federal groundfish fisheries off Alaska are managed under two FMPs, *The Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area* (BSAI) (NPFMC, 2005a) and *The Fishery Management Plan for Groundfish of the Gulf of Alaska* (NPFMC, 2005b). The Council developed (and the Secretary of Commerce approved) these FMPs and their amendments pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) and other applicable Federal laws and executive orders (E.O.s). The FMPs manage the groundfish fisheries for optimum yield (OY) and allocate harvest among user groups while preventing overfishing and conserving marine resources. The FMPs, certain amendments, and additional actions necessary to conserve public trust resources are developed by the Council and NMFS.

The groundfish fisheries occur in the North Pacific Ocean and Bering Sea in the EEZ from 50°N to 62°N. The BSAI groundfish fisheries cover most the Bering Sea under U.S. jurisdiction, extending southward to include the waters south of the Aleutian Islands west of 170° W. longitude to the border of the U.S. EEZ and northward to Saint Mathew Island. Although the BSAI FMP jurisdiction extends north to the Bering Strait, little groundfish fishing effort has been expended to date in the area north of St. Mathew Island. However, with increasing sea temperatures and receding ice cover, fishing activity may extend further northward in the future.

2.0 DESCRIPTION OF THE ALTERNATIVES

2.1 Development of the Alternatives

The process of developing alternatives began with the evaluation of alternatives for Bering Sea habitat conservation in the EFH EIS (NMFS 2006a). As described in Section 1.1, the EFH EIS examined several alternatives to minimize the effects of fishing on EFH in the GOA, Bering Sea, and Aleutian Islands. The EFH EIS examined measures for the Bering Sea that included an open area, trawl gear modifications, and rolling closures to bottom trawl fishing. At the time of final action on the EFH EIS in February 2005, the Council did not adopt measures to conserve habitat in the Bering Sea, but rather initiated a more detailed examination of reasonable alternatives and options for this area.

In December 2005, the Council and its Scientific and Statistical Committee (SSC) and Advisory Panel (AP) received a report from staff on a proposed problem statement and preliminary alternatives drawn from the EFH EIS. Public input was provided at the Council, SSC, and AP meetings. Following staff, SSC and AP reports, and public testimony, the Council deliberated on this issue. The Council modified the suite of alternatives to exclude the rotations in the area-based measures, but include gear modification alternatives based on recent research, and alternatives for open areas based on location of recent bottom trawl effort.

In June 2006, the Council and its advisory committees further discussed potential alternatives for Bering Sea habitat conservation. The Council remained concerned about defining the northern boundary of the open area alternative, and tasked staff with developing an open area approach that would utilize fishing data through 2005.

The Council noted that an open area based on older fishing patterns may not adequately represent the distribution of current bottom trawl fisheries, as effort may have expanded northward in response to fish distribution (according to public testimony). This primarily is due to shifts in the ecosystem; a northward shift in response to changing temperatures, atmospheric forcing and compositional changes in the predominant groundfish biomass structure. Recent fishing effort depicts this northern shift in fishing effort particularly in the flatfish fisheries (yellowfin sole, rockfish, flathead sole and other flats). The concern expressed in June 2006 was that the open area described and analyzed in the EFH EIS does not reflect recent effort in the northern areas (St. Matthew and south of Nunivak Island) or consider reporting area 519 Bogoslof. The original open area was based on bottom trawl effort from 1998-2002. This modified open area has been updated to include the original bounds analyzed within the EFH EIS and incorporates more recent information on the location of the bottom trawl fishery. Low fishing effort has been defined as any location that has had observed fishing more than two trawls/100km² area. Utilizing an editing tool in ArcGIS the bounds of the previous open area were extended or reduced to capture bottom trawl sets that occurred more than two trawls/100km² areas based on the 1990-2005 data, bathymetric and land mass features, while considering enforcement concerns. Additional extensions occurred to include the areas specifically near Bogoslof, south of Nunivak Island, and the 10° strip on the south end of the Red King Crab Savings Area. However certain areas that had fishing only 1 time in the area further north were not counted.

In October, 2006 the Council reviewed the open area approach concept and suggested that the northern boundary of the open area would be configured such that the area south and west of St. Matthew Island is excluded from the open area to conserve blue king crab habitat and suggested further options for modifying the northern boundary of the proposed open area based on varying thresholds levels of historic fishing. The blue king crab savings area is near St. Matthew Island and extends southwest to protect juvenile, non-ovigerous female and male blue king crab habitat, and northeast to protect areas used by ovigerous females. This area has: (1) been represented in the NMFS and ADF&G surveys to contain juvenile and mature BKC; (2) locations of PSC catch in the rock sole trawl fleet; and (3) observations from the directed crab fishery. Industry comments indicate that increased flatfish trawl effort has been progressing northward on average 20 miles/year, some of this effort is occurring near St. Matthew Island. This crab stock is severely depleted; the last pot survey found

only 5 legal male BKC in the area. Given these concerns, the area near St. Matthew was excluded from all open area alternatives.

In December 2006, following staff reports and recommendations by the SSC and AP, as well as public testimony, the Council finalized alternatives for analysis, focusing on open and closed areas to bottom trawling, as well as gear modifications for bottom trawl gear. A workshop was held one evening of the Council meeting to discuss the practical implementation of using disks or disk clusters on sweeps of bottom trawls in the Bering Sea.

In February 2007, following staff reports and recommendations by the SSC and AP, as well as public testimony, the Council restructures the alternatives in a manner to improve the comparisons of the alternatives and options, so that different combinations could be chosen and the effects clearly analyzed in the document. Additionally this allowed for further clarification of the northern research area that develops a well designed experiment.

Background on Open Area Approaches:

The premise of the open area approach is that 'the first pass of a trawl is the worst pass (trawling over undisturbed bottom has more habitat impacts than subsequent trawl passes). Thus, constraining trawling to areas that have already been impacted has habitat conservation benefits. Allowing trawling in previously untrawled areas could potentially result in acute local changes to the benthos and overall an increase in the long-term effects indices (LEI). The LEI were the tool used in the EFH EIS to assess the impacts of fisheries on EFH.

Limiting the trawl fishery to those areas traditionally fished provides a precautionary approach by setting aside relatively pristine areas before they become impacted. This habitat conservation measure mirrors the approach used for protecting terrestrial areas from development (e.g., national parks). The EFH EIS analysis (Chapter 4) discusses potential benefits of prohibiting bottom trawling in the northern Bering Sea areas, particularly to conserve snow crab habitat and habitats used by other species.

The creation of an open area that encompasses historically fished areas would not reduce the effects of fishing that generated the LEI scores. On the other hand, creation of closure areas in areas currently fished may redirect effort into areas with lower catch rates, and in turn may cause more impacts on EFH.

Background on Gear Modifications Approach

Early on, the idea of modifying bottom trawl gear seemed reasonable approach to minimize the effects of fishing on habitat. Gear modification alternatives for EBS bottom trawls were evaluated in the EFH EIS (NMFS 2006a). The rationale behind modifying bottom trawl gear is to minimize contact of trawl components on the seafloor, and thus reduce habitat effects. Unlike area closures, gear modifications do not require redistribution of fishing effort.

Additional research has been completed since the time the EFH EIS was written (see Appendix A). The results of this research indicate that rollers on the sweeps of bottom trawl gear can reduce bottom contact without decreasing the efficiency of the net to catch some target species.

2.2 Alternatives Analyzed

This EA/RIR/IRFA evaluates the impacts of three primary alternatives to the status quo, along with several relatively minor elements which are considered as options to the alternatives. The alternatives and options are as follows: Note that the major components are considered as alternatives, and the minor components are provided as options. These Options can be chosen in any combination with any of the alternatives.

Alternative 1: Status quo. No additional measures would be taken to conserve benthic habitat (Figure 2.2-1).

Alternative 2: Open area approach. This alternative would prohibit non-pelagic trawling outside of a designated 'open area'. Non-pelagic trawling would be prohibited in the northernmost shelf area and the deepwater basin area of the Bering Sea. There is only one open area analyzed, which is based on the EFH EIS area, modified using non-pelagic trawl effort distribution data through 2005 (Figure 2.2-2).

Note that the open area approach will contain the boundaries for the Etolin Strait Area as negotiated by representatives of these coastal communities and the flatfish industry.

Alternative 3: Gear modifications. This alternative would require gear modifications for all non-pelagic trawl gear used in flatfish target fisheries. Specifically, this alternative would require discs on non-pelagic trawl sweeps to reduce seafloor contact and/or increase clearance between the sweep and substrate. A performance standard of at least 2.5 inches elevation of the sweep from the bottom would be required

The below options could be selected in combination with any Alternative more than one option can be chosen.

Option 1. Close the area around Saint Matthew to non-pelagic trawling. This area would be configured such that the area near St. Matthew Island is closed to conserve blue king crab habitat (Figure 2.2-3).

Option 2. Close an area to non-pelagic trawling around Nunivak Island with the southern border extending along the nearshore portion of Etolin Strait . This area would be configured such that the area around Nunivak Island and Etolin Strait is closed to conserve nearshore habitats, and minimize potential interactions with community use and subsistence fisheries taking place in the nearshore areas (Figure 2.2-4).

Option 3. Close an area to non-pelagic trawling around Nunivak Island with the southern border extending along the nearshore portion of Etolin Strait and Kuskokwim Bay. This area would be configured such that the area in southern Etolin Strait and Kuskokwim Bay is closed to conserve nearshore habitat and minimize potential interactions with community use and subsistence fisheries taking place in the nearshore areas. The boundaries of this closure area are the result of negotiations by representatives of the flatfish industry and coastal communities (Figure 2.2-5).

Option 4: Close an area to non-pelagic trawling from the northern boundary line of the open area under Alternative 2, stretching from the Russian border around the southern end of St. Matthew Island to and around the southern portion of Nunivak Island and across Kuskokwim Bay to Cape Newenham and designate it as the Northern Bering Sea Experimental Fishing Area. The Council requests the NOAA/NMFS Alaska Fisheries Science Center design an adaptive management experiment in the closed northern area described under this option to study the effects of non-pelagic trawling in previously untrawled areas. The study should include open and closed areas and appropriate monitoring to study fishing impacts on benthic communities and ecological process, particularly as this relates to juvenile snow crab. The adaptive management experiment design will include review by the SSC. NMFS will provide the draft adaptive management experiment design to the Council for review within 18 months following the Federal Register publication of the final rule for this action (Figure 2.2-6).

Option 5: Close the area to non-pelagic trawling around St. Lawrence Island. This area would be configured such that the area around St. Lawrence Island is closed to non-pelagic gear to conserve blue king crab habitat and minimize potential interactions with community use and subsistence fisheries taking place in nearshore areas (Figure 2.2-7).

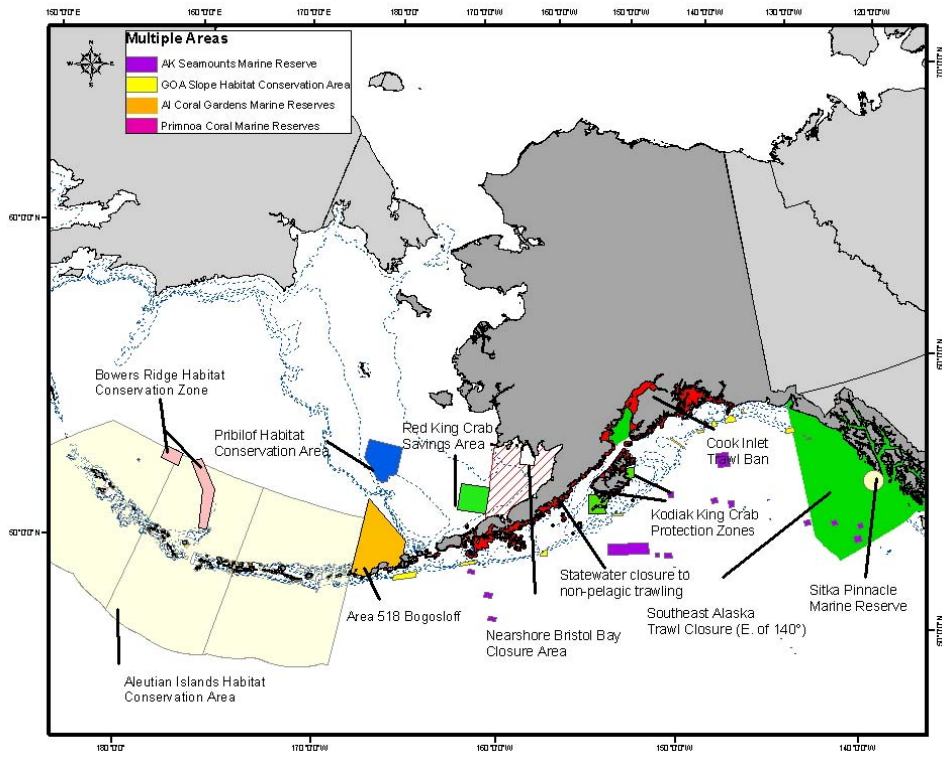


Figure 2.2-1. Year round closures for non-pelagic gear, as the status quo.

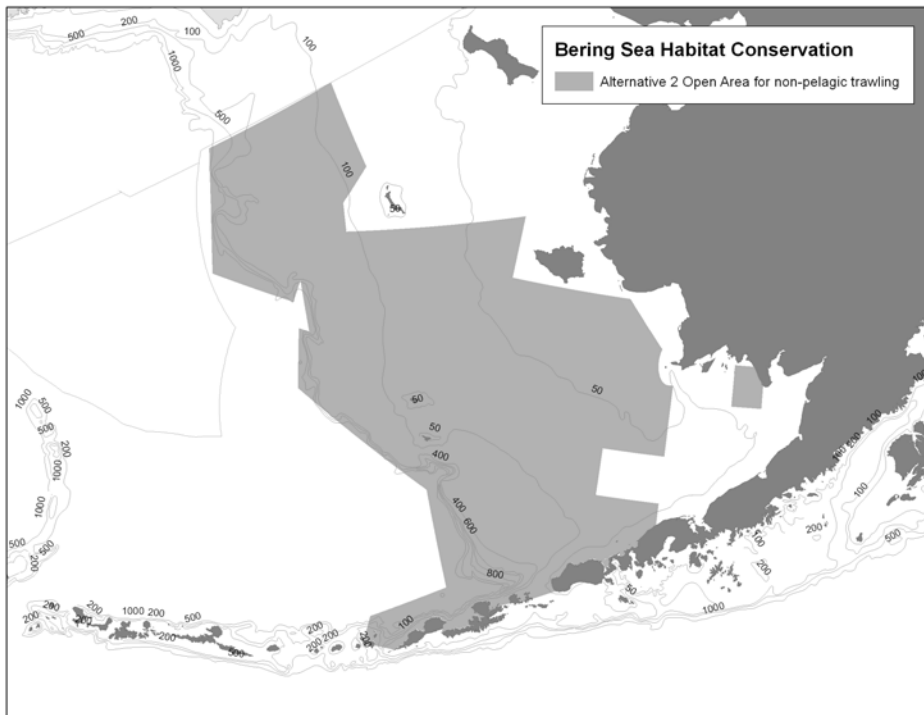


Figure 2.2-2. Alternative 2 Open Area Approach for Bering Sea. This alternative would prohibit non-pelagic trawling outside of a designated ‘open area’. Non-pelagic trawling would be prohibited in the northernmost shelf area and the deepwater basin area of the Bering Sea.

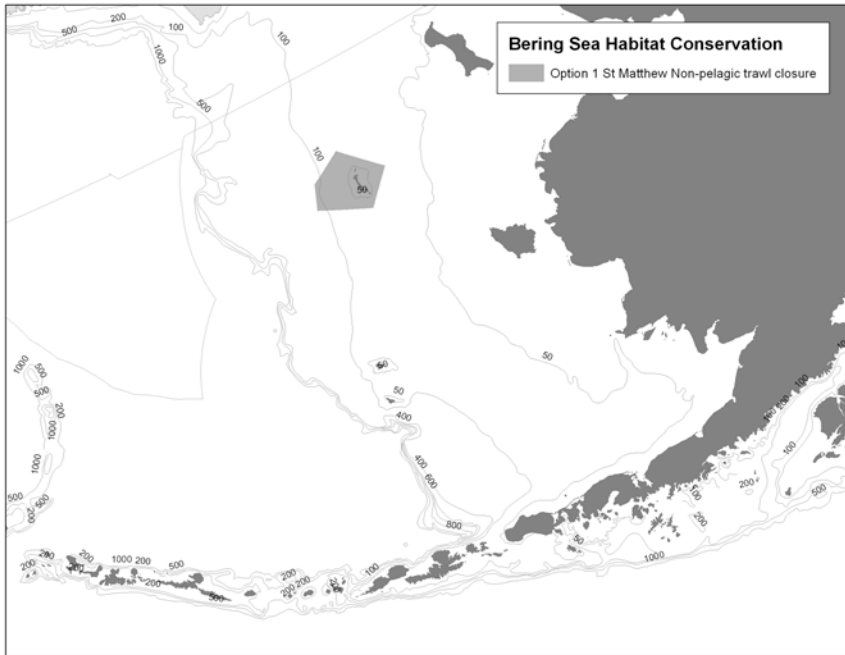


Figure 2.2-3 Option 1. Close the area around Saint Matthew to non-pelagic trawling to conserve blue king crab habitat.

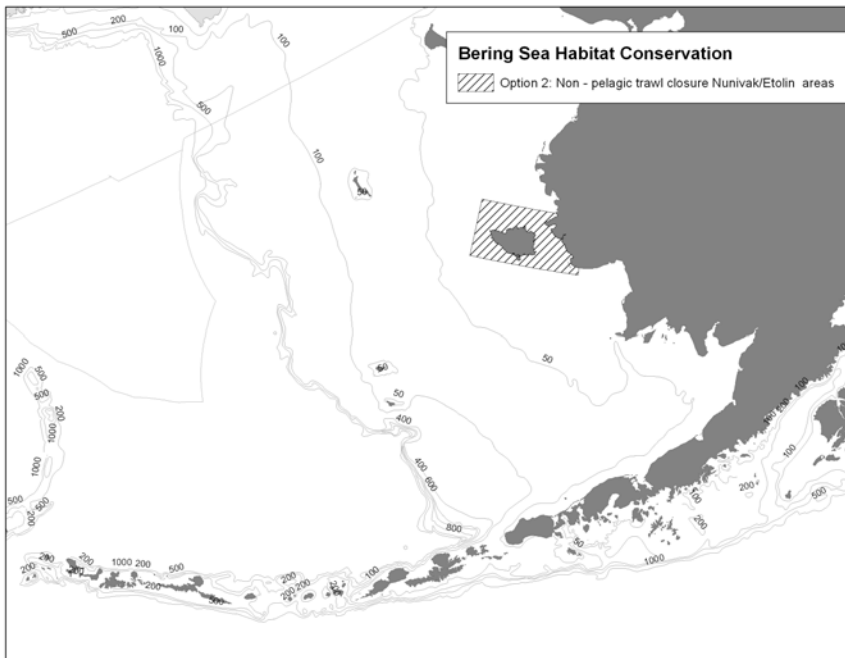


Figure 2.2-4. Option 2. Close an area to non-pelagic trawling around Nunivak Island with the southern border extending along the nearshore portion of Etolin Strait such that the area is closed to conserve nearshore habitats, and minimize potential interactions with community use and subsistence fisheries taking place in the nearshore areas.

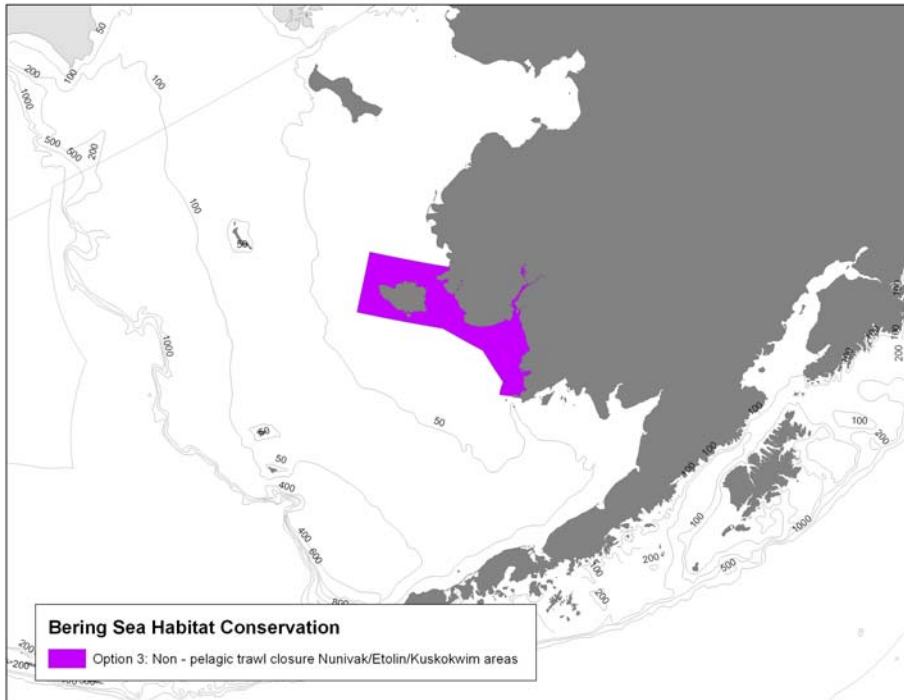


Figure 2.2-5. Option 3. Close an area to non-pelagic trawling around Nunivak Island with the southern border extending along the nearshore portion of Etolin Strait and Kuskokwim Bay to conserve nearshore habitat and minimize potential interactions with community use and subsistence fisheries taking place in the nearshore areas. The boundaries of this closure area are the result of negotiations by representatives of the flatfish industry and coastal communities.

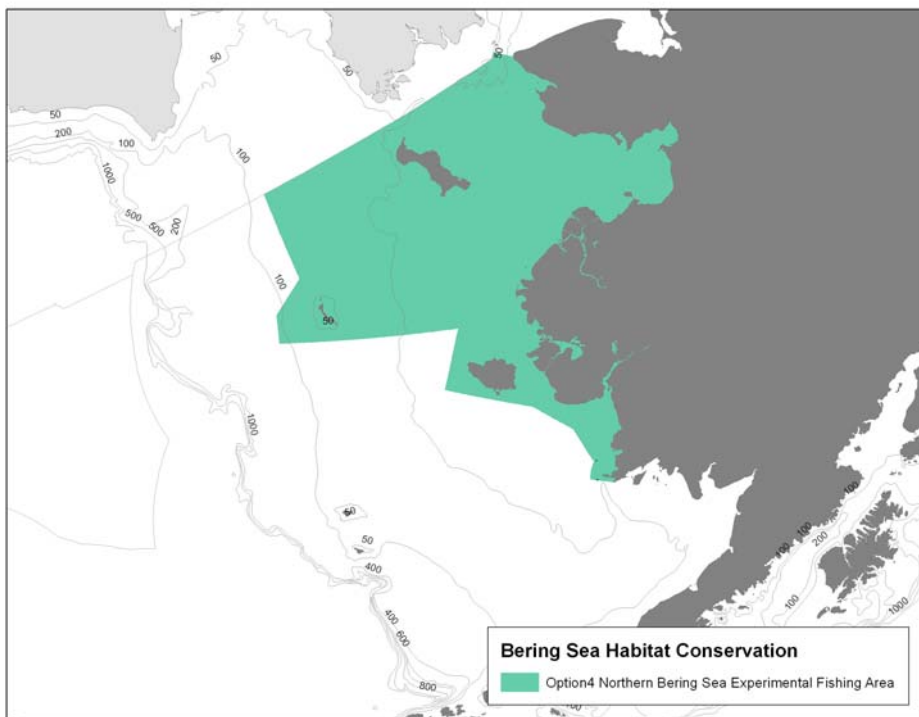


Figure 2.2-6. Option 4 The Northern Bering Sea experimental fishing area would be closed to fishing with non-pelagic trawl gear.

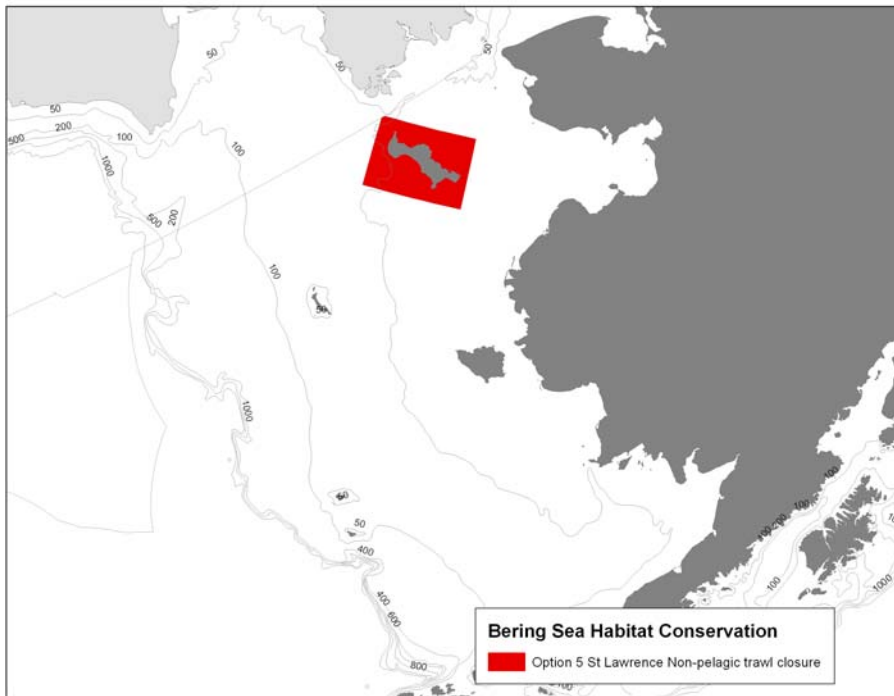


Figure 2.2-7. Option 5 Close the area to non-pelagic trawling around St. Lawrence Island to conserve blue king crab habitat and minimize potential interactions with community use and subsistence fisheries taking place in nearshore areas.

Alternatives Considered But Rejected

During the process of developing the alternatives, a number of ideas were suggested as possible ways to further conserve fish habitat in the Bering Sea. Some of these were reasonable and practicable, and appeared to address the problem statement; these alternatives are examined in detail in this analysis. Other ideas were discussed, but dropped from further consideration as they were determined to be unreasonable, not practicable, and/or did not address the specified problem. The following is a brief summary of those alternatives that were considered but not further evaluated.

A smaller open area that excluded locations used by snow crabs. In June 2006, the Council requested staff and the BSAI Crab Plan Team consider additional protection areas for Bering Sea snow crab (*C. opilio*). Data on snow crab distribution and bycatch were examined and evaluated by the team. The plan team concluded that additional measures specifically designed for snow crab habitat conservation were unnecessary, given existing scientific information. The plan team further noted that while there may be bycatch concerns in the future should the bottom trawl effort continue to push northward, the team had no habitat related concerns at this time. In October, the Council received these reports, and determined that habitat conservation measures for snow crab were unnecessary and not practicable. Nevertheless, this analysis evaluates the impacts of prohibiting bottom trawling the St. Matthew area, and other northern areas that currently include EFH for snow crab habitat.

Two smaller open area options with more southerly boundaries. In October 2006, the Council requested staff examine options for the open area boundary based on the intensity of bottom trawl effort in the northern area. Three options were developed and considered based on ranges for relatively low to relatively high trawl effort. The analysis indicated that the two boundary options that extended more southerly (and thus providing for a smaller open area) would eliminate a substantial portion of the historic grounds for bottom trawling. In other words, the areas considered have been important fishing grounds for the fleet, with 7-13% of the groundfish catch coming from those areas, and 7-12% of the groundfish bottom trawl effort (1990-2005). The number of bottom trawl hauls observed in this region exceeded 18,500 hauls for the medium intensity option, and over

33,000 hauls for the high intensity boundary option. The data clearly show that this northerly area has received substantial bottom trawl effort, and thus the area would already be considered impacted to some degree. Given that the purpose of an open area approach is to prevent expansion of fishing effort into new grounds, a smaller open area alternative would go beyond this purpose. Any gains in habitat conservation would be offset by effort redistribution, with more intensive trawling (possibly with reduced catch rates or higher PSC bycatch rates) in the remaining open areas.

A smaller open area with several canyon areas excluded. In June and October 2006, the Scientific and Statistical Committee (SSC) recommended that the Council consider canyon areas (Pribilof, Pervenets, and Zhemchug canyons) in the Bering Sea for possible habitat conservation measures. In response, the Council requested a discussion paper be prepared to examine available scientific information on the canyon areas (and skate nursery areas). Scientists at the NMFS Alaska Fisheries Science Center prepared this paper (NMFS 2006c), and concluded that the available scientific information does “not support any proposals for closures based on the existence of unique and/or essential habitat, nor do they make the case for inordinately sensitive habitat in need of immediate protection”. Further, the canyon areas are important fishing grounds for the trawl fleet, with substantial catches of pollock, rockfish, and flatfish species taken from the canyon areas. Relatively high amounts of trawl effort have occurred in the canyon areas. Given these conclusions, the Council decided that an alternative to not include the canyons in the open area was neither reasonable or practicable, nor scientifically warranted at this time. Rather, the Council adopted the Scientific and Statistical Committee’s recommendation to gather more information on the Bering Sea slope canyons, and suggested that this be a top research priority for the North Pacific Research Board.

Skate nursery area closures. Recent research has discovered several discrete locations in the Bering Sea where three skate species (Alaska skate, Aleutian skate, and Bering skate) deposit their egg cases to develop, with evidence for extended embryonic development of > 3 years (Hoff 2006). As with the canyon areas, the SSC had recommended that the Council consider these skate nursery areas for conservation measures. In response, the Council requested a discussion paper be prepared to examine available scientific information on the skate nursery areas. Scientists at the NMFS Alaska Fisheries Science Center prepared this paper (NMFS 2006c), and concluded that “areas supporting large numbers of egg cases are extremely important and warrant special consideration...It seems prudent to consider protecting these nursery areas until such a time as the extent of their contribution to the skate populations in the EBS (and perhaps elsewhere) is better understood.”

The Council acknowledged that these areas may be important for skates. However, the Council did not consider conservation measures for these areas as practicable or reasonable alternatives for this current action. These three skate species are considered to be at sustainable population levels, and these populations have persisted, or perhaps even increased, despite more than 30 years of bottom trawling in the Bering Sea. There is no evidence that bottom trawling impacts these egg cases or the EFH for this life stage, and it is unknown how many of these nursery areas exist. Nevertheless, the Council elected to consider skate nursery sites as a priority for the next HAPC cycle, which the Council intends to discuss further at its April 2007 meeting.

Require pelagic trawls be fished in a manner to avoid bottom contact. The NMFS sent a letter to the Council on June 1, 2006 noting that the EFH EIS had determined that pelagic trawl gear was likely to contact the soft substrates of the Bering Sea, and suggested that the developing Bering Sea habitat conservation analysis assess the effects of pelagic gear on the Bering Sea bottom habitat. Further, if the Council considered restrictions on pelagic trawl gear to reduce potential adverse effects, a review of the current performance standard should be included in the analysis. This request was supported by the SSC and comments made in public testimony to the Council. However, the Council felt that the potential adverse effects of pelagic trawl gear on Bering Sea habitat was thoroughly evaluated in the EFH EIS, the current regulations and performance standards were adequate, and that no additional measures need be considered at this time as they were neither warranted by regulations nor practicable in terms of operations or costs to the fishery.

From a conservation and NEPA perspective, an alternative that required off-bottom use of pelagic trawls would not be considered reasonable, in that it would not adequately address the identified purpose and need for the

analysis. The EIS found that pelagic trawl gear had virtually no effect on the infauna or epifauna prey on sand and/or mud habitats, and generated LEI values of 4.6% reduction of sand/mud biostructure and 7.2% reduction of slope biostructure. Although these impacts on biostructure contributed substantially to the overall effects of fishing activities, any effects by pelagic trawls were considered to have minimal effects on the EFH of managed species. The EFH EIS indicated that of the FMP managed species, only juvenile red king crab and blue king crab used the sand/ mud biostructure habitats (see EFH EIS Table B-3.1), areas which receive virtually no pelagic trawl effort. The biogenic structure on the slope is considered habitat for adult golden king crab juvenile Pacific Ocean perch and northern rockfish, juvenile and adult shortraker/rougheye rockfish and shortspine thornyhead rockfish, and adult dusky rockfish (see EFH EIS Table B-3.1). Pelagic trawls are only used to target pollock on the relatively smooth bottom of the continental shelf. When off the shelf, and over the deeper waters of the slope or basin areas, pollock are found well off the bottom and are the nets are fished in a pelagic mode, well off the bottom and away from potential effects on biogenic structure such as corals and sponges. Thus, the effects of pelagic trawl gear on EFH of FMP managed species was considered minimal.

Such an alternative may not be practicable from an operational standpoint. Pelagic trawl gear is currently defined in regulations, and a performance standard is also established in regulation. The performance standard sets a maximum allowance for the catch of crabs. Specifically, the BSAI trawl gear performance standard specified that it is prohibited to “Use a vessel to participate in a directed fishery for pollock using trawl gear and have on board the vessel, at any particular time, 20 or more crabs of any species that have a carapace width of more than 1.5 inches (38 mm) at the widest dimension.” Crabs were chosen for the standard because they inhabit the seabed, and if caught, provide proof that a trawl has been in contact with the bottom. A regulation that allows virtually no bottom contact would be difficult to monitor and enforce. It may be impossible to ‘fly’ a pelagic trawl in such a manner that it comes close to, but never touches the bottom. Thus, the 20 crab performance standard does address concerns about fishing hard on the bottom, while providing some measure of accountability and enforceability.

An alternative that required pelagic trawl gear to be fished off the bottom was deemed unreasonable, and unpracticable from an economic standpoint as well. Previous analyses, supported by testimony, indicated that the larger (and most valuable) pollock tend to swim very close to the bottom when on the shelf area (See BSAI Amendment 57 analysis). Regulations that prohibit fishermen from targeting this portion of the biomass may result in lower product values, increased effort to make up for reduced catch rates, increased operational costs, and increased catches of juvenile pollock. Because the Bering Sea pollock fishery accounts for about one half of the total value of Alaska fishery harvests, and losses from such a regulation could translate into tens of millions of dollars or more. Based on all of the considerations discussed in the preceding paragraphs, an alternative to require pelagic trawl gear to be fished off the bottom was dropped from further analysis.

3.0 STATUS OF THE AFFECTED ENVIRONMENT

Essential Fish Habitat (EFH) means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purpose of interpreting the definition of essential fish habitat, “waters” include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include areas historically used by fish where appropriate; “substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities; “necessary” means the habitat required to support a sustainable fishery and a healthy ecosystem; and “spawning, breeding, feeding, or growth to maturity” covers a species’ entire life cycle.

This chapter contains brief descriptions of the environment of the Bering Sea, including physical environment, major living marine resources and their habitats, and the social and economic conditions associated with the various fisheries. Additional information can be found in the EFH EIS (2006a) and the Draft Programmatic SEIS (NMFS 2001a). The information in this chapter is important when predicting the direct, indirect, and cumulative impacts that will accrue from the proposed action.

3.1 Physical Environment

The Bering Sea is a semi-enclosed, high-latitude sea. Of its total area of 2.3 million sq km, 44 percent is continental shelf, 13 percent is continental slope, and 43 percent is deep-water basin. A special feature of the BS is the pack ice that covers most of its eastern and northern continental shelf during winter and spring. The dominant circulation of the water begins with the passage of north Pacific water (the Alaska Stream) into the BS through the major passes in the AI. There is net water transport eastward along the north side of the AI and a turn northward at the continental shelf break and at the eastern perimeter of Bristol Bay. Eventually BS water exits northward through the Bering Strait, or westward and south along the Russian coast, entering the western north Pacific via the Kamchatka Strait.

The eastern BS sediments are a mixture of the major grades representing the full range of potential grain sizes of mud (subgrades clay and silt), sand, and gravel. The relative composition of such constituents determines the type of sediment at any one location. Sand and silt are the primary components over most of the seafloor, with sand predominating the sediment in waters with a depth less than 60 m. Overall, there is often a tendency of the fraction of finer-grade sediments to increase (and average grain size to decrease) with increasing depth and distance from shore. This grading is particularly noticeable on the southeastern BS continental shelf in Bristol Bay and immediately westward.

The distribution of benthic sediment types in the eastern BS shelf is related to depth. Considerable local variability is indicated in areas along the shore of Bristol Bay and the north coast of the Alaska Peninsula, as well as west and north of Bristol Bay, especially near the Pribilof Islands. Nonetheless, there is a general pattern whereby nearshore sediments in the east and southeast on the inner shelf (0 to 50 m depth) often are sandy gravel and gravelly sand. These give way to plain sand farther offshore and west. On the middle shelf (50 to 100 m), sand gives way to muddy sand and sandy mud, which continue over much of the outer shelf (100 to 200 m) to the start of the continental slope. Sediments on the central and northeastern shelf (including Norton Sound) have not been so extensively sampled, but while sand is dominant in places here, as it is in the southeast, there are concentrations of silt both in shallow nearshore waters and in deep areas near the shelf slope. In addition, there are areas of exposed relic gravel, possibly resulting from glacial deposits.

Available sediment data for the BS shelf were classified in the EFH EIS to describe four habitat types. The first, situated around the shallow eastern and southern perimeter and near the Pribilof Islands, has primarily sand substrates with a little gravel. The second, across the central shelf out to the 100 m contour, has mixtures of sand and mud. A third, west of a line between St. Matthew and St. Lawrence islands, has primarily mud (silt) substrates, with some mixing with sand. Finally, the areas north and east of St. Lawrence Island, including Norton Sound, have a complex mixture of substrates. The distribution of sediments in the Bering Sea is shown in Figure 3.1-1.

The following section is excerpted from the 2007 Ecosystem SAFE (Boldt et al., 2006).

Ice and Temperature Trends in the Bering Sea

The Bering Sea was subject to a change in the physical environment and an ecosystem response after 1977, a minor influence from shifts in Arctic atmospheric circulation in the early 1990s, and persistent warm conditions over the previous 4 years. A major transformation, or regime shift, of the Bering Sea occurred in atmospheric conditions around 1977, changing from a predominantly cold Arctic climate to a warmer sub arctic maritime climate as part of the Pacific Decadal Oscillation (PDO). This shift in physical forcing was accompanied by a major reorganization of the marine ecosystem on the Bering Sea shelf over the following decade. Surveys show an increase in the importance of pollock to the ecosystem. Weather data beginning in the 1910s and proxy data (e.g. tree rings) back to 1800 suggest that, except for a period in the 1930s, the Bering Sea was generally cool before 1977, with sufficient time for slow growing, long-lived, cold-adapted species to adjust. Thus the last few decades appear to be a transition period for the Bering Sea ecosystem.

A comprehensive report (National Research Council 1996) attributes the ecosystem reorganization toward pollock to the combination of fishing and the 1976 regime shift. They hypothesize that fishing of large whales increased the availability of planktonic prey, fishing on herring reduced competition, and fishing on flatfish reduced predation. The modeling study of Trites et al. (1999) noted that the increase in pollock biomass could not be explained solely by trophic interaction from these removals, and favored environmental shifts as an explanation. While the physical shift after 1976 was abrupt and pollock biomass increased rapidly, the ecosystem adjustment probably took a prolonged period as relative biomass shifted within the ecosystem. Biodiversity measures (richness and evenness) of roundfish, excluding pollock, decreased throughout the 1980s and were stable in the 1990s (Hoff 2003). Jellyfish, which share a common trophic level with juvenile pollock and herring, may have played a role in the ecosystem adjustment as their biomass increased exponentially beginning in the early 1980s, but recently have crashed in 2001-2003.

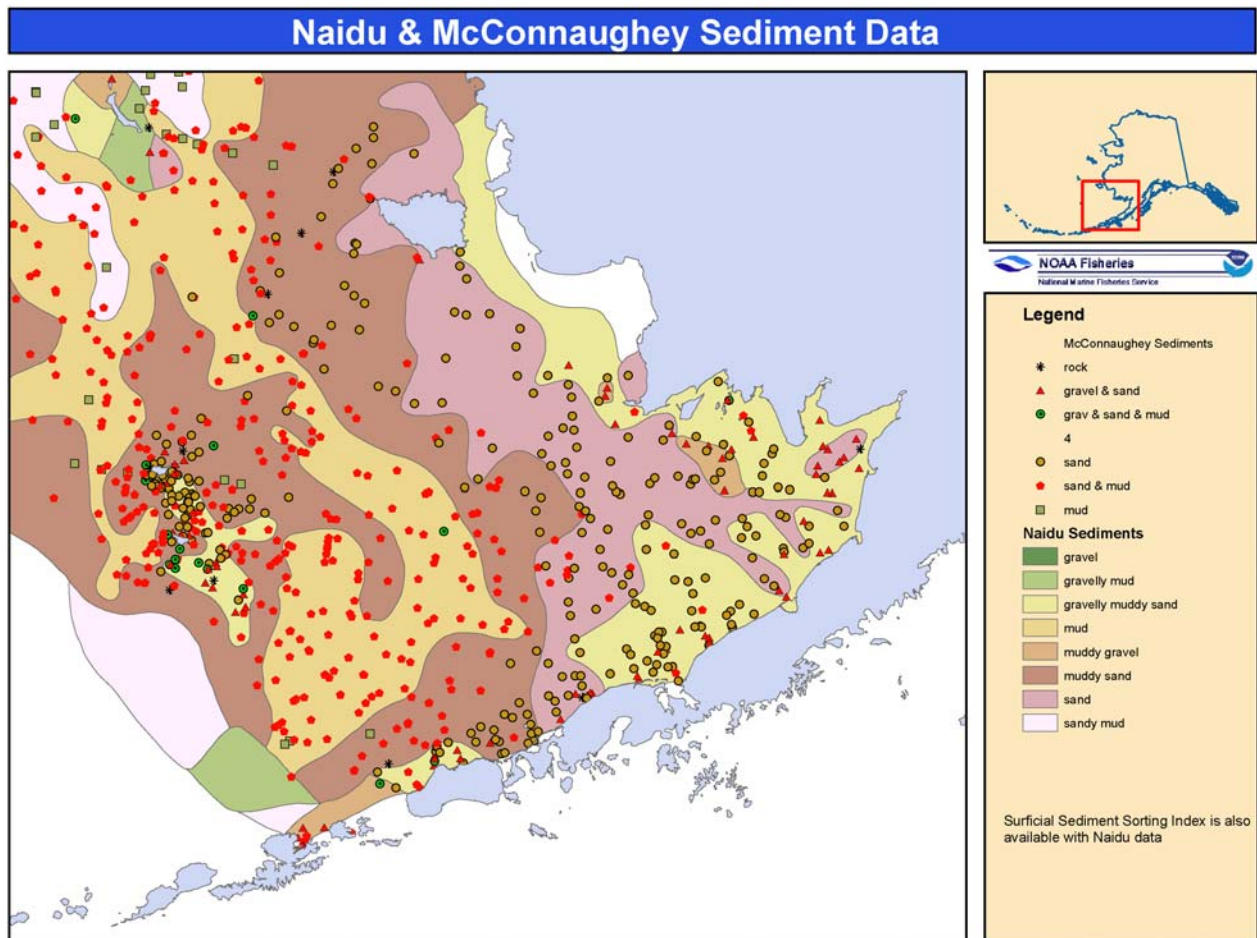


Figure 3.1-1. Available sediment data in the Bering Sea Source: Naidu and McConnaughey, NOAA Fisheries Alaska Fisheries Science Center.

A specific Arctic influence on the Bering Sea began in the early 1990s, as a shift in polar vortex winds (the Arctic Oscillation – AO) reinforced the warm Bering conditions, especially promoting an earlier timing of spring melt back of sea ice. Flatfish increased in the mid-1980s due to changes in larval advection (Wilderbuer et al. 2002), but the AO shift to weaker winds have since reduced these favorable conditions (Overland et al. 1999).

Warm conditions tend to favor pelagic over benthic components of the ecosystem (Hunt et al. 2002, Palmer 2003). Cold water species, i.e. Greenland turbot, Arctic cod, snow crab and a cold water amphipod, are no longer found in abundance in the SE Bering Sea, and the range of Pacific walrus is moving northward. While it is difficult to show direct causality, the timing of the reduction in some marine mammals suggests it is due to

some loss of their traditional Arctic habitat. Although physical conditions appear mostly stable over the last decade, the warmest water column temperatures have occurred in 2001—2005 on the southeast Bering Sea shelf, despite considerable year-to-year variability in the AO and PDO.

The overall climate change occurring in the Arctic, as indicated by warmer atmospheric and oceanic temperatures and loss of 15 % of sea ice and tundra area over the previous two decades, is hypothesized to make the Bering Sea less sensitive to the intrinsic climate variability of the North Pacific. Indeed, when the waters off of west coast of the continental U.S. shifted to cooler conditions after 1998, the subarctic did not change (Victoria pattern), in contrast to three earlier PDO shifts in the 20th century. Neither the PDO nor the Victoria indices can fully explain an abrupt shift to warmer conditions in the Bering Sea since 2000. In the current warm regime, the magnitude of SAT fluctuations has been steadily increasing since the mid-1980s, and the Bering Sea may become even warmer before it will switch to a new cold regime. If the regime concept is true, this switch may happen anytime soon, especially given the uncertain state of the North Pacific climate, suggesting that it may be in a transition phase.

The warming trend in the Arctic is illustrated in the adjacent Figure 3.1-2, which shows the Northern Hemisphere sea ice extent in March, as measured from passive microwave instruments onboard NOAA satellites. March is the month when Arctic sea ice reaches its maximum extent. The overall downward trend in the sea ice extent has accelerated in the past four years. In 2006 it was 14.5 million square kilometers, the lowest value for any March on record. This is 1.2 million square kilometers below the long-term (1979-2000) mean. The implications of this trend for the North Pacific are likely to include a tendency for a shorter season during which intense cold-air outbreaks of arctic origin can occur.

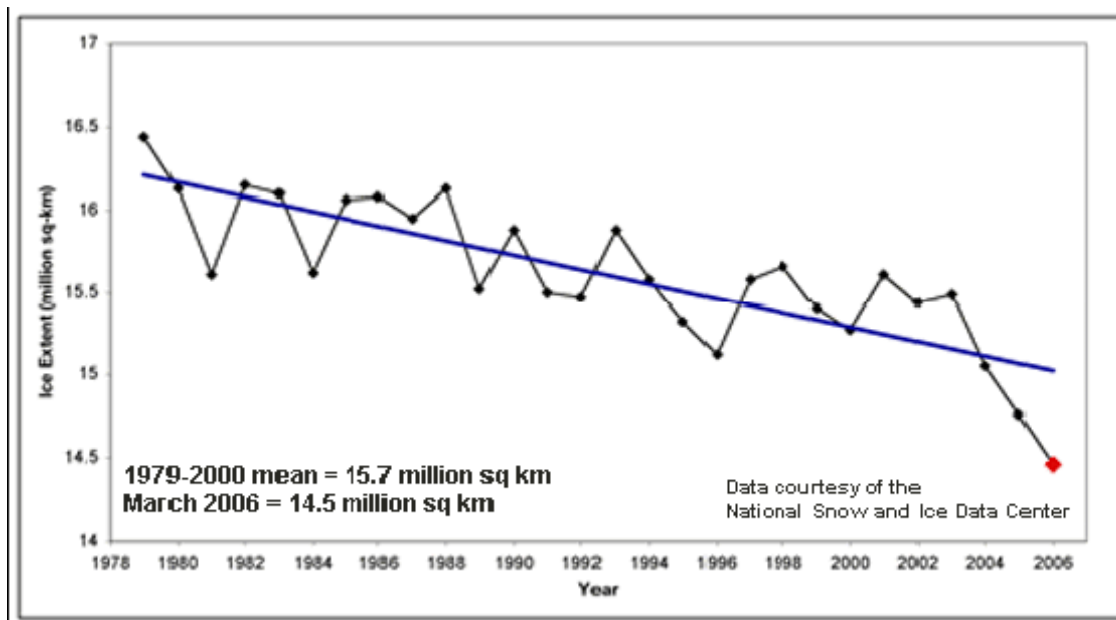


Figure 3.1-2. March sea-ice extent (in millions of square kilometers) across the Northern Hemisphere.

The high degree of variability within the 2006 winter season is also seen in ice cover surrounding Mooring 2. Ice appeared in the area in mid-January, which is an average start date of the ice season there (Figure 3.1-3).

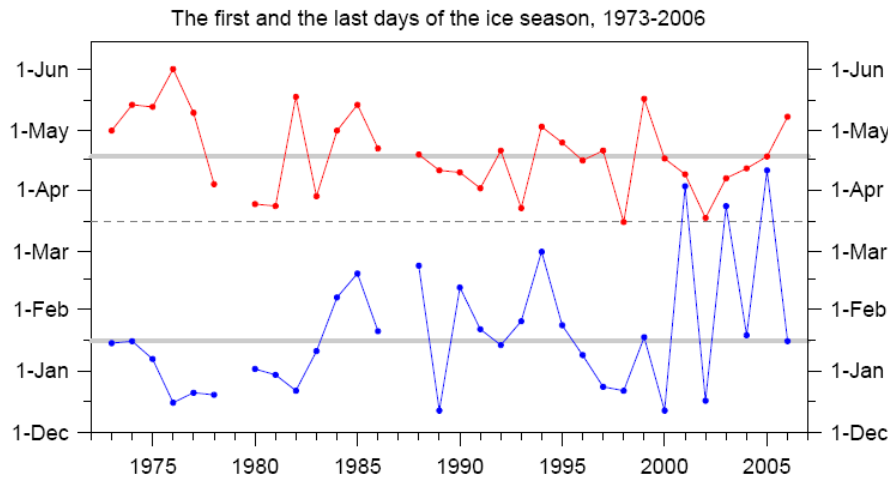


Figure 3.1-3. The first and last days of the ice season, 1973-2006. The gray solid horizontal lines are the mean dates for these two variables. The dashed line (March 15) is used as a threshold to calculate the ice retreat index. No ice was present in the box in 1979 and 1987 (source).

Due to very cold weather in January, ice quickly extended south, covering more than 80% of the box. Anomalously mild and stormy weather occurred in February and March causing ice to retreat as quickly as it arrived. Because of cold weather spells later in spring, ice peaked again around April 1 and May 1. Ice finally cleared the box in the second week of May, which made the IRI the highest since 1999 (Figure 29 of the Ecosystem SAFE- see figure below).

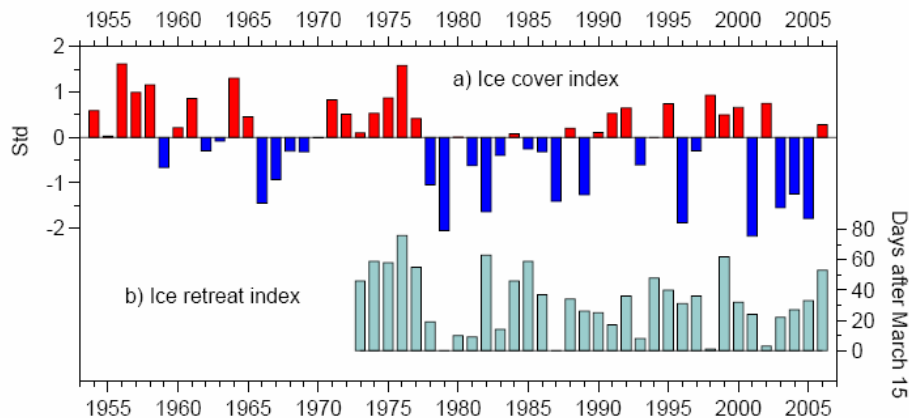


Figure 29. a) Ice cover index, 1954-2006, and b) ice retreat index, 1973-2006.

It is interesting that the Bering Sea was about the only place in the Arctic where sea ice extent anomalies in January 2006 were positive and ice extent was south of its median position for the period 1979-2000. By March 2006, however, sea ice concentration anomalies were negative practically everywhere along the periphery of Arctic ice extent. The total Arctic sea ice extent for this month was 14.5 million sq. km., or 1.2 million sq. km. below the 1979-2000 mean value. This makes March 2006 the record low March for the entire period of observations since 1979. In April sea ice in the Bering Sea advanced again. Figure 3.1-4 illustrates how far south the ice edge was compared to the previous five years.

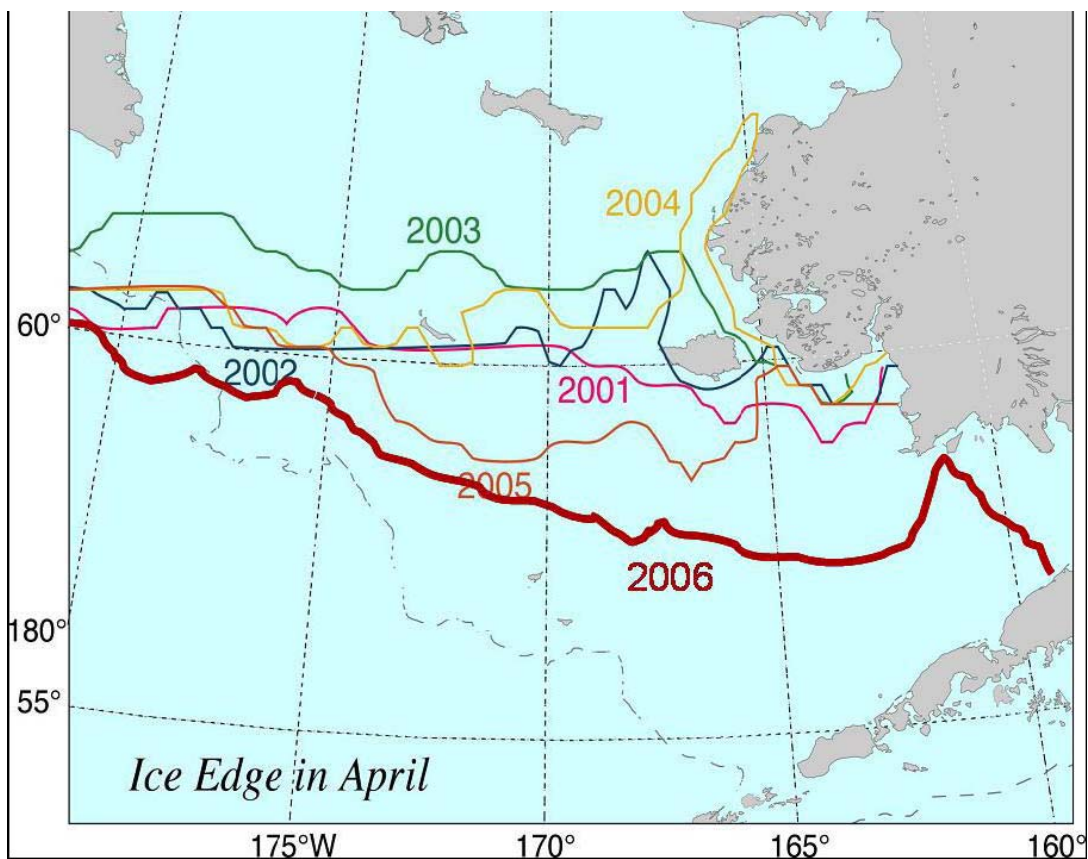


Figure 3.1-4. Location of ice edge in April between 2001 and 2006. (source)

In May, sea ice concentration anomalies in the Bering Sea remained positive, and sea ice extent was much farther south than its median position for this month. Due to anomalous ice cover extent, average sea surface temperature (SST) over the eastern Bering Sea in May was sharply lower. May SST is a good predictor of summer bottom temperatures and the extent of the cold pool. Although sea ice concentration in the eastern Bering Sea was not particularly high after early February, especially as compared with other heavy ice years, ice stayed longer in the area than in any other year since 1999. Mooring 2 records indicate 2006 has been a remarkably cold year, mainly because the ice persisted into May and heating of the water column did not really begin until late May. In contrast, 2005 was the warmest year on record at the Mooring 2 site, since 1995.

Bottom temperature data for the summer of 2006 was unavailable at the time of writing, but given the relatively late ice retreat, it is strongly suspected that the cold pool was the most prominent it has been since 1999. The extent of the cold pool relates not only to the near-bottom habitat, but also impacts the overall thermal stratification and ultimately the mixing of nutrient-rich water from depth into the euphotic zone. Regarding the latter process, June-July wind mixing at M2 during 2006 was the strongest since 1996, and the second strongest since 1979. All in all, it appears that the most important aspect of the physical environmental conditions in the eastern Bering Sea during 2006 was the unusually late retreat of the sea ice in the spring.

Bottom temperature data for the Bering Sea are available from the NMFS summer bottom trawl survey the annual AFSC bottom trawl survey for 2006 started on May 30 and finished on July 28. The average bottom temperature was 1.87°C, well below the 1982-2005 mean of 2.62°C (see Figure 3.1-5). Bottom temperature anomalies from the long-term station means were negative over most of the shelf region except for the southwestern sections of the inner and middle shelf regions. Maximum anomalies occurred in the inner and middle domain where bottom temperatures were < -1°C. The 'Cold Pool', usually defined as an area with temperatures < 2°C, extended much further to the south and east into Bristol Bay compared to 2005.

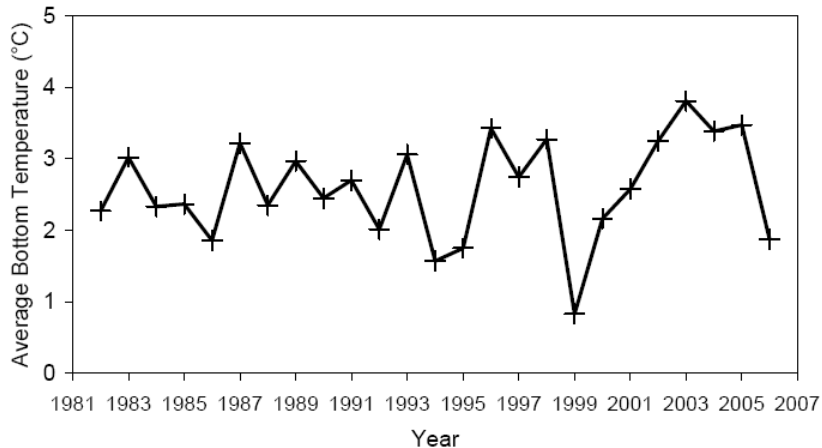


Figure 3.1-5. Mean summer bottom temperature (°C) in the standard bottom trawl survey area of the eastern Bering Sea Shelf, 1975-2006. Temperatures for each tow are weighted by the proportion of their assigned stratum area.

3.2 Biological Environment

3.2.1 Target Fish Stocks

The BS contains about 300 species of fish, 150 species of crustaceans and molluscs, 50 species of seabirds, and 25 species of marine mammals. Groundfish species that are the target of BS fisheries include pollock, cod, sablefish, Atka mackerel, and several species of flatfish, including arrowtooth, Pacific halibut, rock sole, flathead sole, Rex Sole, and Dover sole. Squid, sharks, sculpins, and salmon are also found along the shelf, as well as forage species such as herring, sand lance, and capelin. Large invertebrates subject to fishing on the shelf include red king crab, blue king crab, snow crab, and Tanner crab, as well as golden king crab on the continental slope.

The primary target species affected by the open area alternatives are rocksole and yellowfin sole, Alaska plaice, walleye pollock, Pacific cod, blue king crab, and snow crab (*C. opilio*). Several sculpin species, as well as two forage species (capelin and candlefish) also occur in the northern Bering Sea region. A summary of the biological information for the target species is included in this section. For more information on the stock status or management, refer to the annual *Stock Assessment and Fishery Evaluation* report and the Groundfish PSEIS (NMFS 2004b). Habitat information for these stocks is contained in the EFH EIS (NMFS 2005).

Rock Sole

Northern rock sole are distributed primarily on the eastern Bering Sea continental shelf and in much lesser amounts in the Aleutian Islands region. Two species of rock sole are known to occur in the North Pacific Ocean, a northern rock sole (*L. polyxystra*) and a southern rock sole (*L. bilineata*) (Orr and Matarese 2000). These species have an overlapping distribution in the Gulf of Alaska, but the northern species comprise the majority of the Bering Sea and Aleutian Islands populations where they are managed as a single stock. Adults exhibit a benthic lifestyle and occupy separate winter (spawning) and summertime feeding distributions on the southeastern Bering Sea continental shelf. Northern rock sole spawn during the winter-early spring period of December-March.

Rock sole catches from 1989 - 2005 (domestic only) have averaged 48,175 t annually. Rock sole are important as the target of a high value roe fishery occurring in February and March which accounts for the majority of the annual catch (62% in 2006). About 58% of the 2006 catch came from management areas 509 and 513 with the

rest from areas 513, 517 and 521. The 2006 catch of 35,907 t comprised 29% of the ABC of 126,000 t (89% of the TAC). Thus, rock sole remain lightly harvested in the Bering Sea and Aleutian Islands.

During the 2006 fishing season rock sole harvesting was temporarily closed in the Bering Sea and Aleutian Islands due to halibut bycatch restrictions on February 21 and April 12 (first and second seasonal apportionments were obtained). On August 7 directed rock sole harvesting was closed due to the attainment of the annual halibut bycatch allowance, after which the species could only be retained as bycatch.

Yellowfin Sole

Yellowfin sole are distributed in North American waters from off British Columbia, Canada, (approximately 49° N. latitude) to the Chukchi Sea (about 70° N. latitude) and south along the Asian coast to about 35° N. latitude off the South Korean coast in the Sea of Japan. Adults exhibit a benthic lifestyle and occupy separate winter spawning and summertime feeding distributions on the eastern Bering Sea shelf. From over-winter grounds near the shelf margins, adults begin a migration onto the inner shelf in April or early May each year for spawning and feeding. A protracted and variable spawning period may range from as early as late May through August occurring primarily in shallow water. As with most Bering Sea flatfish, the larvae are planktonic for at least 2-3 months until metamorphosis occurs, and they settle into shallow areas. The adults spawn and feed on sandy substrates of the eastern Bering Sea shelf, feeding mainly on bivalves, polychaetes, amphipods and echinurids.

Yellowfin sole is one of the most abundant flatfish species in the eastern Bering Sea. The yellowfin sole stock biomass has grown since the 1970s to very high and stable levels, with a projected 2007 biomass of 2,000,000 mt. The catch in 2006 was 97,648 mt, and the 2007 TAC was set at 136,000 mt.

Yellowfin sole are caught in bottom trawls both as a directed fishery and in the pursuit of other bottom dwelling species. Recruitment begins at about age 6, and they are fully selected at age 13. Historically, the fishery has occurred throughout the mid and inner Bering Sea shelf during ice-free conditions although much effort has been directed at the spawning concentrations in nearshore northern Bristol Bay. The directed fishery is prosecuted beginning in late January or February, and continuing through to the early fall. The target fishery is allocated a halibut PSC allowance in four seasons, and the fishery has been constrained by this cap. Once the halibut PSC allowance is used, the directed fishery must close until the next PSC seasonal allowance is allocated. In 2004, however, the yellowfin sole fishery did not exceed the halibut PSC limit, but was in fact closed to directed fishing on June 4th as it approached its TAC limit. In recent years, the yellowfin sole fishery has also been constrained by the red king crab PSC limit.

Alaska plaice

Alaska plaice inhabit continental shelf waters of the North Pacific ranging from the Gulf of Alaska to the Bering and Chukchi Seas and in Asian waters as far south as Peter the Great Bay. Adults exhibit a benthic lifestyle and live year round on the shelf and move seasonally within its limits. From over-winter grounds near the shelf margins, adults begin a migration onto the central and northern shelf of the eastern Bering Sea, primarily at depths of less than 100 m. Spawning usually occurs in March and April on hard sandy ground. The eggs and larvae are pelagic and transparent and have been found in ichthyoplankton sampling in late spring and early summer over a widespread area of the continental shelf. The adults feed on sandy substrates of the eastern Bering Sea shelf.

The biomass of Alaska plaice is quite high, projected to be 1,340,000 mt for 2007. Although the stock could sustain significantly higher removal rates, catch limits have been set relatively low to allow higher valued flatfish to be caught given a limited amount of halibut PSC bycatch available to the trawl fleet. The ABC for 2007 was set at 190,000 mt, whereas the TAC was set at only 25,000 mt. The catch in 2006 was 17,871 mt.

Alaska plaice are caught in bottom trawls both as a directed fishery and in the pursuit of other bottom-dwelling species. Recruitment begins at about age 6, and they are fully selected at age 12. The fishery occurs throughout the mid and inner Bering Sea shelf during ice-free conditions. They are caught as bycatch in Pacific cod, bottom pollock and other flatfish fisheries and are caught with these species and Pacific halibut the directed fishery.

Pacific cod

Pacific cod is a transoceanic species, occurring at depths from shoreline to 500 m. The southern limit of the species' distribution is about 34° N. latitude, with a northern limit of about 63° N. latitude. Adults are demersal and form aggregations during the peak spawning season, which extends approximately from January through May. Spawning takes place in the sublittoral-bathyal zone (40-290 m) near bottom. Eggs sink to the bottom after fertilization, and are somewhat adhesive. Larvae are epipelagic, occurring primarily in the upper 45 m of the water column shortly after hatching, moving downward in the water column as they grow. Pacific cod juveniles occur mostly over the inner continental shelf at depths of 60-150 m. and adults occur in depths from the shoreline to 500 m. Average depth of occurrence tends to vary directly with age for at least the first few years of life, with mature fish concentrated on the outer continental shelf. Preferred substrate is soft sediment, from mud and clay to sand.

Pacific cod are relatively abundant in the Bering Sea, but there has been a decline as recruitment has been below average for recent years. The projected 2007 exploitable biomass was 960,000 mt. The Federal water TAC for 2007 was set at 170,720 mt.

The fishery is conducted with bottom trawl, longline, pot, and jig gear. The age at 50 percent recruitment varies between gear types and regions. In the BSAI, the age at 50 percent recruitment is 3 years for trawl gear and 4 years for other longline and pot gear. More than 100 vessels participated in each of the three largest fisheries (trawl, longline, pot). The trawl fishery is typically concentrated during the first few months of the year, whereas fixed-gear fisheries may sometimes run essentially year-round. Bycatch of crab and halibut often causes the Pacific cod fisheries to close prior to reaching the total allowable catch. In the BSAI, trawl fishing is concentrated immediately north of Unimak Island, whereas the longline fishery is distributed along the shelf edge to the north and west of the Pribilof Islands.

Walleye Pollock

Pollock occur throughout the BSAI and GOA FMP management areas, and straddle into the Canadian and Russian exclusive economic zones (EEZs), the international waters of the central Bering Sea, and into the Chukchi Sea. The most abundant stock of pollock is the eastern Bering Sea stock which is primarily distributed over the eastern Bering Sea outer continental shelf between approximately 70-200 m.

Pollock is the most abundant species within the eastern Bering Sea comprising about 75 percent of the catch and 50 percent of the biomass. Although still very abundant (biomass projected at 6,360,000 mt for 2007), the stock is projected to decline through 2008, when an apparently strong 2005 year class begins to recruit to the fishery. The TAC for 2007 was set at 1,394,000 mt.

Peak pollock spawning occurs on the southeastern Bering Sea and eastern Aleutian Islands along the outer continental shelf around mid-March. North of the Pribilof Islands spawning occurs later (April-May) in smaller spawning aggregations. Spawning occurs pelagically and eggs develop throughout the water column (70-80 m in the Bering Sea shelf). Larvae are also distributed in the upper water column, with the larval period lasting approximately 60 days.

At age 1 pollock are found throughout the eastern Bering Sea both pelagically and on bottom. Age 1 pollock from strong year-classes appear to be found in great numbers on the inner shelf, and further north on the shelf than weak year classes which appear to be more concentrated on the outer continental shelf. From age 2-3 pollock are primarily pelagic and then to be most abundant on the outer and mid-shelf northwest of the Pribilof

Islands. As pollock reach maturity (age 4), they appear to move from the northwest to the southeast shelf to recruit to the adult spawning population. Adults occur both pelagically and demersally on the outer and mid-continental shelf of the eastern Bering Sea and Aleutian Islands. In the eastern Bering Sea few adult pollock occur in waters shallower than 70 m.

By regulation, the eastern Bering Sea pollock fishery has been divided into two fishing periods: a roe-bearing “A” season fishery generally occurring in January-March, and a nonroe bearing “B” season fishery generally occurring in August-October. The “A” season concentrates fishing effort on prespawning pollock in the southeastern Bering Sea. During the “B” season, fishing is still primarily in the southeastern Bering Sea, but some fishing also occurs on the northwestern shelf. Also during the “B” season, catcher processor vessels are required to fish north of 56° N. latitude because the area to the south is reserved for catcher vessels delivering to shoreside processing plants on Unalaska and Akutan. Only pelagic trawl gear can be used in the Bering Sea pollock fishery.

Blue King Crab

Blue king crab (*Paralithodes platypus*) has a discontinuous distribution throughout their range (Hokkaido Japan to Southeast Alaska). In the Bering Sea, discrete populations exist around the Pribilof Islands, St. Matthew Island, and St. Lawrence Island. Smaller populations have been found around Nunivak and King Island. Blue king crab molt multiple times as juveniles. In the Pribilof area, 50% maturity of females is attained at 96 mm (about 3.8 inches) carapace length, which occurs at about 5 years of age. Blue king crab in the St. Matthew area mature at smaller sizes (50% maturity at 81 mm CL for females) and do not get as large overall. Blue king crab have a biennial ovarian cycle and a 14 month embryonic period. Juvenile blue king crab require cobble habitat with shell hash, or other protective cover. Adult male blue king crab occur at an average depth of 70 m and an average temperature of 0.6°. The nearshore state water areas are used extensively by ovigerous female blue king crabs, and these state waters are closed to all state managed fisheries.

The annual NMFS eastern Bering Sea trawl survey visits the St. Matthew Island area in July. The trawl survey does not tow in waters shallower than 20 fm (37 m) and rarely in waters shallower than 30 fm (55 m) in the vicinity of St. Matthew Island. Ovigerous female distribution from the trawl survey (years 1990 to 2005) together with trawl effort and existing closures are shown in Figure 3.2-2. Directed crab fishery catch from 1997-2000 is shown with ovigerous females and non-pelagic trawl effort in Figure 3.2-3. Catch distribution from the 2005 NMFS survey in the vicinity of St. Matthew Island is shown in Figure 3.2-4.

Concentrations of ovigerous females with uneyed eggs are rarely encountered in standard surveys, but were, however, identified by nearshore work (<20 fm) performed by ADF&G to supplement the standard pot survey. Highest densities of ovigerous females with uneyed eggs were observed on the southern side of St. Matthew Island, and there was a general increase in their densities with decreasing depth (Pengilly 2003).

ADF&G analysis of the efficacy of the State water closure surrounding St. Matthew island concluded the following (from Pengilly 2003): “The analysis of female blue king crab distribution in the St. Matthew Island area showed the shortcomings of both the annual NMFS EBS trawl survey and the standard ADF&G triennial pot survey as platforms for gathering abundance data on reproductive females. The NMFS EBS trawl survey station grid design, coupled with a distribution of mature females that is concentrated in shallow, rocky-bottom areas south and adjacent to St. Matthew Island, results in poor recruitment of mature female blue king crab to the trawl survey. In contrast, the survey station grid design for the standard ADF&G triennial pot survey is adequate for sampling densities from the distribution of mature-barren females (i.e., those females that have hatched eggs, but have not yet extruded the next clutch of eggs). However, the standard ADF&G triennial pot survey is not adequate for sampling densities from the distribution of mature-ovigerous females. Additionally, from these analyses it can be concluded that the 3-nmi fishery closure area surrounding St. Matthew, Hall, and Pinnacle Islands is effective for protecting mature females when they are carrying clutches of eggs (ovigerous), but is not effective for protecting mature females during the extended period between hatching a clutch of eggs and extruding the next clutch of eggs.”

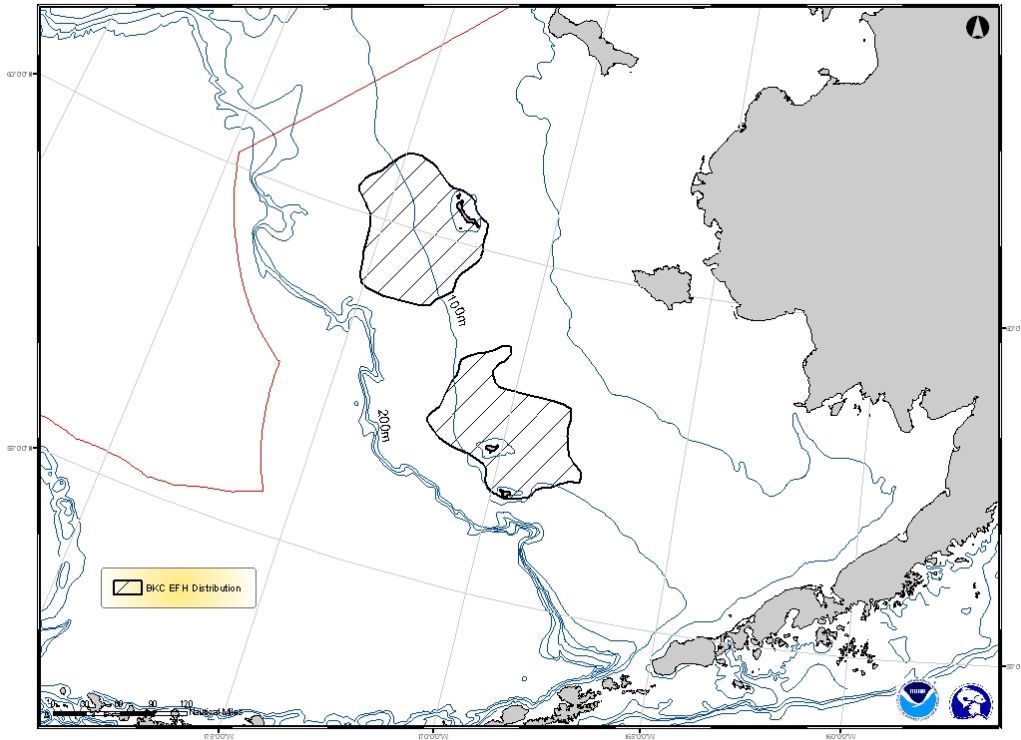


Figure 3.2-1. EFH Distribution of BSAI Blue King Crab

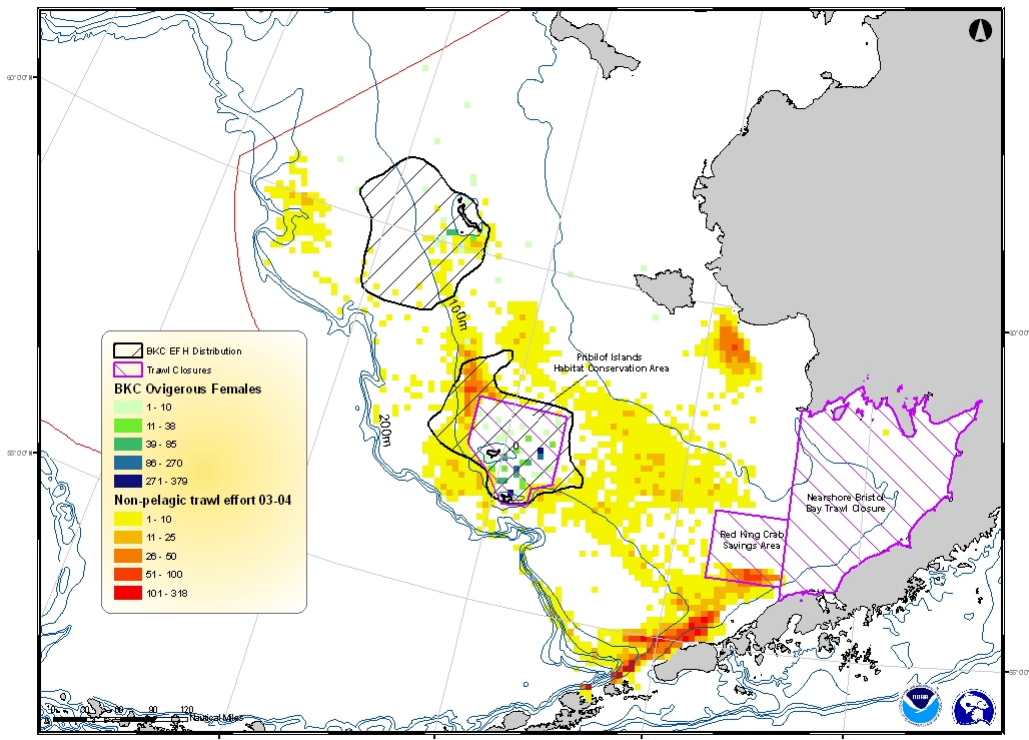


Figure 3.2-2 Map of the Eastern Bering Sea with the current fishery closures, BKC EFH, Non pelagic trawl effort from 2003-4 and locations of BKC ovigerous females from the EBS trawl survey 1990-2004

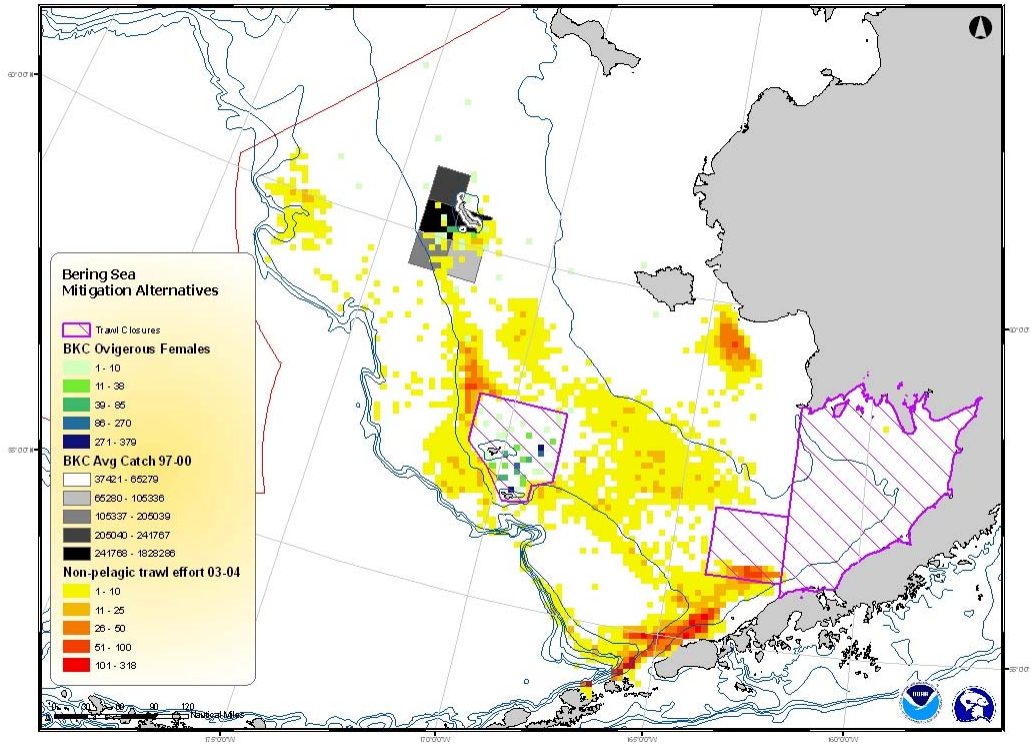


Figure 3.2-3. Map of the Eastern Bering Sea with the current fishery closures, BKC EFH, Non pelagic trawl effort from 2003-4 and locations of BKC ovigerous females from the EBS trawl survey 1990-2004, with locations of BKC catch from 1997-2000.

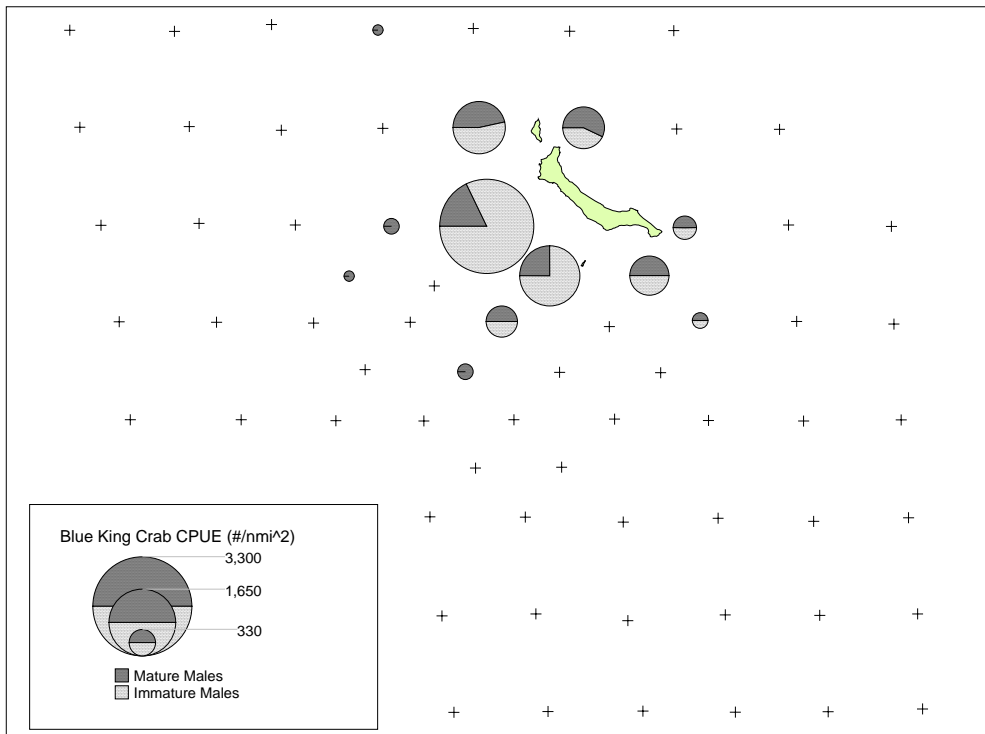


Figure 3.2-4. Catch distribution of blue king crab during the 2005 NMFS EBS trawl survey near St. Matthew Island, as summarized by ADF&G.

The Saint Matthew Island blue king crab stock remains at low biomass levels. The total mature biomass (TMB) in 2006 was estimated to be 11.2 million pounds. Although this is at its second highest level since the overfished declaration of 1999, it is at approximately ½ the “rebuilt” level of 22.0- million pounds. From all indications, this stock continues to remain at a depressed level, comparable to that of the mid-1980s. Unlike the mid-1980s, however, the stock is in a prolonged period (now in its seventh year) of depressed status. There are some promising indications for the stock, however, as the 2006 survey estimated higher numbers at all sizes than observed in 2005. As always with this stock, forecasts of the stock’s future, particularly the future recruitment into the mature size class, should be viewed with some skepticism. Abundance estimates are heavily influenced by the catch in relatively few tows and precision of estimates is generally poor. Total mature biomass would need to increase nearly double to 22.0 million pounds from the 2006 estimate for the stock to be considered “rebuilt.” Data from the 2006 survey do not provide any expectations for such an increase in the near-term future; the estimates from 1999 through 2006 indicate at best only a weakly increasing trend in total mature biomass. The fishery has been closed since 1999 through the 2005/2006 season.

Table 3.2-1 St. Matthew blue king crab fishery harvest relative to harvest strategy target and guideline harvest level (GHL), 1993-2004.

Fishery Year	Harvest Strategy Target ^a	Actual ^b	Number of males >104 mm CL ^c	Number Harvested ^d	GHL ^e	Harvest ^f
1993	20%	16%	3.98	0.63	4.4	3.00
1994	20%	20%	4.11	0.83	3.0	3.76
1995	20%	17%	3.99	0.67	2.4	3.17
1996	20%	15%	4.38	0.66	4.3	3.08
1997	20%	20%	4.70	0.94	5.0	4.65
1998	20%	15%	4.13	0.63	4.0	2.87
1999	Fishery closed		1.01	0	0	0
2000	Fishery closed		1.21	0	0	0
2001	Fishery closed		1.34	0	0	0
2002	Fishery closed		1.47	0	0	0
2003	Fishery closed		1.33	0	0	0
2004	Fishery closed		1.29	0	0	0

^a Harvest strategy in effect for 1993-1998 seasons targeted 20% of abundance of males >104-mm carapace length (CL) as estimated from pre-season survey.

^b Actual number of legal males harvested as percentage of pre-season estimated abundance of males >104-mm carapace length (CL).

^c Estimated abundance of males >104-mm carapace length (CL) from pre-season survey (millions of animals). From Vining and Zheng (2004).

^d Millions of animals.

^e GHL established pre-season (millions of pounds).

^f Actual harvest (millions of pounds).

This stock is annually surveyed by the NMFS Crab/Groundfish annual trawl survey. Total mature biomass for the stock is computed by multiplying the area-swept estimate for each sex and 5-mm CL size group by the mean weight of the sex-size group and the estimated proportion mature in the sex-size group, dividing that product by the estimated survey catchability of the sex-size group, and summing over both sexes and each size group (NPFMC 1998b).

The limited spatial distribution of the St. Matthew blue king crab stock and presence of rocky bottom habitat within that distribution poses problems in using the NMFS EBS trawl survey to assess the stock. Although the trawl survey station density is increased in the vicinity of St. Matthew Island to better sample from the blue king crab stock, important nearshore areas are not adequately sampled to detect important trends in stock distribution (Vining et al. 2001). Females, in particular, are poorly sampled by the trawl survey and abundance estimates for females from the survey data are considered unreliable. Additionally, only a small portion of the trawl survey effort in the St. Matthew Island Section is expended within the area that the commercial fishery typically occurred or, apparently, in the area that the crabs most likely to be harvested tend to occupy pre-season (Pengilly and Watson 2004). Slight changes in distribution of stock components from year to year could affect vulnerability to the trawl survey and the resulting abundance estimates.

Survey estimates for St. Matthew Island blue king crabs indicated dramatic declines of both male and female crabs in all size categories in 1999. Recruitment to this stock had been declining for several years, but the sharp decline in all sizes of crabs suggested large survey measurement errors, a large increase in natural mortality, or some combination of both.

The Saint Matthew Blue King Crab fishery was subsequently closed in 1999 due to low mature male abundance (Zheng and Kruse 1999) and to total mature biomass (TMB) being estimated as below minimum stock size threshold (MSST) (Stevens et al. 2000). It has remained closed since. The stock was declared overfished in 1999 and a rebuilding plan was implemented in 2000. This stock remains in “overfished” condition (Figure 3.2-5).

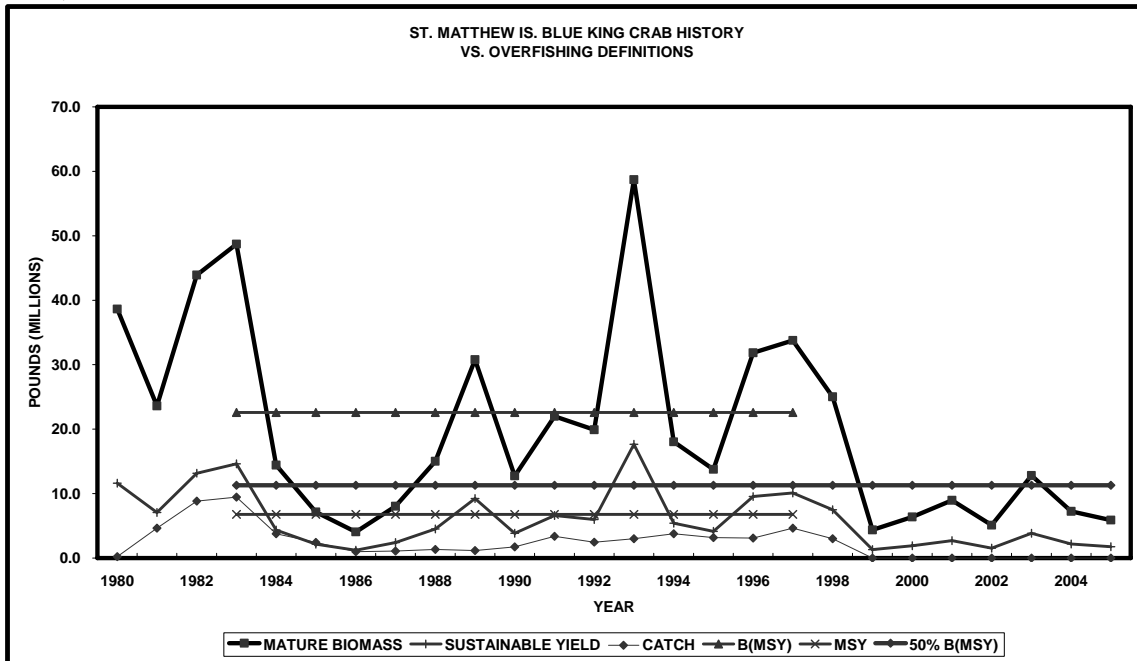


Figure 3.2-5 St Matthew blue king crab mature biomass, catch and biological reference points in relation to overfished status 1980-2005.

Saint Lawrence blue king crab

This stock is not annually surveyed by NMFS. Little is known about stock status of blue king crab in the St. Lawrence Island region. Commercial harvests in the St. Lawrence Section have only been reported for four years. The largest of these four was a harvest of 52,557 pounds (24 t) in 1983. This was caught primarily near the southeast shore of St. Lawrence Island (Kohler and Soong, 2005). The following year regulations were adopted which closed all waters within ten miles of all inhabited islands in the St. Lawrence Section (St. Lawrence Island, Little Diomed and King Island). Since that time the other three harvests on record are 984 pounds (0.4 t) in 1989, 53 pounds (0.02 t) in 1992, and 7,913 pounds (3.6 t) in 1995 (Kohler and Soong, 2005). This stock is not surveyed and while commercial harvest and sale of blue king crab from near shore during winter are permitted under regulations, there are no reports to ADF&G of commercial sales in recent years (Kohler and Soong, 2005).

Snow Crab

Snow crabs (*Chionoecetes opilio*) are distributed on the continental shelf of the BS, the Arctic Ocean, and in the western Atlantic Ocean as far south as Maine. In the BS, they are common at depths of no more than 200 m.

The eastern BS population within United States waters is managed as a single stock; however, the distribution of the population extends into Russian waters to an unknown degree.

This stock in 2006 was estimated at 547.6-million pounds, above the minimum stock size threshold but slightly below the estimate for 2005 (610.7-million pounds). The estimated total mature biomass in 2006 remains below the rebuilt level (it is 59% of the 'rebuilt' level of 921.6-million pounds) and maintains the trend of 'hovering about' the minimum stock size threshold for the last 8 surveys without any apparent trend towards rebuilding. The abundance estimate for males ≥ 4 -inches carapace width in 2006 (143.89-million crabs) is by far the highest value since 1998 and twice the estimate for 2005 (72.1-million crabs). However, this area-swept estimate of abundance of males ≥ 4 -inches in 2006 is associated with poor precision ($\pm 76.4\%$ of the point estimate) and the doubling of abundance from 2005 is unexpected from the 2005 survey data; the 2006 snow crab model estimate for this value in 2006 is 80.9-million crabs. Despite the increase in estimated abundance of males ≥ 4 -inches, the 2006 standard survey area-swept estimates provide no strong evidence that the stock currently or potentially rebuilding.

3.2.2 Prohibited Species

Prohibited species in the BSAI Groundfish FMP are Pacific halibut, Pacific herring, Pacific salmon and steelhead, king crab, and Tanner crab. These species must be avoided while fishing for groundfish, and must be returned to the sea with a minimum of injury except when their retention is authorized by other applicable law. In order to control the catch of those species in the groundfish fisheries, the Council has instituted prohibited species catch limits for the trawl fisheries for halibut, herring, red king crab, *Chionoecetes bairdi* crab, *C. opilio* crab, and Chinook and other salmon (Witherell and Pautzke, 1997). These PSC limits are applied by target fishery and season.

PSC limits are important in this analysis because the PSC limits constrain the bottom trawl fleets ability to catch the available TAC for Pacific cod and flatfish stocks, in particular. Because any closure area established for bottom trawling would limit where a vessel can fish, that vessel may be unable to fish in locations that have lower PSC bycatch rates. Higher PSC bycatch rates would thus result in lower catches of flatfish overall. Similarly, gear requirements that reduce catch rates disproportionately to PSC bycatch rates would have the same effect.

Pacific Halibut

Pacific halibut fisheries are managed by the International Pacific Halibut Commission (IPHC), under a treaty between the U.S. and Canada. The IPHC management process and stock assessments take into account all fishery removals (bycatch in the Federal and State groundfish fisheries, and catch in the IPHC-regulated commercial, subsistence, and sport fisheries) when determining halibut allocations to the directed fisheries. In recent years, incidental bycatch mortality of halibut has represented about 13 percent of total fishery mortality.

Pacific halibut are considered a single stock from the Pacific west coast to the Bering Sea. During the summer Pacific halibut are found along the northeast continental shelf, and adults make seasonal migrations between summer feeding grounds and deeper spawning grounds. The halibut resource is considered to be healthy, and total catch has been near record levels in recent years.

The BSAI Groundfish FMP employs mechanisms to reduce the incidental catch of halibut in the groundfish fisheries. The total Bering Sea trawl halibut mortality limit is 3,400 mt, of which about 1,665 mt has been allocated to flatfish fisheries, on average. Most of the remaining halibut mortality allowance is allocated to the Pacific cod trawl fishery.

Crab

The interactions of the groundfish fisheries with three types of crab are monitored in the BSAI Groundfish FMP: red king crab, *C. opilio*, and *C. bairdi*. The directed crab fisheries are managed by the State of Alaska, with Federal oversight established in the BSAI King and Tanner Crab FMP.

Red king crab are widely distributed throughout the BSAI, along the shelf up to depths of 250 m. Bairdi Tanner crab are distributed on the continental shelf, and are concentrated around the Pribilof Islands and immediately north of the Alaska Peninsula. Opilio Tanner crabs are distributed on the continental shelf and are common at depths of no more than 200m.

Numerous trawl closure areas have been implemented in the BSAI Groundfish FMP to mitigate potential concerns about unobserved crab mortality (crab wounded or killed but not captured) and possible habitat degradation due to trawling or dredging. The FMP also establishes PSC limits for these species based on the total abundance of the species. The upper limits are approximately 0.5 percent of total animals for red king crab, 1.2 percent for *C. bairdi*, and 0.1 percent for *C. opilio* (Witherell et al. 2000). Because incidental catch of crab is small, relative to other sources of mortality, time and area closures for trawl gear are thought to be more effective in reducing effects on crab stocks (Witherell and Harrington 1996).

PSC limits apply to crab caught within specified PSC Limitation Zones, and are apportioned by gear, target fishery, and season. The table below demonstrates the PSC limits and bycatch of crab species during the last three years, for the target flatfish fisheries. For the *C. opilio* and *C. bairdi* crab, bycatch levels are far less than the PSC limit, and catch of Tanner crab does not constrain the flatfish fisheries. Attainment of the red king crab PSC limit closed Zone 1 to the yellowfin sole fishery in May of 2002 and 2003, and closed it to the remaining flatfish target fisheries in February of 2002.

Table 3.2-2 Crab PSC Limits for Target Flatfish Fisheries, and Bycatch, in numbers of crab

Year	Zone 1 red king crab PSC limit	Zone 1 red king crab bycatch	<i>C. opilio</i> PSC limit	<i>C. opilio</i> bycatch	Zone 1 <i>C. bairdi</i> PSC limit	Zone 1 <i>C. bairdi</i> bycatch	Zone 2 <i>C. bairdi</i> PSC limit	Zone 2 <i>C. bairdi</i> bycatch
2002	76,446	77,219	3,746,111	787,577	706,164	312,746	2,384,643	528,683
2003	76,446	75,157	3,746,111	556,442	706,164	256,670	2,384,643	498,738
2004	155,256	68,497	3,746,111	1,631,939	706,164	147,166	2,384,643	248,285

NOTE: Zone 1 encompasses much of the waters of Bristol Bay west to 165° W. longitude; adjacent to the west, Zone 2 extends northwest and encompasses the Pribilof Islands. The *C. opilio* PSC limit applies to crab caught within the *C. Opilio* Bycatch Limitation Zone, which encompasses the Pribilof Islands and extends northwest.

Salmon

The status description of salmon is in the Alaska Groundfish Harvest Specifications EIS and adopted by reference for this analysis (NMFS 2007a). The majority of salmon taken in the groundfish fisheries is in the pollock fishery. The non-pelagic trawl fishery took only 5 percent of the total salmon bycatch in the 2006 BSAI groundfish fisheries (Mecum 2007). The Lower Columbia River and Upper Willamette River stocks of Pacific salmon are listed under the ESA and occur in the Bering Sea. Very few of these stocks are taken in the BSAI trawl fisheries and are likely taken in pollock trawl fishing due to the large amount of Chinook salmon bycatch in the pelagic trawl fishery compared to the non-pelagic trawl fisheries (NMFS 2006e and Mecum 2007). Because the alternative and options are not likely to affect non-pelagic trawl fishing activities in a manner that would change salmon bycatch amounts (no change in basic gear type, broad location, or amount of harvest), it is unlikely this action would have any effect on ESA-listed salmon beyond those effects already considered in previous consultations (NMFS 2007b) nor any affect on salmon bycatch in general for the BSAI groundfish fisheries.

3.2.3 Fish Habitat

The EFH EIS contained the description and location of EFH for all managed fish stocks off Alaska. When overlaid, all areas of habitat are considered essential for some species life stage. In the Bering Sea area, the pelagic waters over the deepwater basin areas are essential for juvenile Pacific salmon. The continental slope area is considered essential fish habitat for Bering Sea rockfish species, Greenland turbot, and sablefish. The shelf area is essential fish habitat for virtually every life stage of nearly all flatfish species, walleye pollock, Pacific cod, red and blue king crabs, Tanner crabs, opilio crabs, and other managed stocks. More information is available in the EFH EIS, and discussed in more detail relative to the northern open area boundary in Chapter 4. Descriptions of EFH for managed species in the northern Bering Sea area (those most pertinent to the area affected by the action) are attached as Appendix B of this analysis. A thorough literature review of the effects of fishing on fish habitat was contained in the EFH EIS and need not be repeated in this analysis.

The EFH EIS evaluated the effects of fishing on habitat by using a quantitative mathematical model developed by the NMFS Alaska Fisheries Science Center (see EFH EIS, Appendix B). The model estimated the proportional reductions in habitat features relative to an unfished state, assuming that fishing will continue at the current intensity and distribution until the alterations to habitat and the recovery of disturbed habitat reach equilibrium. The model provided a tool for bringing together all available information on the effects of fishing on habitat, such as fishing gear types and sizes used in Alaska fisheries, fishing intensity information from observer data, and gear impacts and recovery rates for different habitat types. Due to the uncertainty regarding some input parameters (e.g., recovery rates of different habitat types); the results of the model were displayed as point estimates, as well as a range of potential effects. Nevertheless, the model was deemed to provide the best available scientific information for assessing effects of fishing on habitat by NMFS, the Council, and the Council's SSC, and an independent panel of outside experts.

The analysis indicated that fishing, and particularly bottom trawling, has long-term effects on benthic habitat features off Alaska, but these effects were considered to have minimal impacts of fish stock productivity. If the current pattern of fishing intensity and distribution continues into the future, living habitat features that provide managed species with structure for refuge would be reduced by 0 to 11 percent in each habitat area, with the largest reduction occurring on soft substrates of the Aleutian slope area. There would be almost no reduction (0 to 3 percent) in infaunal and epifaunal prey for managed species. Viewed another way, habitat loss due to fishing off Alaska is relatively small overall, with most of the available habitats unaffected by fishing (infaunal prey are 97 to 100 percent unaffected, epifaunal prey are 97 to 100 percent unaffected, living structure is 89 to 100 percent unaffected, and hard corals are 84 to 98 percent unaffected). The model's long term effect indices (LEI) values for the Bering Sea habitat features are shown in Table 3.2-3. The relative contribution of the different Bering Sea target fisheries to these LEI values are shown in Table 3.2-4.

Table 3.2-3 Long-term effect indices (LEI in % reduction) for fishing effects on benthic habitat features of the Bering Sea (from EFH EIS Table B.2-9).

Habitat Features	Sand	Sand/mud	Mud	Slope
Infauna prey	0	2	0	3
Epifauna prey	0	2	0	3
Living structure	4	11	0	11
Non-living structure	0	1	0	4

Table 3.2-4 Long-term effect indices (LEI in % reduction) for fishing effects on soft substrate biostructure of the Bering Sea by fishery (from EFH EIS Table B.2-9).

Fishery	Sand/mud	Slope
Pollock pelagic trawl	4.6%	7.2%
Yellowfin sole bottom trawl	2.9%	0.2%
Flathead sole/flatfish bottom trawl	1.8%	1.6%
Rock sole bottom trawl	0.9%	0.2%
Pollock bottom trawl	0.4%	0.6%
Pacific cod bottom trawl	0.2%	0.4%
Sablefish/turbot bottom trawl	0.1%	0.7%
Pacific cod longline	0.0%	0.0%
Rockfish bottom trawl	0.0%	0.0%
Pacific cod pot	0.0%	0.0%
Sablefish/turbot longline	0.0%	0.0%
TOTAL	10.9%	10.9%

Potential effects of fishing activities on sessile invertebrates have been of particular concern, as they account for the higher LEI values in the sand/mud habitat of the Bering Sea. There are a number of benthic invertebrate species in the Bering Sea that as a group are considered emergent epifauna available for potential use as fish habitat, including sponges, bryozoans, sea raspberries, sea whips and sea pens, anemones, and ascidians. Sea whips and sea pens (Pennatulacea) are distributed along the slope area. Sponges (Porifera) are found on the continental shelf, particularly in outer Bristol Bay. Anemones (Actiniaria), ascidians (Asciacea), and bryozoans (Ectoprocta) are found at mid-depths of the shelf, particularly in the vicinity of the Pribilof Islands and in Bristol Bay. Information on the effects of trawl fisheries on these invertebrate species is provided in Appendix B of the EFH EIS. A comprehensive review of the distribution of these invertebrates can be found in the EFH EIS and in Malecha et al. (2005).

A review of habitat conservation measures implemented for Alaska fisheries prior to implementation of recent EFH mitigation measures is provided in the EFH EIS (NMFS 2006a). Measures included fishing equipment restrictions, marine protected areas, harvest limits, and effort controls. These measures were further augmented by the EFH mitigation measures and HAPC protection measures implemented in August 2006. These measures established new and expansive marine protected areas (Witherell and Woodby 2005). To date, over 388,000 nm² of the EEZ have been closed to bottom trawling. In addition, over 5,400 nm² have been set aside as ‘marine reserves’, where no commercial bottom is allowed. These areas include coral gardens, Primnoa coral thickets, and all seamounts off Alaska. The adjacent figure illustrates the year-round bottom trawl closure areas to protect fish habitat off Alaska (Figure 3.2-6).

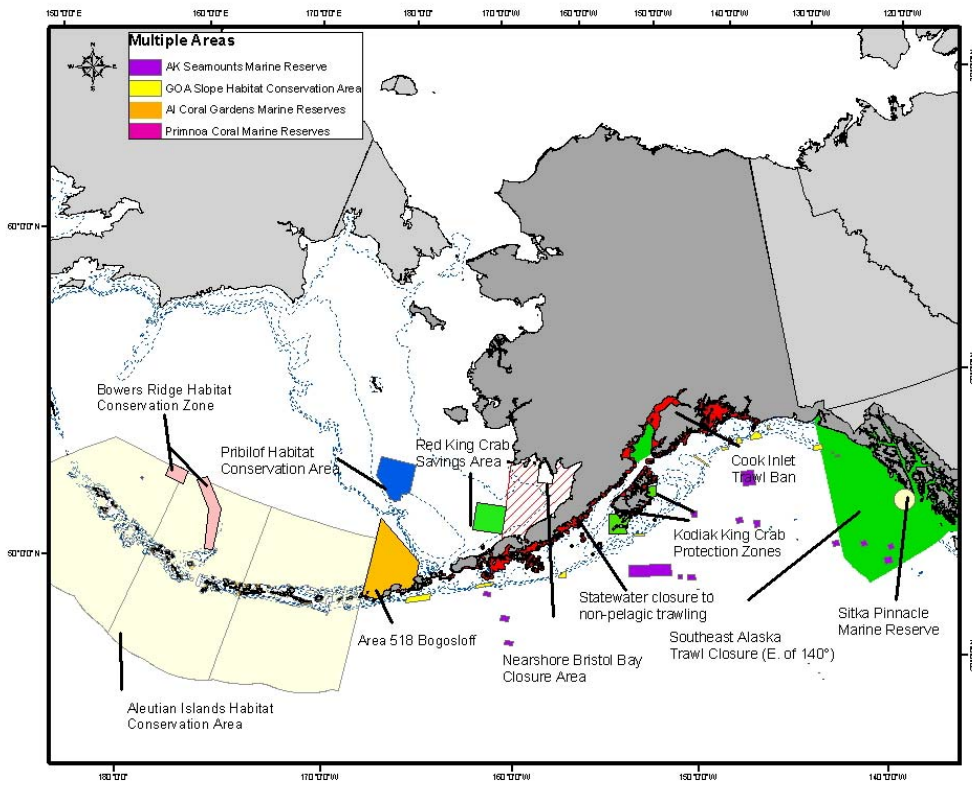


Figure 3.2-6 Year-round bottom trawl closures

3.2.4 Marine Mammals and Seabird Status

Marine mammals and seabirds may be listed as endangered or threatened under the ESA, may be protected under the Marine Mammal Protection Act (MMPA), may be candidates or being considered as candidates for ESA listings, may have declining populations in a manner of concern to State or federal agencies, may experience large bycatch or other mortality related to fishing activities, or may be particularly vulnerable to direct or indirect adverse effects from some fishing activities. These species have been given various levels of protection under the current FMPs of the Council, and are the subjects of continuing research and monitoring to further define the nature and extent of fishery impacts on these species. A current description of status and ESA consultations for each listed species is contained in section 3.4 of the harvest specifications EIS (NMFS 2007a). The Alaska Groundfish Harvest Specifications EIS (NMFS 2007a) provides the most recent status information on marine mammals and seabirds which may be impacted by the action. The status description in the EIS is incorporated here by reference.

Marine mammals and seabirds, including those currently listed as endangered or threatened under the ESA, that may be present in the BSAI are listed in Table 3.2-5. The group includes great whales, pinnipeds, and seabirds. NMFS is the expert agency for ESA-listed Pacific salmon and marine mammals, except sea otters and polar bears. The U.S. Fish and Wildlife Service (USFWS) is the expert agency for ESA-listed seabirds, sea otters and polar bears. Of the species listed under the ESA and present in the action area, several species may be adversely affected by groundfish commercial fishing. These include Steller sea lions, humpback whales, sperm whales, and short tailed albatross (NMFS 2006d, USFWS 2003a and 2003b). Both USFWS BiOps concluded that the groundfish fisheries and the annual setting of harvest specifications were unlikely to cause the jeopardy of extinction, or the adverse modification or destruction of critical habitat for ESA-listed seabirds. Pacific salmon is discussed in section 3.2.2. All BSAI and GOA fisheries must be in compliance with the ESA.

Section 7 consultations with respect to the actions of the Federal groundfish fisheries have been completed for all the ESA-listed species, either individually or in groups. On November 30, 2000, an FMP-level biological opinion was issued pursuant to Section 7 of the ESA on all NMFS managed ESA-listed species present in the fishery management areas for all groundfish fisheries. That FMP-level biological opinion concluded that the FMPs are likely to adversely modify only the critical habitat of the Steller sea lion. On October 19, 2001, NMFS released a biological opinion for the Steller sea lion protection measures that concluded that the fisheries conducted according to the protection measures are not be likely to jeopardize the Steller sea lion or its critical habitat. For additional information, see the Steller sea lion EIS (NMFS 2001). Additional information on all endangered or threatened species in the BSAI can be found in the PSEIS (NMFS 2004) and in sections 3.4 and 8.2 of the Alaska Groundfish Harvest Specifications EIS (NMFS 2007a). Because of new information and the passage of time since the last FMP-level consultation, NMFS has reinitiated FMP level section 7 consultations on the effect of the groundfish fisheries on Steller sea lions, humpback whales and sperm whales. The consultation is scheduled for completion in 2008, after completion of the Steller sea lion recovery plan.

Table 3.2-5 Marine Mammals and ESA-listed Seabirds in the BSAI

					Scientific Name	ESA Status
Common Name						
					<i>Balaena glacialis</i>	Endangered
					<i>Balaena mysticetus</i>	Endangered
					<i>Balaenoptera borealis</i>	Endangered
					<i>Balaenoptera musculus</i>	Endangered
					<i>Balaenoptera physalus</i>	Endangered
					<i>Megaptera novaeangliae</i>	Endangered
					<i>Physeter macrocephalus</i>	Endangered
					<i>Phoebastria albatrus</i>	Endangered
					<i>Eumetopias jubatus</i>	Endangered and Threatened ²
					<i>Somateria fishcheri</i>	Threatened
					<i>Polysticta stelleri</i>	Threatened
					<i>Brachyramphus brevirostris</i>	Candidate
					<i>Balaenoptera acutorostrata</i>	None
					<i>Orcinus orca</i>	None
					<i>Phocoenoides dalli</i>	None
					<i>Phocoena phocoena</i>	None
					<i>Lagenorhynchus obliquidens</i>	None
					<i>Berardius bairdii</i> and <i>Mesoplodon</i> spp.	None
					<i>Callorhinus ursinus</i>	None
					<i>Phoca vitulina</i>	None
					<i>Enhydra lutris</i>	Threatened
					<i>Ursus maritimus</i>	Proposed 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.

³ NMFS designated critical habitat for the northern right whale on July 6, 2006 (71 FR 38277).

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

⁵ Proposed to be listed as threatened, January 9, 2007 by USFWS, (72 FR 1064)

3.2.4.1 Marine Mammals

Some marine mammal species are resident throughout the year, while others migrate into or out of Alaska fisheries management areas. The BSAI and GOA support one of the richest assemblages of marine mammals in the world. Twenty-eight species are present from the orders Pinnipedia (seals, sea lion, and walrus), Carnivora (sea otter and polar bear), and Cetacea (whales, dolphins, and porpoises). Marine mammals occur in diverse habitats, including deep oceanic waters, the continental slope, and the continental shelf (Lowry et al. 1982).

The PSEIS (NMFS 2004) provides descriptions of the range, habitat, diet, abundance, and population status for marine mammals. The most recent marine mammal stock assessment reports (SARs) for nearly all marine mammals occurring in the BSAI were completed in 2005 based on 2002 through 2004 data (Angliss and Outlaw 2005). Northern elephant seals, and marine mammals under USFWS jurisdiction, were assessed in 2002 (Angliss and Outlaw 2005). This information is incorporated by reference.

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

The Steller sea lion inhabits many of the shoreline areas of the BSAI, using these habitats as seasonal rookeries and year-round haulouts. The Steller sea lion has been listed as threatened under the ESA since 1990. In 1997 the population was split into two stocks or distinct population segments (DPS) based on genetic and demographic dissimilarities, the western and eastern stocks. Because of a pattern of continued decline in the western DPS, it was listed as endangered on May 5, 1997 (62 FR 30772), while the eastern DPS remained under threatened status. The western DPS inhabits an area of Alaska approximately from Prince William Sound westward to the end of the Aleutian Island chain and into Russian waters.

Throughout the 1990s, particularly after critical habitat was designated, various closures of areas around rookeries and haulouts and some offshore foraging areas affected commercial harvest of pollock, Pacific cod, and Atka mackerel, important components of the western DPS of Steller sea lion diet. In 2001, a biological opinion was released that provided protection measures that would not jeopardize the continued existence of the Steller sea lion nor adversely modify its critical habitat; that opinion was supplemented in 2003, and after court challenge, these protection measures remain in effect today (NMFS 2001, Appendix A). A detailed analysis of the effects of these protection measures is provided in the *Steller Sea Lion Protection Measures Supplemental EIS* (NMFS 2001).

The Bering Sea subarea has several closures in place for Stellar sea lions including no transit zones, rookeries, haulouts, and the Stellar Sea Lion Conservation Area. Pacific cod and Atka mackerel are important prey species for Steller sea lions (NMFS 2001). The proposed action would not change the Atka mackerel, Pacific cod, pollock, and groundfish closures associated with the five Steller sea lion sites located at Sea lion Rock, Bogoslof I./Fire I., Adugak I., and Walrus I. The harvest of Pacific cod in the Bering Sea subarea is temporally dispersed (§ 679.20). The harvest of Atka mackerel and Pacific cod is spatially dispersed through area closures (§ 679.22). These harvest restrictions on the Atka mackerel, pollock, and Pacific cod fisheries decrease the likelihood of disturbance, incidental take, and competition for prey to ensure the groundfish fisheries do not jeopardize the continued existence or adversely modify the designated critical habitat of Steller sea lions (NMFS 2000 and NMFS 2001).

Several species of whales use the Bering Sea as summer feeding grounds and then return to seasonal wintering and calving areas further south. The endangered North Pacific right whale is perhaps of most concern given its very small known population size. This whale moves through the Aleutian Island region annually to occupy feeding habitat in the eastern Bering Sea; it is very rare, and only up to 25 individuals have been seen annually in recent surveys. Critical habitat for the North Pacific right whale is designated in the Bering Sea east of the Pribilof Islands. This designation was finalized July 6, 2006 (71 FR 38277). The area was designated based on the presence of foraging right whales and their zooplankton prey species in concentrations necessary for foraging.

NMFS also proposed listing the North Pacific right whale as a separate species from the Atlantic right whale (71 FR 77694, December 27, 2006). Designation of a species is a trigger for reinitiation of formal consultation under the ESA regulations (50 CFR 402.16). Consultation on the new species listing will be reinitiated once the species designation is finalized. NMFS has determined through informal consultation that the Alaska groundfish fisheries are not likely to adversely affect Northern right whales or their designated critical habitat (NMFS 2006d). Northern right whales are rarely seen in Alaskan waters. The latest confirmed sighting was reported by scientists on the NOAA research vessel Miller Freeman off Kodiak Island during Chiniak Gully pollock research in August 2006 (Tom Pearson, personal communication, September 6, 2006). Because the action is limited to the bottom trawl fisheries which does not affect the pelagic zooplankton that is important right whale prey, right whale occurrence is very rare, and fishing activities where right whales may occur is not likely to change, this action is not likely to have any impacts on Northern Pacific right whales or their designated critical habitat.

Northern fur seals forage in the pelagic area of the Bering Sea and reproduce on the Pribilof and Bogoslof Islands. On June 17, 1988, NMFS declared northern fur seal stock of the Pribilof Islands, Alaska (St. Paul and St. George Islands), to be depleted under the MMPA. The Pribilof Islands population was designated depleted because it declined to less than 50 percent of levels observed in the late 1950s, and no compelling evidence suggested that carrying capacity has changed substantially since the late 1950s (NMFS 2006f). Recent pup counts show a continuing decline in the number of pups surviving in the Pribilof Islands. NMFS researchers found an approximately nine percent decrease in the number of pups born between 2004 and 2006. The pup estimate decreased most sharply on Saint Paul Island. Saint George Island showed a small increase over 2004, though it still registered a decrease of three percent from the 2002 estimate. (Available from <http://www.fakr.noaa.gov/newsreleases/2007/fursealpups020207.htm>). The diet of fur seals in the Bering Sea does not indicate that there would be any competition between the non-pelagic trawl fisheries and fur seals. Fur seals eat primarily pollock and squid in the Bering Sea, and no evidence of flatfish prey exists from Bering Sea diet studies (NMFS 2006f). A draft conservation plan has been developed for northern fur seals and is available at <http://www.fakr.noaa.gov/protectedresources/seals/fur/cplan/draft0506.pdf>. Even though prey availability does not appear to be an issue for this action, fur seals are incidentally taken by the flatfish trawl fishery and may experience disturbance and entanglement in marine debris (NMFS 2007a).

An informal consultation with the USFWS on the effects of the groundfish fisheries on the southwest Alaska DPS of northern sea otters was completed in 2006 (Mecum 2006). The southwest Alaska DPS of northern sea otter is listed as threatened under the ESA (70 FR 46365, August 9, 2005). Overall, this DPS has declined by more than half since the 1980s and by 90 percent in some locations. The USFWS is developing a recovery plan for the southwest Alaska DPS of northern sea otters under the ESA. On December 19, 2006, the Center for Biological Diversity sued the USFWS for violation of Section 4 of the ESA for failure to designate critical habitat for the southwest Alaska DPS of northern sea otters. In 2006 and 2007, the sea otter recovery team is developing a recovery plan including identifying the areas and features needed for critical habitat for northern sea otters.

The informal consultation concluded that the groundfish fisheries were not likely to adversely affect northern sea otters (Mecum 2006). The USFWS has determined that, based on available data, sea otter abundance is not likely to be significantly affected by commercial fishery interaction at present (Angliss and Outlaw 2005), and commercial fishing is not likely a factor in the population decline (70 FR 46365, August 9, 2005). Northern sea otters are not likely to interact with groundfish fisheries in the Alaska EEZ because the areas of fishing and the types of prey preferred by otters do not overlap with the groundfish fisheries. Otters feed primarily in the rocky near shore areas on invertebrates, while groundfish fisheries are conducted further offshore on groundfish species (Funk 2003). Otters may also feed on clams in Federal waters in the soft sediment substrate of Bristol Bay and Kodiak areas (70 FR 46365, August 9, 2005). Portions of the EEZ used by sea otters in Bristol Bay are closed to trawling (50 CFR 679.22(a)(9)). This trawl closure reduces potential interaction between trawl vessels and sea otters and ensures the clam habitat used by sea otters is not disturbed. NMFS observer's monitored incidental take in the 1990–2000 groundfish trawl, longline, and pot fisheries. No mortality or serious injuries to sea otters were observed in the EEZ. One sea otter mortality in the trawl fishery of the BSAI was reported in 1997, but no other sea otter mortality in the groundfish fisheries in the EEZ off Alaska has been reported (Funk 2003). Because this action is limited to the non-pelagic trawl fisheries and would make no changes to the fisheries that may impact sea otters, this action is not likely to affect northern sea otters in any manner not already considered under previous ESA consultations.

Polar bears are primarily located in the Chukchi and Beaufort Sea regions using pack ice year round and may spend short times on shore. The bears may extend their range to the southern most proximity of the ice into the Bering Sea in the winter (72 FR 1064, January 9, 2007). Historical information indicated that they may have ranged as far south as St. Matthews and the Pribilof Islands, but they have not occurred in these areas for decades, potentially due to hunting and changes in sea ice (B. Cummings, Center for Biological Diversity, pers. comm. February 6, 2006, and 72 FR 1064, January 9, 2007)). There is no

evidence of interactions between polar bear and groundfish fisheries, and groundfish fisheries are not listed as a potential threat to polar bears (72 FR 1064, January 9, 2007). Very few of the polar bear prey species are taken incidentally in the groundfish fisheries (Table 4.1-3); and therefore, are unlikely to result in reducing the availability of prey. The proposed action would likely have no effects on polar bears.

3.2.4.2 Seabirds

The seabird resource includes the seabird populations that nest within, or that migrate into and spend time within, the action area. Birds included in the seabird resource are listed in Table 3.2-6.¹

Table 3.2-6. Seabird species occurring in Alaska waters

Albatrosses <ul style="list-style-type: none"> • Black-footed • Short-tailed • Laysan 	Gulls <ul style="list-style-type: none"> • Glaucous-winged • Glaucous • Herring • Mew • Bonaparte's • Sabine 	Murres <ul style="list-style-type: none"> • Common • Thick-billed
Northern fulmar	Jaegers <ul style="list-style-type: none"> • Long-tailed • Parasitic • Pomarine 	Guillemots <ul style="list-style-type: none"> • Black • Pigeon
Shearwaters <ul style="list-style-type: none"> • Short-tailed • Sooty 	Eiders <ul style="list-style-type: none"> • Common • King • Spectacled • Steller's 	Murrelets <ul style="list-style-type: none"> • Marbled • Kittlitz's • Ancient
Storm petrels <ul style="list-style-type: none"> • Leach's • Fork-tailed 	Kittiwakes <ul style="list-style-type: none"> • Black-legged • Red-legged 	Auklets <ul style="list-style-type: none"> • Cassin's • Parakeet • Least • Whiskered • Crested
Cormorants <ul style="list-style-type: none"> • Pelagic • Red-faced • Double-crested 	Terns <ul style="list-style-type: none"> • Arctic • Aleutian 	Puffins <ul style="list-style-type: none"> • Rhinoceros • Horned • Tufted

Seabirds spend the majority of their life at sea rather than on land. The group includes albatrosses, shearwaters, petrels (*Procellariiformes*), cormorants (*Pelecaniformes*), and two families of *Charadriiformes*, gulls (*Laridae*), and auks (*Alcidae*), such as puffins, murres, auklets, and murrelets. Several species of sea ducks (*Merganini*) also spend much of their lives in marine waters. Other bird groups contain pelagic members, such as swimming shorebirds (*Phalaropodidae*), but they seldom interact with groundfish fisheries, and therefore will not be further discussed.

Thirty-eight species of seabirds breed in Alaska. More than 1,600 colonies have been documented, ranging in size from a few pairs to 3.5 million birds. The USFWS is the lead federal agency for managing and conserving seabirds and is responsible for monitoring the distribution and abundance of populations. Breeding populations are estimated to contain 36 million individual birds in the Bering Sea; total population size (including subadults and nonbreeders) is estimated to be approximately 30 percent higher. Five additional species that occur in Alaskan waters during the summer months contribute another 30 million birds.

¹ This list is based on the list of seabirds in the PSEIS (NMFS 2004, pp. 3.7-18 to 3.7-87), with the addition of the common and king eiders.

The PSEIS (NMFS 2004) provides descriptions of the range, habitat, diet, abundance, and population status for these seabirds.

Species nesting in Alaska

- Tubenoses-Albatrosses and relatives: Northern fulmar, Fork-tailed storm-petrel, Leach's stormpetrel
- Kittiwakes and terns: Black-legged kittiwake, Red-legged kittiwake, Arctic tern, Aleutian tern
- Pelicans and cormorants: Double-crested cormorant, Brandt's cormorant, Pelagic cormorant, Red-faced cormorant
- Jaegers and gulls: Pomarine jaeger, Parasitic jaeger, Bonaparte's gull, Mew gull, Herring gull, Glaucous-winged gull, Glaucous gull, Sabine's gull
- Auks: Common murre, Thick-billed murre, Black guillemot, Pigeon guillemot, Marbled murrelet, Kittlitz's murrelet, Ancient murrelet, Cassin's auklet, Parakeet auklet, Least auklet, Wiskered auklet, Crested auklet, Rhinoceros auklet, Tufted puffin, Horned puffin

Seabirds that visit Alaskan waters when they are not breeding

- Tubenoses: Short-tailed albatross, Black-footed albatross, Laysan albatross, Sooty shearwaters, Short-tailed shearwater
- Gulls: Ross's gull, Ivory gull

Conservation concerns over black-footed albatross have risen in recent years. Melvin et al. note that the World Conservation Union changed the conservation status of the black-footed albatross from its vulnerable rating to its endangered rating in 2003 (Melvin, et al. 2006, p. 4). In September 2004, the USFWS received a petition to list the black-footed albatross as threatened or endangered under the ESA. The petition is under review at this time (S. Fitzgerald, pers. comm., 2006; Melvin et al. 2006).

Spectacled eiders (*Somateria fischeri*) are large diving sea ducks that spend most of the year in marine waters, where they primarily feed on bottom-dwelling mollusks and crustaceans. Besides breeding and molting in some Alaska coastal areas, spectacled eiders congregate during the winter in exceedingly large and dense flocks in open leads in the pack ice in the central Bering Sea between Saint Lawrence and Saint Matthew Islands (USFWS 2006). Spectacled eiders from all three known breeding areas (in Alaska and Russia) use this wintering area. While at sea, spectacled eiders appear to be primarily bottom feeders, eating mollusks and crustaceans at 40 m to 70 m in the wintering area. Because nearly all individuals of this species may spend each winter occupying an area of ocean less than 50 km (31 mi) in diameter, they may be particularly vulnerable to chance events during this time (USFWS 2003a). Critical habitat has been designated for the spectacled eider in their wintering area between St. Lawrence and St. Matthews Islands (Figure 4.1-6). The most important feature of the critical habitat is the density of benthic fauna available to foraging eiders (Greg Balogh, USFWS pers. Comm., February 22, 2007). A 2001 survey of prey eaten by spectacled eiders in this winter habitat showed almost exclusive use of *Nuculana radiata* clams, a dominant species (Lovvorn, et. al, 2003). They will eat other bivalve species and may eat other benthic prey, such as polychaetes and amphipods, depending on abundance (Lovvorn, University of Wyoming, pers. comm. February 22, 2007).

The numbers of spectacled eiders breeding on the Yukon-Kuskokwim Delta dropped by about 94 percent from about 48,000 pairs in the 1970s to less than 5,000 by 1992 (Ely et al. 1994, Stehn et al. 1993). Surveys suggest the Yukon-Kuskokwim Delta population now stands at about 8,000 birds and has stabilized or increased slightly from 1992–1999 (Bowman et al. 1999). Surveys on the North Slope of Alaska suggest a fairly stable trend from 1993–1999 (Larned et al. 1999). Nothing is known about spectacled eider population trends in Russia due to the lack of systematic surveys.

Recent information provided by the USFWS indicates that short-tailed albatross may gather in large numbers in a portion of the Bering Sea near the Donut Hole. On September 24, 2004, Mr. Jason Everett on the vessel Blue Gadus photographed a flock of over one hundred short-tailed albatross at 60° 5'N latitude, 178° 39 minutes W longitude. This aggregation is unusual behavior for short-tailed albatross which are generally solitary or in small groups in the open ocean (Greg Balogh, USFWS, per. comm., February 2007).

3.3 Socioeconomic Environment

During public testimony before the AP, the issue of the potential for gear conflict between H&G trawl CP vessels operating in proposed (and currently) open trawl areas near some small western Alaska communities and small fishing vessels, especially halibut vessels, from those communities was raised. A further concern about conflicts between subsistence use areas and an open area approach was brought forward by residents of the Etolin Strait/Kuskokwim Bay and St. Lawrence Island areas.

The alternatives considered in this analysis would affect the prosecution of fisheries using bottom trawl gear. Bottom trawl gear is used in the Bering Sea to catch various flatfish species, Pacific cod, and rockfish. The standard rigging is approximately the same for all of the bottom trawl target fisheries on the continental shelf, so a description of the yellowfin sole trawl fisheries is provided here as an example. Other flatfish target fisheries using bottom trawl gear include rock sole, flathead sole and other flatfish.

For reasons related to their proximity to various alternative open and closed areas detailed in the analysis of alternatives discussion, this issue focuses on the western Alaska communities of Kipnuk, Chefornak, and Platinum. In addition, information on the nearby communities of Mekoryuk, Savoonga, Gambell, Goodnews Bay, Kwigillingok, Umkumuite, Nightmute, and Tanunak is provided. All of these communities are predominantly and traditionally Yup'ik Eskimo communities. A more thorough description of the communities is in section 5.6.5.5. An overview of subsistence takes is provided below.

The yellowfin sole fishery is prosecuted with otter trawls (Figure 3.3-1) rigged to fish effectively for flatfish, which live on or very near the substrate. Approximately 20 to 30 trawl catcher-processor vessels are currently involved with this fishery in the BS. Typical vessel length (LOA) for boats targeting yellowfin sole is from 107 to 341 feet. Yellowfin sole is fished with a two- or four-seam trawl with a relatively low vertical opening (typically 1 to 3 fathoms). Nets are made of polyethylene netting, with codends and intermediates using 5.5- to 8-inch mesh in square or diamond configuration. Trawl codends are usually made with polyethylene netting attached to four longitudinal riblines. The riblines are typically chain, wire, or synthetic rope. Floats are attached along the length of the codend to counteract the weight of the steel components. Container lines around the circumference are attached along the length of the codend to restrict the expansion of the netting, preventing damage and allowing the codend to be hauled up a stern ramp. Sacrificial chafing gear, typically polyethylene fiber, is attached to the codend to protect it from abrasion on the stern ramp and occasional contact with the seafloor.

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

Contact with the seafloor is predominantly from doors, sweeps, footropes, and to a lesser extent from the codend. Although codends are usually rigged with some poly twine chafing gear, a design objective for modern flatfish nets is to employ sufficient poly floats to buoy the net body and codend to keep it mostly off the bottom or at least reduce the drag on the bottom to the greatest extent possible. This reduces the problem of sand and mud in the catch (which lowers product value and complicates processing). Sweeps are made of steel cable covered by rubber bobbins and disks ranging from 4 to 8 inches in diameter. Sweep sections (both sides) range in length from 250 to 800 feet and occasionally longer for nets with smaller footrope extensions and larger sweeps extensions. Footropes are designed to keep the net off the bottom by utilizing rubber disks and bobbins that range in size from 8 to 16 inches in diameter. Steel cable and chain used for the footrope runs through rubber disks at spaced intervals of 18 to 48 inches. Flotation on the net headrope provides lift to the footrope to reduce unnecessary drag and increase towing efficiency and performance. Some headrope/footrope combinations are designed to be as much as 70 percent buoyant at depth. Footropes typically extend 100 to 200 feet.

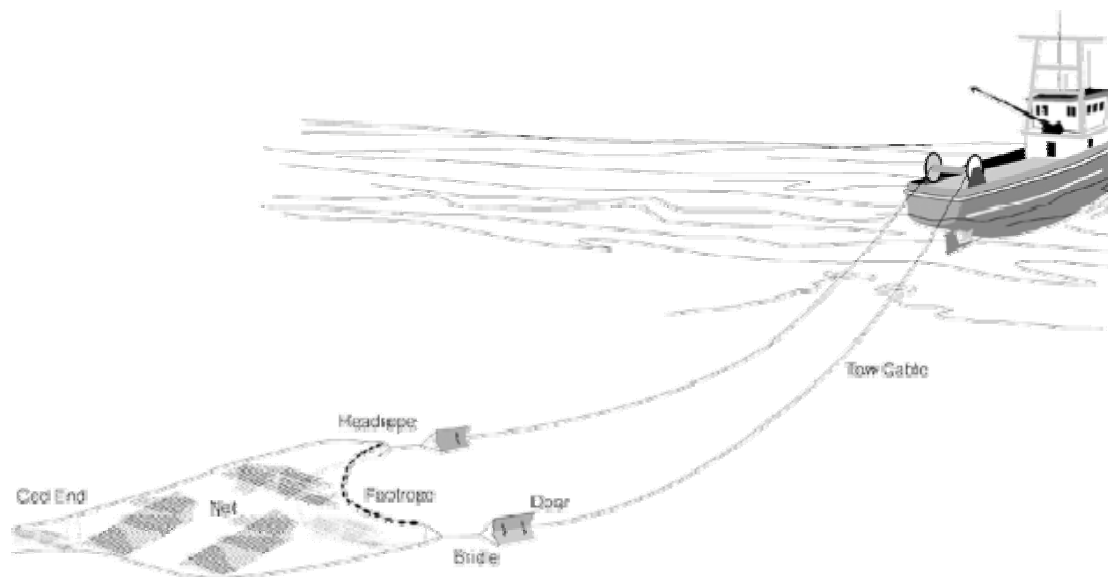


Figure 3.3-1 Depiction of otter trawl gear.

When set, the net is unwound from a net reel, the sweeps are attached, and then the doors are attached. Wire cable attached to each door is let out to a distance of approximately 3 times the depth. Modern trawl winches are designed to automatically adjust tension and release when necessary. The tow duration in this fishery is about 1 to 4 hours, at a speed of 3 to 4 knots. Tows may be in a straight line, or they may be adjusted to curve around depth contours or to avoid location of hangs and fixed gear. They may also be pushed by current, or for other reasons. At haulback, the setting procedure is reversed, and the codend is dumped into the fish-hold below decks.

4.0 ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

An EA must consider whether an action will have a significant effect on the quality of the human environment (40 CFR 1508.27; NAO 216-6, 6.01b). Significance is determined by considering the contexts (geographic, temporal, and societal) in which the action will occur, and the intensity of the effects of the action. The evaluation of intensity should include consideration of the magnitude of the impact, the degree of certainty in the evaluation, the cumulative impact when the action is related to other

actions, the degree of controversy, and consistency with other laws. If an impact is not considered significant, a Finding of No Significant Impact (FONSI) is issued.

The proposed action is limited to the Eastern Bering Sea and to bottom trawl fishing. Any effects of this action are therefore limited to these locations and to any component of the environment that may be impacted by bottom trawl fishing in these locations.

4.1 Significance Criteria

This section describes the criteria by which the impacts of the proposed action are analyzed for each of the following resource categories:

- Habitat
- Target Species
- Economic and Socioeconomic Aspects of Federally Managed Fisheries
- Other Fisheries and Fishery Resources
- Protected Species
- Ecosystem

Evaluation criteria have been developed for each of these categories recently within the Habitat Areas of Particular Concern (HAPC) EA (NMFS 2006b). The EFH EIS, (NMFS 2005) provide recent information on the effects of fishing on EFH. The analysis used in this EA draws upon the evaluations used in the EFH EIS and adopts the significance criteria used in the HAPC EA (NMFS 2006b) because of the similar type of action analyzed and the latest information provided by these analyses.

The four ratings used to assess each potential effect are:

Significantly negative (S-): Significant adverse effect in relation to the reference point. Information, data, and/or professional judgment indicate that the action will cause a significant adverse effect on the resource.

Insignificant impact (I): Insignificant effect in relation to the reference point. Information, data, or professional judgment suggests that the action will not cause a significant adverse effect on the resource.

Significantly positive (S+): Significant beneficial effect in relation to the reference point. Information, data, and/or professional judgment indicate that the action will cause a significant benefit to the resource.

Unknown (U): Unknown effect in relation to the reference point. There is an absence of information to determine a reference point for the resource, species, or issue and data is insufficient to adequately assess the effect of the action. Professional judgment is also not able to determine the effect of the action on the resource.

The reference point condition, where used, represents the state of the environmental component in a stable condition or in a condition judged not to be threatened at the present time. For example, a reference point condition for a fish stock would be the state of that stock in a healthy condition, able to sustain itself, successfully reproducing, and not threatened with a population-level decline. The following subsections describe the significance criteria used to evaluate the proposed alternatives. Significance criteria are provided for each of the resource categories listed above.

4.1.1 Potential Effects and Significance Criteria

The EFH EIS provided some background discussion of the effects of the Alternatives in this EA/RIR/IRFA (through its evaluation of EFH-Action 3 Alternative 1 (status quo), Alternative 4 (Bering Sea) and Alternative 5 (Bering Sea) in the EFH EIS) for effects on fish habitat, target species, other fisheries and fishery resources, protected species, ecosystems, and cumulative effects (NMFS 2005). Updated information on cumulative effects is in the Harvest Specifications EIS (NMFS 2007). No new information is available to support different criteria or conclusions than those presented in the EFH and Harvest Specifications EISs and therefore, the Alternative 1 (status quo) effects analysis adopts by reference analysis from the EFH and harvest specifications EISs effects analyses (NMFS 2005 and 2007).

This section will focus on the effects of Alternatives 2 & 3 and the Options on the effects on fish habitat, target species, other fisheries and fishery resources, protected species, ecosystems, cumulative effects, and the human environment and compare those effects to the significance criteria for each component and compare the effects to Alternative 1 status quo effects. The section will provide additional details beyond the EFH EIS (NMFS 2005) for these Alternatives since the concepts of the open areas and gear modifications analyzed in the EFH EIS were similar in concept but not mirror to these alternatives. Additional further consideration is needed for global warming and a potential for a northward migration of the bottom trawl fishing fleet.

The action is limited to changes in bottom trawling, and therefore, the analysis will focus on the effects of allowing or prohibiting bottom trawling in areas identified in Alternative 2 Options 1-5, and gear modifications for the bottom trawl fleet identified in Alternatives 3.

4.1.2 Habitat

The issues of primary concern with respect to the effects of fishing on benthic habitat are the potential for damage or removal of fragile biota within each area that are used by fish as habitat and the potential reduction of habitat complexity, benthic biodiversity, and habitat suitability. Habitat complexity is a function of the structural components of the living and nonliving substrate and could be affected by a potential reduction in benthic diversity from long-lasting changes to the species mix. Many factors contribute to the intensity of these effects, including the type of gear used, the type of bottom, the frequency and intensity of natural disturbance cycles, history of fishing in an area and recovery rates of habitat features. This process is presented in more detail in section 3.2 of the HAPC EA (NMFS 2006b) as well as Section 3.4.3 of the EFH EIS (NMFS 2005). A specific description of the effects of bottom trawl on habitat is in section 3.2.1 of the HAPC EA and is adopted here by reference. Further concern is noted that benthic habitat that has not had previous fishing effort on them could potentially in the future due to global warming and potential trends of fish stocks to migrate into northern waters.

Based on the information available to date, the predominant direct effects caused by bottom trawling include smoothing of sediments, moving and turning of rocks and boulders, resuspension and mixing of sediments, removal of seagrasses, damage to corals, and damage or removal of epibenthic organisms (Auster et al. 1996, Heifetz 1997, Hutchings 1990, ICES 1973, Lindeboom and de Groot 1998, McConnaughey et al. 2000). Trawls affect the seafloor through contact of the doors and sweeps, footropes and footrope gear, and the net sweeping along the seafloor (Goudey and Loverich 1987). Trawl doors leave furrows in the sediments that vary in depth and width depending on the shoe size, door weight, and seabed composition. The footropes and net can disrupt benthic biota and dislodge rocks. Larger seafloor features or biota are more vulnerable to fishing contact, and, larger diameter, lighter footropes may reduce damage to some epifauna and infauna (Moran and Stephenson 2000). An Alaska-based fishery impacts assessment model analyzes the effect of fishing gears on habitats, including fragile biota. This model is Appendix B of the EFH EIS (NMFS 2005).

In terms of habitat the BS has a mix of substrates, defined in part by the continental shelf, continental break and a deep-water basin. The distributions of benthic sediment types in the EBS shelf are related to

these depth features and are described in Chapter 3 of this document. Each of the substrates by depth zone may have different effects on them

Each alternative was rated by significance criteria for any effect on marine benthic habitat. The significance criteria are outlined in Table 4.1.1 and are grouped into four categories:

1. Mortality and damage to living habitat species: Damage to or removal of HAPC biota (such as seapens/whips, anemones, and sponges) by direct contact with fishing gear;
2. Modification of non-living substrate by direct contact with fishing gear (non-living substrates such as sand, rock and shell);
3. Modification of the community structure in terms of benthic biodiversity;
4. Modification of habitat suitability to support healthy fish populations.

Each of the criteria was assessed qualitatively, due to the lack of existing habitat data. Specifically, the second category, “modifications to nonliving substrate by gear” is somewhat hypothetical, as problems have been identified in assessing impacts for fishing gears. The third category identifies effects from fishing that may result in a change in the biodiversity within the habitat area. Intense or high frequency fishing activities within a relatively small area may result in a change in diversity by removing resident species and by attracting opportunistic fish species that feed on injured or uncovered marine organisms disturbed in the wake of the tow.

Specific impacts to habitat from different management regimes are very difficult to predict. The ability to predict the potential effects on benthic habitat from mitigate measures that change the geographical and seasonal patterns of fishing depends on having detailed information regarding habitat features, life histories of living substrates, the natural disturbance regime, and how fishing with bottom trawl gear at different levels of intensity affects different habitat types.

Several simplifying assumptions were made:

1. Disturbances, such as fishing, in sensitive habitats may add additional stress on areas with slow recovery times and fragile long-lived sessile marine organisms. Some natural disturbances occur on the Bering Sea Shelf in shallow areas.
2. Closing areas to disturbances benefits benthic habitat.
3. Disruption of non-living structure, such gravel and sand, may alter habitat for species
4. If more area is restricted or closed to fishing, fewer alterations and disturbances to marine habitat from fishing are expected. Conversely, increasing the fishing effort in an area will place additional stress on benthic habitat.
5. Management measures propose to protect one area will likely result in benefits to that area, with only slight increased stress on habitats elsewhere.

Criteria used in this EA to evaluate effects of the proposed action on habitat are provided in Table the reference point against which the criteria are applied is the current size and quality of marine benthic habitat and other essential fish habitat in the Bering Sea.

Table 4.1-1 Criteria used to determine significance of effects on habitat.

Effect	Criteria			
	Significantly Negative (-)	Insignificant (I)	Significantly Positive (+)	Unknown (U)
Habitat complexity: Mortality and damage to living habitat species	Substantial increase in mortality and damage; long-term irreversible impacts to long-lived, slow growing species.	Likely not to substantially increase mortality or damage to long-lived, slow growing species.	Substantial decrease in mortality or damage to long-lived, slow growing species.	Information, magnitude and/or direction of effects are unknown.
Habitat complexity: (non-living substrates such as gravel sand and shell hash)	Substantial increase in the rate of removal or damage of non-living substrates.	Likely not to substantially increase alteration or damage non-living substrates.	Substantial decrease in the rate of removal or damage of non-living substrates.	Information, magnitude and/or direction of effects are unknown.
Benthic biodiversity	Substantial decrease in community structure from baseline.	Likely not to substantially decrease or increase community structure.	Substantial increase in community structure from baseline.	Information, magnitude and/or direction of effects are unknown.
Habitat suitability	Substantial decrease in habitat suitability over time.	Likely not to substantially change habitat suitability over time.	Substantial increase in habitat suitability over time.	Information, magnitude and/or direction of effects are unknown.

4.1.2.1 Habitat Complexity- living species

Section 4.3.2.1 of the EFH EIS addressed the effects of Alternative 1, the status quo, on fish habitat in the Bering Sea (NMFS 2005). On the whole, current protection measures provide minimal long term reductions in structure forming habitat features. Within the Bering Sea the sand/mud and slope habitats had the highest (11%) effects for decreases in biological structure long term effect indices (LEI) values for non-living structures identified in Appendix B of the EFH EIS (NMFS 2005). The status quo in the EFH EIS was rated as \emptyset , an indiscernible effect, and the current status quo in this analysis is thus rated as (I) insignificant.

Increases in long term reductions in structure-forming habitat features were not different from the status quo for any of the habitats or feature types in the EBS under Alternative 2 open area. Freezing the footprint of the fishery would provide similar reductions to habitat complexity as the status quo. The methodology to select the open area approach is to make the open area best represent the historic bottom trawl footprint while preventing future expansions. The Alternative 2 open area approach would prevent expansion of the bottom trawl fleet into newer areas to the north.

Alternative 3 gear modifications may have beneficial effects on the amount of biological structure in the Bering Sea compared to the status quo, due to the changes in the amount of contact of the trawl sweeps to the sea bed. This alternative would likely have a less adverse effect on habitat compared to the status quo because the gear modification would result in less contact with the seafloor. Gear modification resulted in a decrease of the trawl sweeps contact with seabed by about 90% and was effective in reducing trawl sweep impact effects to basketstars and sea whips (Dr. Craig Rose, pers. com. 1/3/2007).

Option 1 would provide some benefits to habitat complexity for living species by creating a closure around St. Matthew Island. Although the area has been fished in recent years and consequently does have some disturbed bottom habitat.

Options 2 and 3 would provide some benefits to habitat complexity for living species by closing near shore areas in the vicinity of Etolin Strait. These areas are shallow in depth and have high levels of natural physical disturbances. Habitat complexities of living structures are not well documented in this area. Although some shallow areas may have important habitat for herring, halibut and some crab species.

Option 4 would provide some benefits to habitat complexity for living species by creating a Northern Bering Sea Research Closure area, that would only allow expansion of the fishing fleet only by experimental fishing or an exempted fishing permit in the northward portion of the Bering Sea that has not been fished and has undisturbed bottom habitat only after careful review and a request. Habitat complexities of living structures are not well documented in the northern portion of the BS.

Option 5 would provide some benefits to habitat complexity for living species by creating a closure around St. Lawrence Island. The area has been not been fished commercially with non-pelagic gear, however may have some disturbed bottom habitat from the commercial crab fishery. A closure in this area would be a slight benefit to blue king crab habitat.

4.1.2.2 Habitat Complexity to non living substrate

Section 4.3.2.1 of the EFH EIS addressed the effects of Alternative 1 (status quo) on fish habitat in the Bering Sea (NMFS 2005). The status quo in the EFH EIS was rated as Θ , an indiscernible effect, and the current status quo in this analysis is thus rated as (I) insignificant. LEI values for non-living structure were all less than 5 percent for all habitat types. All the habitat types included unfished, lightly fished and heavily fished areas. On the EBS shelf, effects were primarily concentrated into many small discrete pockets. On the EBS slope, there were two larger areas where high-effect values were concentrated: 1) an area of sand/mud habitat between Bristol Bay and the Pribilof Islands and 2) an area of sand habitat north of Unimak Island and Unimak Pass mostly inside of the 100m contour. These areas have been fished long enough that the current state of non living habitat features likely reflects those similar to equilibrium. The status quo Alternative 1 receives an insignificant impact.

Like the status quo Alternative 2 also would receive an insignificant impact on habitat complexity to non living species since the open area approach mimics fishing impacts under the status quo.

It is likely that Alternative 3 would provide no further decreases to non living species' habitat complexity and would likely provide some benefit to non living substrates. The extent of the effect would depend on the substrate and the intensity of fishing. Because fishing is likely to occur in the same locations as used historically, the repeated fishing in an area with modified gear is not likely to show a substantial improvement for non-living substrate, and therefore Alternative 3 would receive in insignificant impact.

Options 1-5 would provide some positive benefits to non living species habitat complexities and would likely provide some benefit to non living substrates as discussed above.

4.1.2.3 Benthic biodiversity

Benthic biodiversity is qualitatively analyzed based on potential modification of community structure. Section 4.3.2.1 of the EFH EIS addressed the effects of Alternative 1 (status quo) on fish habitat in the Bering Sea (NMFS 2005). The Bering Sea is mostly comprised of habitats that support organisms with faster recovery rates than the slow long lived hard corals. However, these organisms or living substrates combined with non-living substrates serve as important functional roles to fish and invertebrates with structural habitat for living, breeding, and growth to maturity. The status quo has had consistent long term fishing patterns in the Bering Sea and the effects were classified as indiscernible in regards to benthic biodiversity in the EFH EIS (2005). Areas of primary concern would be those that contain long lived species, such as hard corals or seaweeds. Hard corals are generally absent in the Bering Sea; sea

whips are locally common near the shelf break and in the canyons. The current status quo Alternative 1 receives an insignificant rating in this analysis because the current rates of fishing are not substantially going to increase or decrease community structure.

Alternative 2 open area approaches (both options) mimic the fishing activities under the current status quo and thus would also receive an (I) insignificant rating.

Alternative 3 would reduce potential destruction of benthic species and potentially preserve benthic biodiversity and would likely provide some benefit to non living substrates. The extent of this protection is dependent on the benthic diversity in the area and the intensity of fishing. Because the areas have been previously fished, any protection is not likely to result in substantial beneficial effects on benthic biodiversity and therefore, Alternative 3 would receive an insignificant impact.

Options 1-5 would provide some positive benefits to benthic species and would likely provide some benefit to benthic biodiversity.

4.1.2.4 Habitat suitability

The EFH EIS concluded there were indiscernible effects for the status quo, from the current fishing patterns on benthic biodiversity and habitat complexity (NMFS 2005). Habitat suitability is in part composed of these indices, therefore, the current status quo in the Bering Sea is rated insignificant (I) for habitat suitability for this analysis. It is noted however not taking action on by adopting an open area approach could involve a northward expansion of the fleet into areas that have not been fished.

Under Alternative 2, the open area approach, there would be no change from the status quo and its effect on habitat suitability, the effect of these alternatives and suboptions would also be (I) for this action.

Alternative 3 would provide no further decreases to habitat suitability and may provide some benefit to habitats particularly substrates, thus overall habitat suitability may benefit over time. Because this would occur in an area that has already been impacted by fishing, any beneficial impacts are not expected to be substantial. Alternative 3 would receive an insignificant rating.

Options 1-5 would provide some positive benefits to habitat suitability although any beneficial impacts are not expected to be substantial and would receive an insignificant rating.

4.1.3 Target Species

Target species for the Bering Sea are managed within the Bering Sea subarea and those species are described in Section 3.2.1. In terms of target species, the FMP describes the target fisheries as, those species which are commercially important and for which a sufficient data base exists that allows each to be managed on its own biological merits. Catch of each species must be recorded and reported. This category includes pollock, Pacific cod, yellowfin sole, Greenland turbot, arrowtooth flounder, rock sole, 'other flatfish' sablefish, Pacific Ocean Perch, 'other rockfish, Atka mackerel, and squid. Other non-groundfish targeted FMP species in Federal waters include crab and scallops. In terms of state managed crab and invertebrates fisheries, no effects of these target species are expected as no fisheries are prosecuted with the gear type proposed in these Alternatives.

The significance criteria used to evaluate the effects of the action on target species is in Table 4.1-2.

It was determined within the EFH EIS (NMFS 2005) that considerable scientific uncertainty remains regarding the consequences of habitat changes for managed species. Nevertheless, the EIS analysis concluded that the effects on EFH from fishing target species are minimal because no indication exists that continued fishing at the current rate and intensity would alter the capacity of EFH to support healthy populations of managed species over the long term. Therefore Alternative 1 Status quo is rated as

insignificant for all target species in terms of stock biomass, fishing mortality, spatial and temporal distribution, and change in prey availability. Catch of target species is expected to remain the same under all alternatives. No changes in stock biomass, fishing mortality and prey species availability are anticipated under any of the alternatives.

Alternative 2 Open area approaches mimic the current status quo in terms of fishing effort for target species. Increases in effort on target species were not different from the status quo in terms of stock biomass, fishing mortality, spatial and temporal distribution, and change in prey availability based on the current fishing practices because the size differences of the open area are small compared to status quo. Therefore groundfish target species receive an insignificant rating since the stock biomass, fishing mortality, spatial and temporal distribution, and change in prey availability would be the same as the status quo. In terms of invertebrate species Blue King Crab and Opilio Tanner crab stocks have no directed fishing occurring with bottom trawl gear. Potential impacts could occur to these stocks in terms of fishing mortality from incidental bycatch. However, the spatial distributions of these stocks are currently near St. Matthew Island and are outside of the proposed open areas. Therefore, the effects of Alternative 2 receive an insignificant rating for shellfish target species since the stock biomass, fishing mortality, spatial and temporal distribution, and change in prey availability would be the same as the status quo.

The effects of the open area alternatives depend on fish stock distribution and fishing distribution. Potential economic impact from the open area alternative depends to some extent on how and where fish stocks and fishers change their distributions in the future. If the fish distribution remains static, the impacts will be negligible. However, if a substantial portion of the flatfish and cod stocks redistribute outside of the open area in the future – and assuming that other stocks don't take their place – there could be some economic impacts to the fleet if they were unable to catch the TACs.

Fish distribution can change with changes in stock biomass and environmental conditions. When a population grows, the distribution generally expands, and when a population declines, it generally contracts to the core of its range. Changes in distribution can be further driven by environmental forces as appears to be the case in the Bering Sea.

With the warming trend of the Bering Sea, it is possible that the non-pelagic trawl fisheries would shift north with the target stocks of some flatfish species. Dr. Paul Spencer of the AFSC has studied the relationship between the eastern Bering Sea flatfish spatial distribution and environmental variability from 1982-2004 (Boldt 2006, page 207). He compared flatfish catch per unit effort of the summer trawl survey to temperature and found that some flatfish species distribution appears to be correlated with temperature. Flathead sole and rock sole were distributed further to the north and northwest during warm periods. As ocean temperatures increase, it is likely flathead sole and rock sole may be harvested further north than in warmer time period; but the extend of movement of the fisheries cannot be predicted.

Few other studies have examined the question of fish distribution and temperature changes in the Bering Sea. Zheng and Kruse (2006) looked at crab changes (red king, Tanner, and snow crab) and a few crab predators – Pacific cod, rock sole, and skates. They noted that during recent years, some groundfish showed a clear trend in changes of centers of distribution. Pacific cod, flathead sole, and arrowtooth flounder populations shifted to the northwest, and rock sole, skates, and Alaska plaice shifted to the northeast, whereas yellowfin sole population showed no change in distribution. For arrowtooth flounder, Pacific cod, and skates, these distribution changes are directly related to mean bottom temperature. Litzow and Mueter (in prep) have examined changes in groundfish species distributions more fully. The area formerly covered by sea ice (and associated cold pool) has become favorable habitat for many subarctic species, and consequently, increases in biomass for most fish stocks have been observed in the area. Although there has been a linear response to bottom temperatures, there is an additional accelerating

shift that cannot be accounted for by temperature alone. Hence predictions into the future under a warming scenario are extremely uncertain (F. Mueter, pers. com.).

Alternative 3 Gear modifications is not expected to have any net decrease in the fishing target catch rates compared to that of status quo conditions. In side-by side field studies conducted by NMFS, the catch of target flatfish species with the modified gear was not significantly different than the catch of unmodified gear when equipped with 6 to 8 inch diameter disk that elevated the sweeps 2.5 inches off the seabed between disks. Additionally the bycatch rates of invertebrate species are not anticipated to differ from status quo. Therefore, the effects of Alternative 3 receive an insignificant rating for groundfish and invertebrate target species since the stock biomass, fishing mortality, spatial and temporal distribution, and change in prey availability would be the same as the status quo.

Option 1 would close the area around Saint Matthew to non-pelagic trawling to conserve blue king crab habitat.

Some trawl effort has occurred on the north side of St. Matthew, targeting P. Cod, yellowfin sole and flathead sole. This area closure would affect less than .001% of the overall bottom trawl effort (1990-2005). It is unknown at this time how many vessels, or how much fish harvested by these vessels to their overall harvest is at this time. However the catch of target species would not expect to be different from the status quo. Therefore, the affects of Option 1 receive an insignificant rating for groundfish and invertebrate target species since the stock biomass, fishing mortality, spatial and temporal distribution, and change in prey availability would be the nearly same as the status quo. Option 1 may provide some unquantified benefits to subsistence harvesters in the future.

Option 2 would close an area to non-pelagic trawling around Nunivak Island with the southern border extending along the nearshore portion of Etolin Straits. Option 3 would do the same but additionally includes nearshore waters of Kuskokwim bay. The waters in the southern portion of Etolin Strait have had very little historic fishing with non-pelagic gear (2000-2005). The predominant catch with non-pelagic gear has been yellowfin sole and prosecuted by the head and gut CP fleet. Although the number of vessels utilizing the area is small the fleet moves into this area to reduce bycatch rates of halibut. The catch of target species would not expect to be affected by this closure area on a large scale, and the vessels utilizing this area would be able to take their fishing in other open areas. The halibut bycatch rates have a potential to be higher with this closure. However the affects of Options 2 & 3 receive an insignificant rating for groundfish and invertebrate target species since the stock biomass, fishing mortality, spatial and temporal distribution, and change in prey availability would be the nearly same as the status quo. Nevertheless, Options 2 & 3 may provide some benefits to subsistence harvesters and local halibut fisherman by reducing competition and gear conflicts with local fisherman.

Additionally Option 4 may provide increased protection for some target species by creating a Northern Bering Sea Research Closure area, that would only allow expansion of the fishing fleet only by experimental fishing or an exempted fishing permit in the northward portion of the Bering Sea that has not been fished. Very minimal fishing has occurred in these proposed northern areas. The affects of Option 4 receive an insignificant rating for groundfish and invertebrate target species since the stock biomass, fishing mortality, spatial and temporal distribution, and change in prey availability would be the nearly same as the status quo.

Option 5 would close an area to non-pelagic gear around St. Lawrence Island. There is already a closure for crab pot gear in this area. Currently no non-pelagic fishing occurs in this area. The affects of Option 5 receive an insignificant rating for groundfish and invertebrate target species since the stock biomass, fishing mortality, spatial and temporal distribution, and change in prey availability would be the nearly same as the status quo.

Table 4.1-2. Criteria used to estimate the significance of effects on the FMP managed target stocks.

Effect	Criteria			
	Significantly Negative (-)	Insignificant (I)	Significantly Positive (+)	Unknown (U)
Stock Biomass: Potential for increasing and reducing stock size	Changes in fishing mortality are expected to jeopardize the ability of the stock to sustain itself at or above its MSST	Changes in fishing mortality are expected to maintain the stock's ability to sustain itself above MSST	Changes in fishing mortality are expected to enhance the stocks ability to sustain itself at or above its MSST	Magnitude and/or direction of effects are unknown
Fishing mortality	Reasonably expected to jeopardize the capacity of the stock to yield fishable biomass on a continuing basis.	Reasonably expected not to jeopardize the capacity of the stock to yield fishable biomass on a continuing basis.	Action allows the stock to return to its unfished biomass.	Magnitude and/or direction of effects are unknown
Spatial or temporal distribution	Reasonably expected to adversely affect the distribution of harvested stocks either spatially or temporally such that it jeopardizes the ability of the stock to sustain itself.	Unlikely to adversely impact the distribution of harvested stocks either spatially or temporally such that it has an effect on the ability of the stock to sustain itself.	Reasonably expected to positively affect the harvested stocks through spatial or temporal increases in abundance such that it enhances the ability of the stock to sustain itself.	Magnitude and/or direction of effects are unknown
Change in prey availability	Evidence that the action may lead to change prey availability such that it jeopardizes the ability of the stock to sustain itself.	Evidence that the action will not lead to a change in prey availability such that it jeopardizes the ability of the stock to sustain itself.	Evidence that the action may result in a change in prey availability such that it enhances the ability of the stock to sustain itself.	Magnitude and/or direction of effects are unknown

4.1.4 Economic and Socioeconomic Aspects of Federally Managed Fisheries:

The reference point against which Alternatives 2-3 were evaluated was the current economic and socioeconomic conditions from the current BS bottom trawl fisheries. No significance determination is required for this component of the analysis. A thorough discussion of the socioeconomic effects of the proposed action is in sections 5 and 6 of this EA/RIR/IRFA.

The analysis generally finds that under Alternative 2 flatfish and Pacific cod represented the largest first wholesale gross revenue at risk over the three year period (2003-2005) but no one species exceeded \$0.50 million or 1.00% of status quo first wholesale gross revenue. The first wholesale gross revenue at risk under the proposed action could be mitigated by additional fishing effort in the area remaining open to NPT. Under Alternative 2, no vessels had 5 percent or more of Bering Sea revenue at risk for any year 2003-2005.

The analysis generally finds that in Alternative 3 no first wholesale gross revenue at risk due to the proposed gear modification since the field studies showed any significant diminishment in target flatfish species catch using the modified gear.

The proposed gear modifications will likely result in additional equipment costs for vessels to comply with the addition of disks to the trawl sweeps and on some vessels may result in modification to operations and/or the cost of additional deck equipment. Gear manufactures estimate the cost of modifying a set of 50-fathom trawl sweeps on a typical H&G Trawl CP vessel at \$500 to \$1,000 for

equipment and labor. H&G Trawl CP vessels reportedly replace their trawl sweeps about once a year and may have two to three sets of sweeps on board the vessel as replacement gear. The estimated total cost of trawl sweep modification to a vessel to comply with the proposed gear modification action is estimated at \$1,500 to \$3,000 per year.

NMFS is investigating the type of implementation program that would be necessary for the gear modification alternative. A program similar to that used for seabird avoidance gear would likely apply to the non-pelagic trawl gear modifications because of the similarity of the type of action needed (enforcing the use of a gear type). The regulations used to implement seabird avoidance gear requirements have successfully reduced the incidence of seabird bycatch and requires less NMFS staff to manage compared to other equipment related programs such as vessel monitoring systems (VMS) and scales. Because no information is collected by gear, the details of the VMS and scales programs to ensure accuracy of information would not be required for non-pelagic trawl gear modifications and therefore, a less complicated program for implementation would be required. Development of a gear modification program will require careful coordination with the Alaska Fisheries Science Center, fisherman, NOAA OLE, and gear manufacturers.

Option 1 the proposed closure around Saint Matthew Island to non-pelagic trawling would have some affect on the gross revenues of Pacific Cod and flatfish vessels. Flatfish, pollock and Pacific cod represented the largest first wholesale gross revenue at risk over the three year period with average revenue at risk of roughly \$0.33 million or 0.16 % of the wholesale gross revenue at risk. The first wholesale gross revenue at risk under the proposed action could be mitigated by additional fishing effort in the area remaining open to NPT.

Options 2 and 3 would have similar gross revenue at risks as with Option 4.

The Northern Bering Sea Research Area considered under Option 4 would close 188,157 sq. km of BS shelf (shelf area to 1,000 m depth) or 23.8% of the 791,731 sq. km. of BS benthic habitat currently open to bottom trawling (shelf area to the 1,000 m depth contour). Gross first wholesale revenue at risk from the proposed Northern Bering Sea Research Area closure area under Option 4 averaged \$0.33 million or 0.16% of the three year average status quo gross revenue. Flatfish, pollock and Pacific cod represented the largest first wholesale gross revenue at risk over the three year period but no one species exceeded \$0.40 million or 0.86% of status quo first wholesale gross revenue. The first wholesale gross revenue at risk under the proposed action could be mitigated by additional fishing effort in the area remaining open to NPT.

4.1.5 Non-Target Resources:

Table 4.1-3 provides the significance criteria to evaluate impacts on non-target resources. These include groundfish species taken as bycatch in the other targeted fisheries, prohibited species, non-specified species and forage fish. Retention of prohibited species (PSC) is forbidden in the BSAI groundfish fisheries. The prohibited species include: Pacific salmon, steelhead trout, Pacific halibut, Pacific herring, and Alaska king, Tanner, and snow crab. Pacific salmon include Endangered Species Act (ESA)-listed salmon that may occur in the BSAI. Pacific salmon are primarily taken in the eastern Bering Sea pollock fishery. Many Pacific salmon are taken in the BS bottom trawl fisheries (3426 fish in the 2006, NMFS Inseason Management data), and no potential takes of ESA-listed salmon are expected with this action. Management measures are currently in 50 CFR 679.21 to reduce the potential for incidental takes of PSC species. These measures include limits on the take of certain PSC species and closures of areas to protect places where PSC species may occur. At present no active management and only limited monitoring of species in the other species and non-specified species occurs. Most of these animals are not currently considered commercially important and are not targeted or retained in groundfish fisheries. The information available for non-specified species is much more limited than that available for target fish

species. Directed fishing for forage fish species is prohibited and most the bycatch of these occur in the pollock pelagic trawl fishery.

The significance criteria used in the 2006-2007 Groundfish Harvest Specifications EA/RIRs for non-specified species is applicable to this analysis of the effects on nontarget species (NMFS 2006a). This EA/RIR provided the latest ideas on determining the significance of effects on nontarget species from the groundfish fisheries considering the lack of data regarding biomass and sustainability of most non-target species. The first criterion in the table was further refined for this analysis from NMFS 2006a to clearly provide a criterion for “insignificant impact” and to be consistent with other analyses of environmental components in this EA/RIR/IRFA. This analysis and the 2006-2007 EA/RIR analyze the effects of groundfish fisheries on nontarget resources in the BS with this proposed action being much narrower in focus.

Due to limited information a mostly qualitative assessment of the relative impacts of Alternatives 2 and 3 are made in relationship to the status quo. The proportion of non target species (nonspecified forage fish, and PSC) removed would not be very different, in relationship to the entire management, compared to the status quo. In terms of bycatch of non target species it is not expected that any negative incremental changes would occur from an open area approaches (Alternatives 2) or from gear modifications Alternative 3. The incidental takes of prohibited species is not anticipated to be different between Alternatives 1 and Alternatives 2-3 and the same amount of target species is expected to be harvested under each alternative (Table 4.1-4). Because the groundfish harvest is not expected to increase, the harvest of non-specific, PSC species and forage species are also not expected to increase. Therefore the effects of any of the Alternatives are expected to be the same and to be insignificant. The Options analyzed under this additionally analysis are also not likely to increase groundfish harvests due to small area closure sizes and are considered to be insignificant.

Table 4.1-3 Criteria used to estimate the significance of effects on nontarget species.

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

Table 4.1-4. Non-pelagic flatfish trawl closures by target species, date, PSC cap for years 2004-2006.

Fishery	2004		2005		2006	
	Closure Date	Reason	Closure Date	Reason	Closure Date	Reason
Flathead sole	24-Feb	Halibut	1-Mar	Halibut	21-Feb	Halibut
	16-Apr	Halibut	22-Apr	Halibut	13-Apr	Halibut
	31-Jul	TAC	18-Aug	Halibut	8-Aug	Halibut
Other Flatfish	24-Feb	Halibut	1-Mar	Halibut	21-Feb	Halibut
	16-Apr	Halibut	22-Apr	Halibut	13-Apr	Halibut
	4-Jun	TAC	6-Jul	Halibut	8-Aug	Halibut
Rock sole	24-Feb	Halibut	1-Mar	Halibut	21-Feb	Halibut
	1-Apr	TAC	22-Apr	Halibut	13-Apr	Halibut
	14-Aug	TAC	5-Jul	Halibut	8-Aug	Halibut
Yellowfin sole	4-Jun	TAC	16-Mar	Red King Crab	20-Apr	Halibut
			19-May	TAC	8-Jun	Halibut
			18-Aug	Halibut	19-Jun	TAC
			17-Sep	TAC	8-Aug	TAC

4.1.6 Marine mammal and Seabird Species Impacts

Many measures are already in place to protect marine mammals and seabirds from adverse encounters with fishing activities. These measures include seasonal and geographic closed areas, requirements for seabird avoidance devices (§ 679.24(e)), observer requirements, and voluntary industry research activities to reduce vessel and gear encounters with protected species. These measures will remain in place in the future under this action. As new knowledge becomes available to minimize adverse impacts of fishing activities on marine mammals and seabirds, the Council and NMFS likely will consider employing additional or modified measures to further reduce adverse interactions.

Assumed in this analysis is the global potential for fuel spills, other accidental contaminant releases, and accidental loss of fishing gear (nets, lines, or buoys) from fishing activities throughout the North Pacific. Much of this lost gear or released contaminants disperse in the ocean, settle to the sea floor, or wash up on shore along the Alaskan or other coastlines. Some of the lost gear may entangle marine mammals or birds, and this is further discussed below. Some contaminants may contact swimming fish, mammals, or birds and be absorbed by animal tissues. While these instances of contamination are most likely not lethal, some mortalities may occur to these species that are unseen and undocumented.

Vessel strikes of mammals and sea birds also may occur and be either unknown to the vessel operator or unreported. Thus there likely are some unrecorded mortalities to marine mammals and seabirds from ship strikes, but Angliss and Lodge (2002) note that the mortality levels from such instances can only be estimated. They have made some attempts to estimate a minimum mortality level to marine mammals from vessel strikes where possible. It is likely that strikes are few in number and have little effect on overall animal populations in the North Pacific. To summarize, these elements of fishing activities cannot be quantified to the extent necessary to be evaluated in any one fishery, region, or season, but are considered here generally and recognized as a byproduct of commercial fishing in the North Pacific.

Descriptions of how fisheries in the North Pacific may interact with marine mammal and seabirds are provided in many other documents. These relevant discussions were incorporated from the following: Wilson (2003), the EFH EIS (NMFS 2005), the PSEIS (NMFS 2004), the Stock Assessment and Fishery Evaluation reports for 2006 (Boldt 2006), Alaska Groundfish Harvest Specifications EIS (NMFS 2007a), and Angliss and Outlaw (2005).

Because this proposed action impacts only the location of bottom trawling, the potential impacts are isolated to those marine mammals and seabirds that may use the locations that are to be either opened or closed. Because the amount of harvest is expected to be the same under each alternative, impacts are likely to be limited to certain direct and indirect effects on marine mammals and seabirds. These include:

1. Disturbance by fishing vessels
2. Potential localized depletion of prey resources where trawling is allowed
3. Incidental take by fishing gear or ship strikes
4. Changes to benthic habitat (for seabirds only)

The criteria for determining significance of effect from various fisheries were developed based on known interactions of marine mammals and seabirds with commercial fisheries in the North Pacific.

4.1.6.1 Marine Mammals:

Direct and indirect interactions between marine mammals and groundfish harvest activity may occur due to overlap of groundfish fishery activities and marine mammal habitat. Fishing activities may either directly take marine mammals through injury, death, or disturbance, or indirectly affect these animals by removing prey important for growth and nutrition or cause sufficient disturbance that marine mammals avoid or abandon important habitat. Fishing also may result in loss or discard of fishing nets, line, etc. that may ultimately entangle marine mammals causing injury or death.

Table 4.1-5 contains the significance criteria for analyzing the effects of the proposed action on marine mammals. These criteria are from the 2006-2007 groundfish harvest specifications EA/RIR (NMFS 2006a). These criteria are applicable to this action because this analysis and the harvest specifications analysis both analyze the effects of groundfish fisheries on marine mammals. The EA/RIR provided the latest ideas on determining the significance of effects on marine mammals based on similar information that is available for this EA/RIR/IRFA. The first criterion in the table was further refined for this analysis from NMFS 2006a to clearly provide a criterion for “insignificant impact” and to be consistent with other analyses of environmental components in this EA/RIR/IRFA.

Table 4.1-5. Criteria for determining significance of impacts to marine mammals.

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

Incidental Take and Entanglement

The Marine Mammal Stock Assessment Reports (SARs) document the quantifiable effects on marine mammals. The National Marine Mammal Laboratory (NMML) completes SARs for marine mammals occurring in Alaskan waters (Angliss and Outlaw 2005). The SARs are reviewed annually for stocks designated as strategic under the MMPA, annually for stocks where there is significant new information available, and at least once every three years for all other stocks as required by the MMPA. The reports are available at the NMFS Alaska Region website at:

http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/individual_sars.html.

The SARs provide population estimates, population trends, and estimates of the potential biological removal levels (PBR) for each stock. The SARs also identify potential causes of mortality and whether the stock is considered a strategic stock under the MMPA.

To understand the level of potential impact of incidental take by the groundfish fisheries, the projected take of marine mammals is compared to the PBR and the Zero Mortality Rate Goal (ZMRG). The PBR is the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population, as defined by the MMPA (16 U.S.C. 1362 (20)). When available, the PBR is used as the measure of potential impact from fisheries mortality. The PBR is identified in the marine mammal stock assessments (Angliss and Outlaw 2005) as the level at which animals may be removed from the stocks while the stocks achieve sustainable populations. Incidental take is predicted to adversely affect marine mammal populations when the proposed harvest levels result in a take that may exceed the PBR.

NMFS' management goal, as required by the MMPA, is total marine mammal mortality below the ZMRG for all commercial fisheries. NMFS has defined ZMRG as 10 percent of the PBR (69 FR 43338). When the total marine mammal mortality and serious injury for all fisheries is above 10 percent of PBR for a given marine mammal stock, an individual fishery that resulted in mortality or serious injury less than 1

percent of the PBR is considered to have met ZMRG for that marine mammal stock. Marine mammal mortality and serious injury below the ZMRG is considered to be at an insignificant level approaching a zero rate.

Marine mammals taken in the BSAI flatfish and Pacific cod trawl fisheries are in Table 4.1-5 below. The majority of species and numbers of marine mammal taken are by the BSAI flatfish trawl fisheries. NMFS annually categorizes all U.S. commercial fisheries (State and Federal) under the MMPA List of Fisheries according to the levels of marine mammal mortality and serious injury. Each fishery is classified through a two-tiered analysis which assesses the potential cumulative impact of all fisheries, as well as individual fisheries impacts, on a marine mammal stock by comparing mortality and serious injury levels to the PBR of each marine mammal stock. The List of Fisheries for 2006 was published in the *Federal Register* on August 22, 2006 (71 FR 48802). Category III fisheries interact with marine mammal stocks with annual mortality and serious injury less than or equal to 1 percent of the marine mammal's PBR level and total fishery-related mortality less than 10 percent of PBR. Any fishery in Category III is considered to have achieved the target levels of mortality and serious injury under the ZMRG (NMFS 2004b). Category II fisheries have a level of mortality and serious injury that exceeds 1 percent but is less than 50 percent of the stock's PBR level, if total fishery related mortality is greater than or equal to 10 percent of the PBR. Category I fisheries have frequent mortality and serious injury of marine mammal resulting in annual mortality greater that or equal to 50 percent of PBR. No Alaska groundfish fisheries are included in Category I.

Table 4.1-6. Category II and III Alaska groundfish fisheries with documented marine mammal takes from the proposed List of Fisheries for 2006 (71 FR 20941; April 24, 2006)

Fishery	Marine Mammal Stocks Taken
Category II	
BSAI flatfish trawl	*Killer whale, AK resident Bearded seal, AK Harbor porpoise, Bering Sea Harbor seal, Bering Sea Northern fur seal, Eastern North Pacific Spotted seal, AK Walrus, AK *Steller sea lions, Western U. S
Category III	
BSAI Pacific cod trawl	Harbor seals, Bering Sea Steller sea lions, Western U. S.
*Serious injuries and mortalities of this stock are greater than 1 percent, but less than 50 percent of the stock's PBR, therefore bycatch of this stock determines this fishery's classification.	

Marine mammals that are not listed in Table 4.1-6 are assumed to be unlikely to be incidentally taken by any of the alternatives due to the absence of incidental take and entanglement records. No records of Alaska groundfish fisheries takes of North Pacific right whales exist.

Table 4.1-6 compares the estimated incidental take of marine mammals to the PBR established in the 2005 Marine Mammal SAR (Angliss and Outlaw 2005) for those animals that are shown in Table 4.1-5 taken in BSAI non-pelagic trawl fisheries. Annual levels of incidental mortality for the groundfish fisheries are based on observed takes, extrapolated to all (observed and unobserved) groundfish harvest. Therefore, qualitative estimates of potential incidental take and entanglement based levels of fishing in an area where the marine mammals may occur are appropriate.

Table 4.1-7. Estimated mean annual mortality of marine mammals from observed BSAI and GOA groundfish fisheries compared to the total mean annual human-caused mortality and potential biological removal for each stock.

Mean annual mortality, expressed in number of animals, includes both incidental takes and entanglements, as data are available, and averaged over several years of data. Years chosen vary by species. Groundfish fisheries mortality calculated based on Angliss and Outlaw (2005).

Marine Mammal	Mean annual mortality, from BSAI and GOA groundfish fisheries	Total mean annual human-caused mortality *	PBR
**Steller sea lions (western)	10.8	217.9	231
**Steller sea lions (eastern)	2.2	9.1	1,967
Northern fur seal	0.48	885	14,546
Harbor seal (BSAI)	4.0	192	379
Spotted seal	0	5,265	Undetermined
Bearded seal	1.6	6,790	Undetermined
Killer whale Eastern North Pacific AK resident	2.3	2.3	11.2
Killer whale Eastern North Pacific Northern resident	0	0	2.16
Harbor porpoise BSAI	1.1	4	393
Pacific walrus	1.2	5,794	Undetermined
* Does not include research mortality. Other human-caused mortality is predominantly subsistence harvests for seals, sea lions, otters, bowhead whales, and walrus.			
** ESA-listed stock.			

The incidental take of marine mammals by the BSAI non-pelagic trawl fisheries is well below either the species PBR or a small fraction of the total mean annual human-caused mortality. Under Alternatives 1, 2, and 3 the overall amounts of fishing and locations of fishing are expected to be the same, and no substantial change in incidental take by fishing operations, or entanglement in marine debris is expected. Under alternative 2, portions of the Bering Sea would be closed to prevent further expansion into untrawled areas which could reduce the potential for incidental take and entanglement for those animals that may occur in the closed area. In addition, all options considered would close waters in specific areas

to non-pelagic trawling which would reduce the potential for entanglement and incidental take in these areas where marine mammals may be present. These limited areas of closures under Alternative 2 and the options is not likely to result in any population level effects and are not likely to have a discernable effect over Alternative 1 because of the currently small number of marine mammals taken in the BSAI groundfish fisheries. Alternative 3 would only modify the gear to protect bottom habitat and no evidence indicates that the modified sweeps would result in a different level of incidental take and entanglement compared to status quo. For these reasons, Alternatives 1, 2 and 3 and options 1 through 5 would have an insignificant effect on the incidental take and entanglement of marine mammals.

Harvest of Prey

Under this action, competition for prey between the non-pelagic trawl fisheries and marine mammals is limited to Steller sea lions. The action includes the harvest of Atka mackerel and Pacific cod by bottom trawl gear in the Eastern Bering Sea. These species are important prey species for Steller sea lions. All Steller sea lion critical habitat in the Bering Sea is closed to Atka mackerel directed fishing by trawl gear (Figure 4.1-1). Some portions of the CH in the Bering Sea are open to Pacific cod trawling. (Figure 4.1-2). By closing these areas, the potential competition between the non-pelagic trawl fisheries for Pacific cod and Atka mackerel and Steller sea lions is reduced. This reduction is greater for the directed Atka mackerel fishery which is entirely prohibited in Steller sea lion protection areas in the Bering Sea. In addition, Pacific cod trawl harvest in the Bering Sea is seasonally apportioned among A, B, and C seasons as shown in Table 4.1-8. The seasonal apportionments reduce the potential for seasonal depletion of prey by limiting concentration of harvest in time. The proposed action would only affect the location of harvests outside of the Steller sea lion protection measures and therefore would have the potential to affect only those animals that may depend on prey resources outside of Steller sea lion protection areas.

Table 4.1-8 Pacific Cod Trawl Sector Seasonal Apportionments in the Bering Sea

Sector	A season	B season	C season
Trawl	60 percent	20 percent	20 percent
Trawl CV	70 percent	10 percent	20 percent
Trawl CP	50 percent	30 percent	20 percent

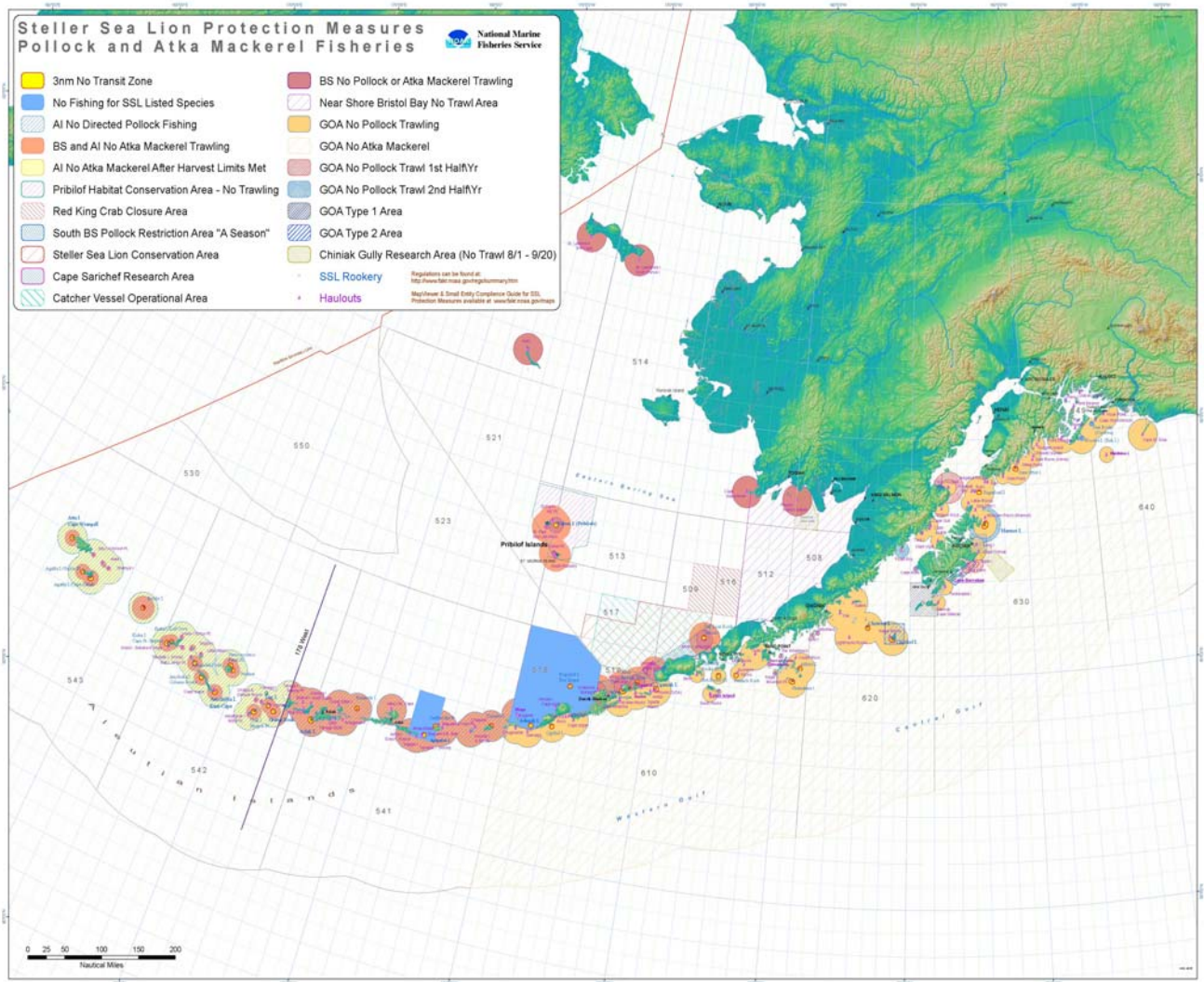


Figure 4.1-1. Atka Mackerel Trawl Fishery Closures Under Steller Sea Lion Protection Measures

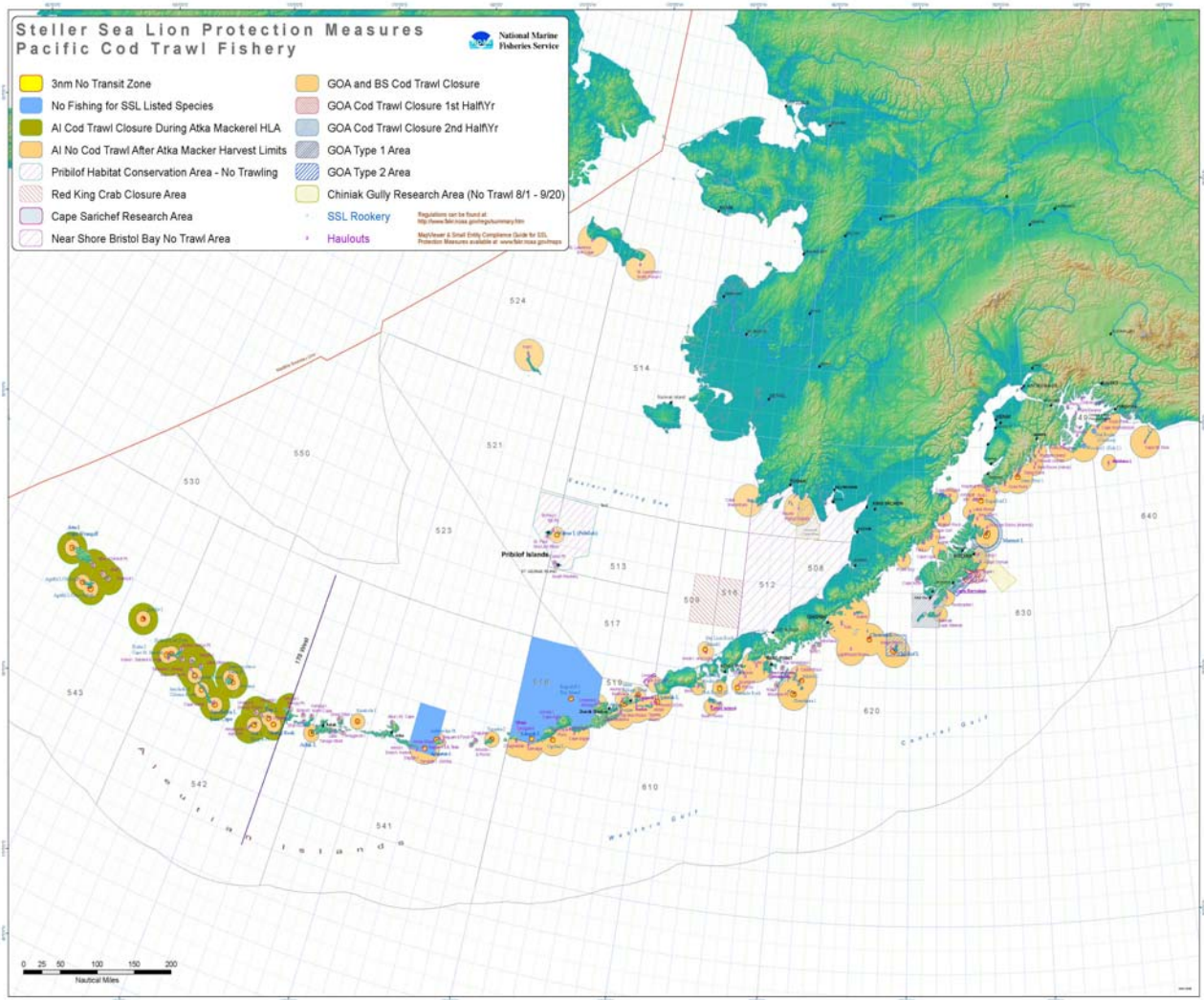


Figure 4.1-2. Pacific Cod Trawl Closures under Steller Sea Lion Protection Measures.

Because regional and seasonal Steller sea lion diets vary in Alaska waters, it is likely that prey are targeted by Steller sea lions when nearshore and densely schooled in spawning or migratory aggregations (Sinclair and Zeppelin 2002). Very little prey data are available for the Bering Sea (Tanya Zeppelin, NMML, pers. comm., February 2007). Sampling of Steller sea lion scat has occurred at Bogoslof Island and Seal Rocks/Amak which are very different environments (pelagic deep water compared to shallow shelf) and the diet varies accordingly.

Overall harvest of prey species is expected to be similar under all alternatives. Alternatives 1 and 2 and the options would not change the implementation of the Steller sea lion protection measures. Some beneficial effect may occur for individual Steller sea lions that may forage in areas that would be closed to Pacific cod and Atka mackerel fishing under Alternative 2 and options 1-5 and that are not currently closed under the Steller sea lion protection measures. These areas are shown in Figure 4.1-3 and Figure 4.1-4. Steller sea lions near Cape Newenham, St. Lawrence Island (SW Cape and S Punuk) and St. Matthews (Hall) would have additional waters closed to non-pelagic trawling, reducing any potential for

competition for prey species in waters outside of Steller sea lion protection areas. Of the four haulouts in this area, only Cape Newenham has enough Steller sea lions present to continue being considered a haulout under the draft biological opinion being prepared by NMFS for the groundfish fisheries (Table 3.32 in the draft biological opinion in development). Animals that may travel north from Cape Newenham may benefit from the closure that would occur under Alternative 2 and options 3 and 4.

Any effect on prey availability is expected to be small because the closures are limited to areas that currently have very little or no fishing and very few Steller sea lions appear to occur in the closure area. This effect is not likely to result in any population level effect since the additional protection would be limited to Pacific cod and Atka mackerel, few animals occur in the area, and the additional closure areas under the options and alternatives are not identified as important to the population under the Steller sea lion protection measures (NMFS 2001). Therefore, Alternatives 1 and 2 and the options would have insignificant effects on the harvest of prey species for marine mammals.

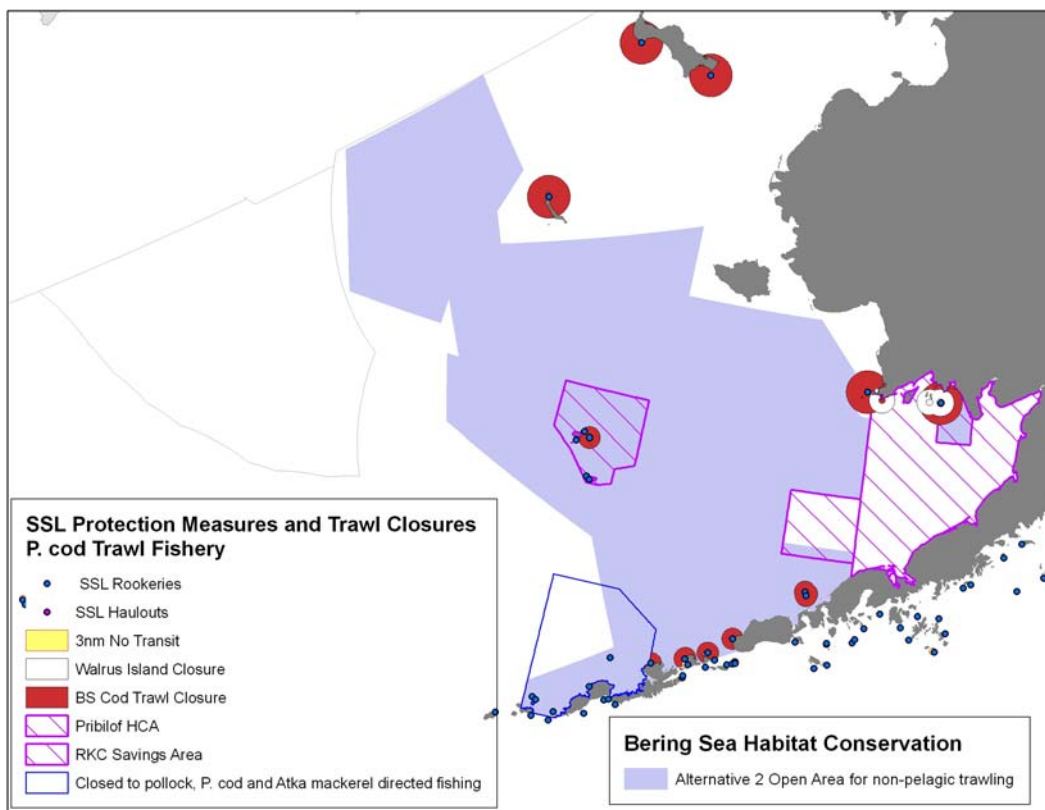


Figure 4.1-3. Pacific cod Trawl Closures under the Steller Sea Lion Protection Measures and Alternative 2.

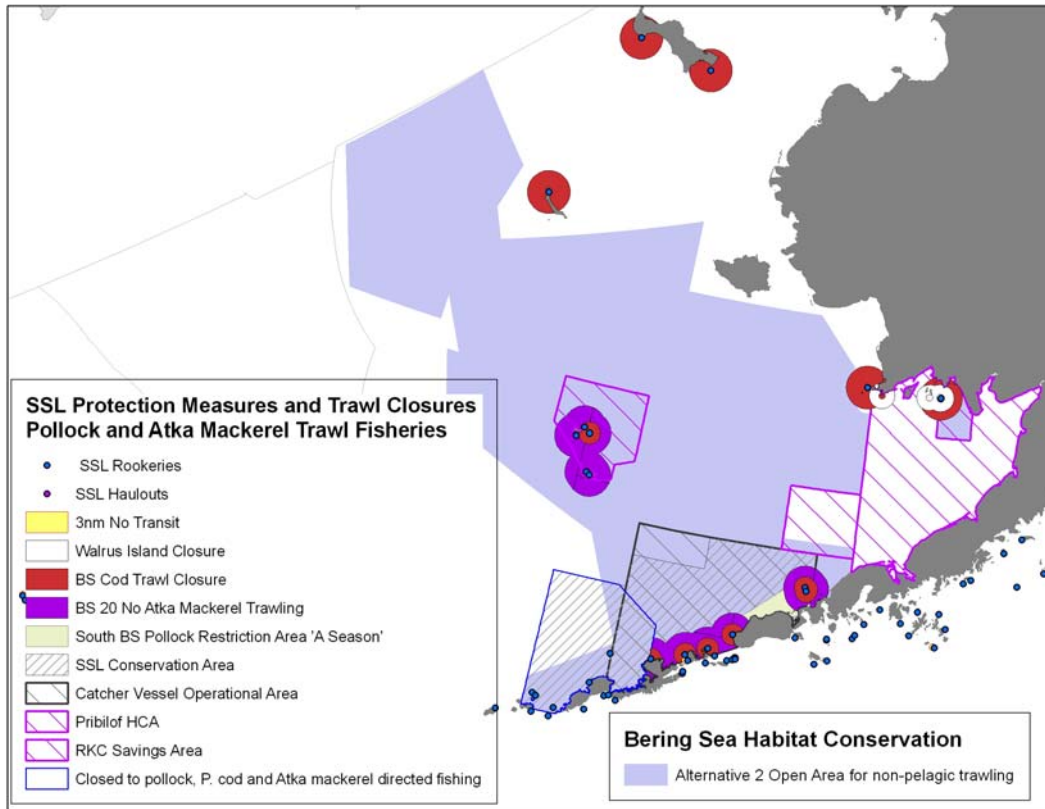


Figure 4.1-4. Atka Mackerel Trawl Closures under the Steller Sea Lion Protection Measures and Alternative 2

Alternative 3 would have no effect on the availability of prey species for Steller sea lions because it involves only the method of harvest of flatfish and is not expected to affect the harvest of prey species. Alternative 3 may improve prey availability for those marine mammals that depend on benthic organisms for prey, such as walrus and some seals. The effect would depend on the overlap between the fisheries and foraging areas for these marine mammals and the amount of impact the modified trawl would have on the prey species. There is no information available that indicates the current flatfish fishery is having an effect on the ability of marine mammal to use benthic habitat for prey and therefore any reduced effect on the benthic habitat is not likely to result in substantial change prey availability. Alternative 3 would have an insignificant effect on the availability of prey species for marine mammals.

Disturbance

The level of overall fishing activities is expected to be the same under all alternatives and options because the closures are limited to areas with little or no fishing. Individual animals that occurred in areas that would be closed under Alternative 2 and the options may experience less potential for disturbance from fishing vessels. This potential beneficial impact is not likely to result in any population level changes for Steller sea lions due to the closure of additional areas that were not identified as needing closure under the Steller sea lion protection measures. Likewise, disturbance of other marine mammals may be less likely in areas that would be closed under Alternative 2 and the options, but the benefit is not likely to be very different from status quo because much of the proposed closure areas have little or no fishing at this time.

None of the Alternatives or options is likely to result in a chance in potential disturbance of northern right whale occurring in critical habitat. Non-pelagic trawl fishing within critical habitat is the same under all

of the alternatives and options. The overlay of Alternative 2 and critical habitat is shown in Figure 4.1-5. The closed area of the Red King Crab Savings Area occurs under all of the alternatives and options. This area has been closed to non-pelagic trawling for the past 10 years (Mary Furness, NMFS inseason management, pers. comm. February 2007). The northern right whale population in the Bering Sea is very small, and only 25 have been seen in one area in recent years. There is no known interaction with northern right whales and the groundfish fisheries. Therefore, Alternatives 1 and 2 would likely have no effect on the disturbance of northern right whales and no effect on critical habitat. Alternatives 3 and the options would have no effect on disturbance of northern right whales because they would result in no change in the level of fishing or interaction with northern right whale, especially in designated critical habitat.

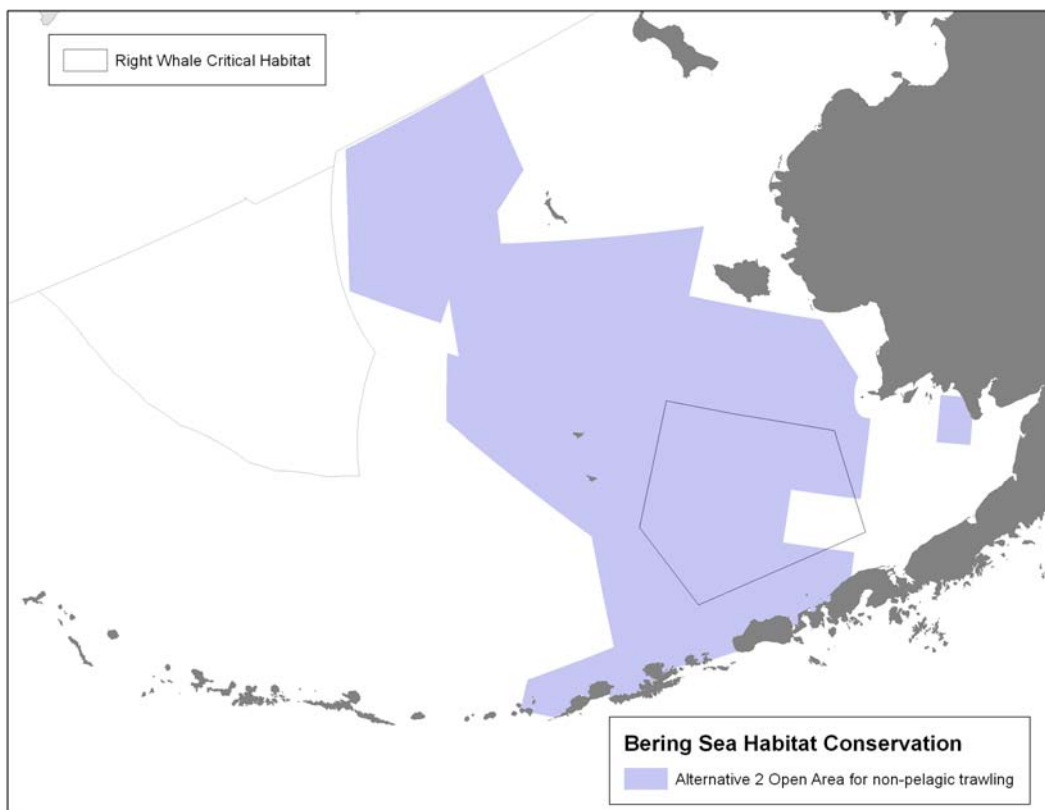


Figure 4.1-5. Northern Right Whale Critical Habitat and Alternative 2.

Alternative 3 would have no effect on the disturbance of marine mammals since it is limited to a change in gear to protect bottom habitat and would not have any impacts on interactions with marine mammals.

4.1.6.2 Seabirds:

The impacts of groundfish fisheries on seabirds are difficult to predict due to the lack of information on many aspects of seabird ecology. A summary of known information, both general and species-specific, can be found in Section 3.7 of the PSEIS (NMFS 2004). An analysis of the programmatic level preferred alternative for management of BSAI groundfish fisheries is in Section 4.9.7 of that document. Section 9 of the Alaska Groundfish Harvest Specifications EIS has a more recent analysis of the impact of the groundfish fisheries on prey availability, incidental take and benthic habitat (NMFS 2007a).

Table 4.1-9 contains the significance criteria for analyzing the effects of the proposed action on seabirds. These criteria are from the 2006-2007 groundfish harvest specifications EA/RIR (NMFS 2006a). These criteria are applicable to this action because this analysis and the harvest specifications analysis both analyze the effects of groundfish fisheries on seabirds. The EA/RIR provided the latest ideas on determining the significance of effects on seabirds based on similar information that is available for this EA/RIR/IRFA. The first criterion in the table was further refined for this analysis from NMFS 2006a to clearly provide a criterion for “insignificant impact” and to be consistent with other analyses of environmental components in this EA/RIR/IRFA

Table 4.1-9 Criteria used to determine significance of impacts on seabirds.

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

For this analysis, seabirds have been grouped as follows:

- Northern fulmar. Impacts on the northern fulmar are considered separately because this species accounts for the vast majority of incidental take that occurs in the hook-and-line fisheries of the BSAI and GOA and is one of the most abundant species that breeds in Alaska colonies.
- Short-tailed albatross. Short-tailed albatross is listed separately because of the special management concerns for animals listed under the ESA, and because of the precarious state of the population.
- Laysan and black-footed albatrosses. Laysan and black-footed albatrosses are treated separately because they belong to a taxonomic group of seabirds (Procellariiformes) that are globally threatened (Birdlife International), both species are on the USFWS’s Birds of Conservation Concern list (USFWS, 2002), and the black-footed albatross has been petitioned for listing under the ESA.

- Spectacled and Steller's eiders. Spectacled eider and Steller's eider are treated as representative of other seaducks because, except for considerations of critical habitat, the impacts on other seaducks such as scoters, long-tailed ducks, and harlequin ducks would be similar to the impacts on these two eider species. The two eider species are singled out because of special ESA management concerns.
- Shearwaters. Shearwaters are migratory birds that do not breed in Alaska.
- Piscivorous seabird species. Piscivorous seabird species are fish-eating seabirds that do breed in Alaska, including murre, kittiwakes, gulls, rhinoceros auklets, puffins, cormorants, jaegers, terns, guillemots, and murrelets.
- Other seabird species. All other seabird species not listed above, such as storm-petrels, crested auklet, and least auklet, are considered as a separate group.

This grouping is a modified version of the approach used in the Steller sea lion SEIS (NMFS 2001, pp. 4-236). The modification is the separate treatment of black-footed and Laysan albatrosses, and shearwaters. These species were grouped together in the PSEIS (NMFS 2004).

Incidental Takes

Estimated incidental take of birds recovered in the nets from trawling operations in the BSAI is approximately 855 birds per year (NMFS 2007a). Gull, shearwaters and fulmars make up 78 percent of the average annual trawl incidental catch for Alaska waters (NMFS 2007a). Additional bird mortality may occur by striking the trawl warps and third wire cables. The estimated takes of gulls, fulmars and shearwaters in the entire groundfish fishery are very small portions of these species populations (NMFS 2007a). The location of the short-tailed albatross aggregate (Figure 3.2-2) discussed above is within the open area that would be established under Alternative 2. Medium to high trawling effort currently occurs in this area. Alternative 1, 2, 3 and the options would not change the potential for takes in the trawl fisheries for short-tailed albatross because the alternative and options would not change the fishing activities currently occurring in the Short-tailed albatross area of congregation.

The level of fishing effort may be an indication of the potential take of seabird species. Because the overall amount of harvest in the non-pelagic trawl fishery is not expected to change under the alternatives and options, the amount of incidental take of seabird species is expected to be the same as status quo. Because the impact of incidental take is not expected to change under the alternatives and options, the effect of the alternatives and options on the incidental take of seabirds is insignificant.

Prey Availability and Benthic Habitat

A description of the effects of prey abundance and availability on seabirds is in Section 3.7.1 of the PSEIS (NMFS 2004) and section 9 of the Alaska Groundfish Harvest Specifications EIS (NMFS 2007a). Detailed conclusions or predictions cannot be made regarding the effects of forage fish bycatch on seabird populations or colonies. However, the present understanding is that fisheries management measures affecting abundance and availability of forage fish or other prey species could affect seabird populations (NMFS 2001; NMFS 2004), although commercial fisheries do not greatly compete directly with seabirds. There is no directed commercial fishery for those species that compose the forage fish management group, and seabirds typically target juvenile stages rather than adults for those target species where there is an overlap between seabirds and commercial fisheries. Most of the forage fish bycatch is smelt taken in the pollock fishery, which is not included in this action.

The Alaska Groundfish Harvest Specifications EIS found that the potential impact of the entire groundfish fisheries on seabird prey availability was limited due to little or no overlap between the fisheries and foraging seabirds based on either prey size, dispersed foraging locations or different prey (NMFS 2007a). The majority of bird groups feed in vast areas of the oceans, are either plankton feeders

or surface or mid-water fish feeders and are not likely to have their prey availability impacted by the non-pelagic trawl fisheries. The possible exception is seaducks that depend on benthic habitat. These include the spectacled and Steller's eiders, scoters, cormorants and guillemots which may feed in areas that could be directly impacted by non-pelagic trawling (NMFS 2004). These species are further discussed below. Additional impacts from bottom trawling may occur, if sand lance habitat is adversely impacted. This would affect a wider array of piscivorous seabirds that feed on sand lance, particularly during the breeding season, when this forage fish is also used for feeding chicks.

Alternative 1 is likely to have an insignificant impact on prey availability for seabirds because no changes in prey availability are expected for foraging seabirds. Very little non-pelagic trawling has occurred in spectacled eider critical habitat under the status quo (Figure 4.1-7). Alternative 3 only applies to modifying the trawl sweeps and would have no impact on the harvest of prey species in pelagic waters. Alternative 3 may reduce the potential for reducing prey availability in those areas where non-pelagic trawling and seabird benthic foraging overlap. These foraging areas are very limited and fishing effort is low as discussed below. Further discussion of Alternative 3 impacts on the benthic habitat which may affect availability for benthic forage species for some seaducks follows.

Spectacled eider designated critical habitat occurs in waters between St. Matthews and St. Lawrence Island in the Bering Sea (Figure 4.1-6). Critical habitat for the spectacled eider has been designated for areas off Norton Sound and Ledyard Bay, but no observed non-pelagic trawl fishing has occurred in these areas. These areas are so far north that non-pelagic trawl fishing is not expected in the future. In 3 of the 4 surveys of spectacled eiders since 1995, the birds have been located in the northwest corner of the critical habitat (G. Balogh, USFWS pers. comm. March 2007). The birds were located in the southeast corner in 1995 (G. Balogh, USFWS and J. Lovvorn, U. of Wyoming pers. comm. March 2007). The abundance and distribution information for spectacle eiders is more than a decade old. Newer information may provide more confidence in estimating potential impacts based on current conditions (Greg Balogh, USFWS, pers. comm. March 5, 2007).

Alternative 2 and options 4 and 5 would prohibit non-pelagic trawling in a portion or most of the spectacled eider designated critical habitat. Alternative 2 and option 4 would prohibit non-pelagic trawling in nearly the entire area of critical habitat. Option 5 would prohibit trawling only in the northeast corner of critical habitat. Alternative 2 and option 4 may have more of an impact on the spectacled eiders since they would prohibit non-pelagic trawling in areas where the birds have been observed.

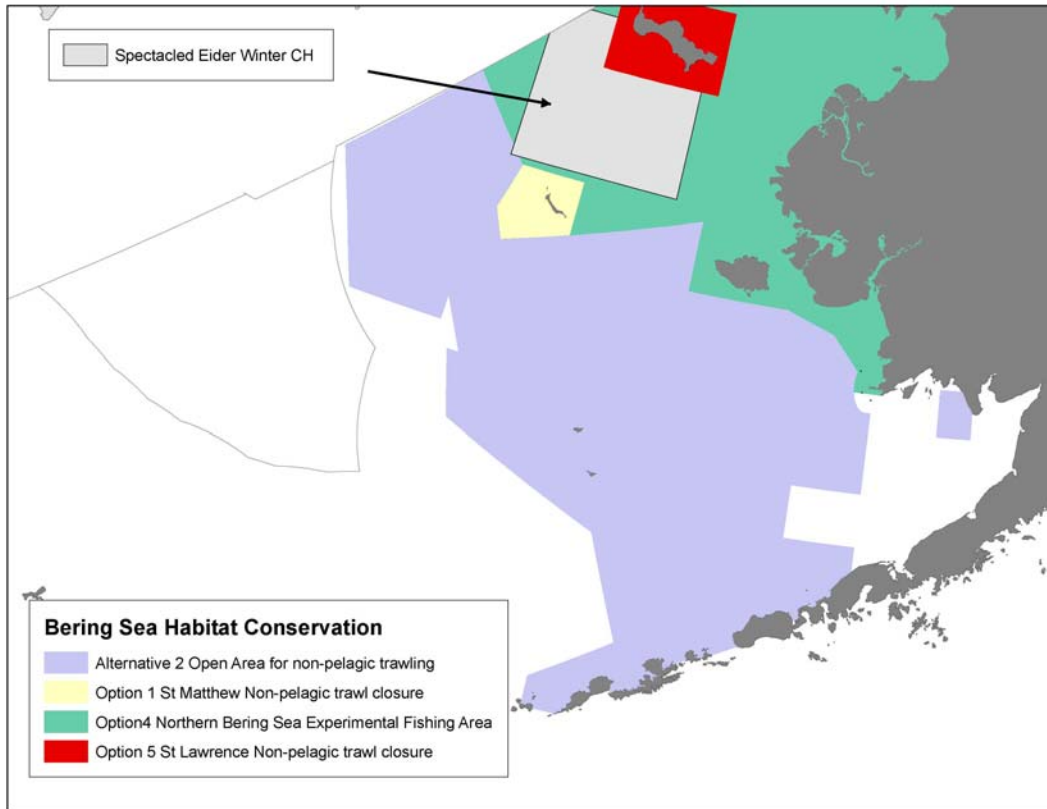


Figure 4.1-6. Spectacled Eider Critical Habitat and Alternative and Options Closures

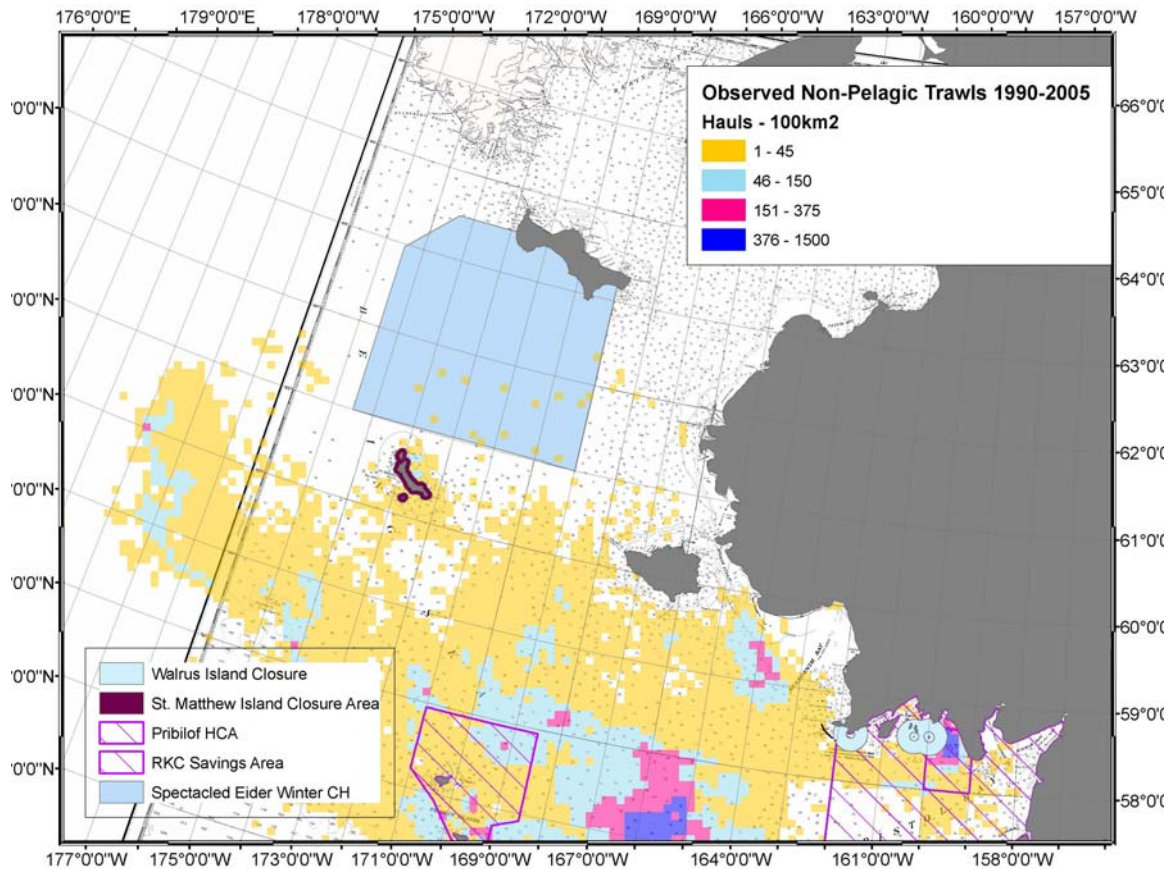


Figure 4.1-7. Observed Non-pelagic Trawls 1990-2005 and Spectacled Eider Winter Critical Habitat (Cathy Coon, NPFMC, February 2007)

Spectacled eiders use the open leads of ice in the winter in the critical habitat area to aggregate and to feed on benthic organisms. These ducks dive 40-70 m to eat clams (exclusively *Nuculana radiata*) in the winter critical habitat area (Lovvorn et al 2003). In the fall and summer, the birds are more dispersed (Greg Balogh, USFWS, February 2007), and vessels are likely to encounter the dispersed population only in October before the sea ice develops. Direct disturbance of the eiders are unlikely because of their dispersed presence in locations of fishing in a limited time of the year.

The important feature of the winter critical habitat area is the presence of clams available to foraging spectacle eiders (Greg Balogh, USFWS, per. comm. February 2007). Because non-pelagic trawl gear contacts the bottom, non-pelagic trawling in the critical habitat may have an impact on spectacle eider prey. These impacts on prey could be from uncovering the clams or from exposing the clams to the abundant predators (starfish and crabs) occurring in the area (Lovvorn, U of Wyoming, per. comm. February 2007). Very limited non-pelagic trawling has been observed within the spectacled eider critical habitat. Out of 280,000 trawls in a 15 year period only 14 occurred inside the critical habitat area, these all occurred in 1992 from two vessels fishing for yellowfin sole or pollock. (Figure 4.1-7) (Cathy Coon, NPFMC, pers. comm. March 2007).

Studies on the effects of non-pelagic trawling on soft sediment fauna have similar results for mollusks in general. Results may depend on the species studied and the type of sediment. A 3- year otter trawling study in sandy bottom of the Grand Banks showed either no effect or increased abundance in mollusks species after trawling (Kenchington, et. al 2001). McConnaughey, Mier and Drew (2000) studied trawling effects using the Bristol Bay area Crab and Halibut Protection Zone. They found more abundant

infaunal bivalves (not including *Nuculana radiata*) in the highly fished area compared to the unfished area. This type of effect may or may not be seen for *Nuculana radiata*, depending on any similarity in life histories.

Recovery of fauna after non-pelagic trawling may also depend on the type of sediment. A study in the North Sea found biomass and production in sand and gravel sediments recovering faster (2 years) than in muddy sediments (4 years) (Hiddink, Jennings and Kaiser 2006). The recovery rate may be affected by the animal's ability to rebury itself after disturbance. Clams species may vary in their ability to rebury themselves based on grain size and whether they are substrate generalist, substrate specialist, or substrate sensitive species (Alexander, Stanton, and Dodd. 1993). It is not known which category *Nuculana radiata* may occupy. The sediment types in spectacled eider critical habitat are shown in Figure 4.1-8. The sediments occurring in the area between St. Matthews and St Lawrence Islands appear to be primarily mud mixed with sand and gravel. If the life history of *N. radiata* is similar to bivalves studies in the North Sea, it is possible that recovery from non-pelagic trawling may take several years.

This potential loss of clam abundance may not be a problem for the eiders if the loss occurs in an area that is not under an ice lead used by the eiders. The location of ice leads depends on the winds which are quite variable. The year the spectacled Eiders were first found (1995) they were in a very southern area of their wintering but have not been seen in this area since. In general, lead density appears to be high enough that the birds' distribution is determined more by the dispersion of their prey. However, the 1995 situation did not conform to that generality for a period of unknown duration (J. Lovvorn, University of Wyoming, pers. comm.. March 2007).

The potential for reduced foraging success is increased if the ice leads occurs throughout critical habitat, the clams are evenly distributed and fishing activity is even distributed. A presentation by J. Grebmeier of the University of Tennessee indicates that bivalves are distributed throughout the area between St. Matthews and St. Lawrence Islands (available from <http://dels.nas.edu/prb/aon/pdfs/grebmeier.pdf>).

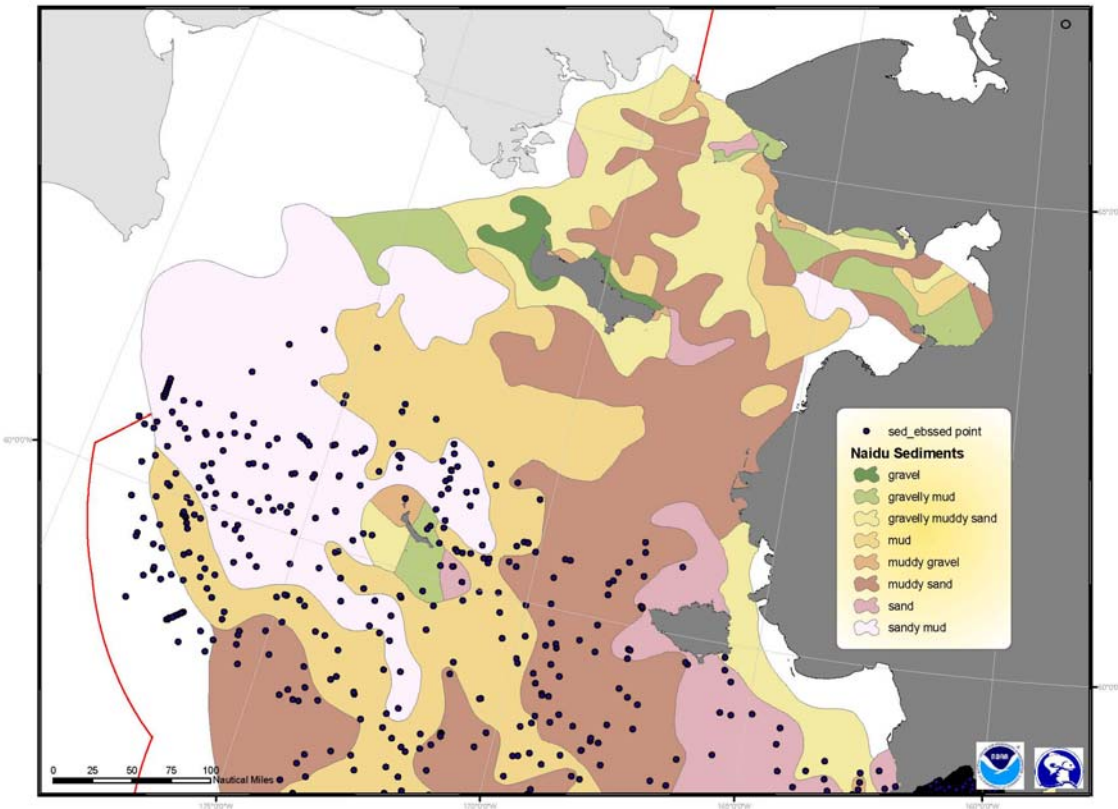


Figure 4.1-8. Sediments in Northern Bering Sea (Developed from Naidu and McConnaughey sediment data. John Olson, Habitat Conservation Division, NMFS Alaska Region, March 2007)

To understand potential effects of closing the spectacle eider critical habitat to non-pelagic trawl, one would need to consider whether trawls have had any detectable effects on the clams, how much effect per contact over an area, and frequency of trawling (Craig Rose, AFSC, per. comm. February 2006) and the potential recovery time. The EFH EIS estimated the distribution of infauna effects relative to 1998 - 2002 fishing (Figure B.2-2a in NMFS 2005). Fishing would have to shift more than 200 nautical miles Northwest in comparable depths before trawl effects on infauna greater than 5% moved north of St. Matthews Island (Craig Rose per. comm. February 2007).

Under Alternative 2 and options 4 and 5, prohibited non-pelagic trawling is likely more protective of spectacled eiders by preventing the disturbance of *Nuculana radiata* prey in critical habitat. Even though a chronic trawling study have showed increase in bivalves in trawled areas (McConnaughey, Meier and Dew 2000), the recovery time for infauna species in muddy sediments in the North Sea study indicates that immediately after trawling, there may be a reduction in infauna species with several years for recovery. Since trawling is likely to occur in the summer or fall, and eider foraging needs occur immediately following in the winter, infauna species recovery from trawling is not likely to occur quickly enough to ensure available clam abundance for foraging. Options 1 would be protective of any seaducks that may use benthic habitat off St. Matthews Island by preventing potential disturbance of the benthic fauna prey. Option 4 is less protective than Alternative 2 because limited experimental fishing would be allowed under an EFP. It is likely that ESA consultation with the USFWS would be necessary before the issuance of any EFP if non-pelagic trawling within the spectacle eider critical habitat is requested.

Steller's eider have critical habitat designated in locations that have non-pelagic trawling observed between 1990 and 2005 (Figure 4.1-9). This species eats benthic fauna such as mollusks and crustaceans (USFWS 2006) which may be impacted by non-pelagic trawl fishing. More intensive trawling has been observed in the southwest edge of the habitat. Out of 282,442 observed bottom trawls between 1990- and 2005, 178 occurred in this Steller's eider critical habitat. Eight vessels targeted yellowfin sole in this area during this time period (Cathy Coon, NPFMC, pers. comm. March 2007).

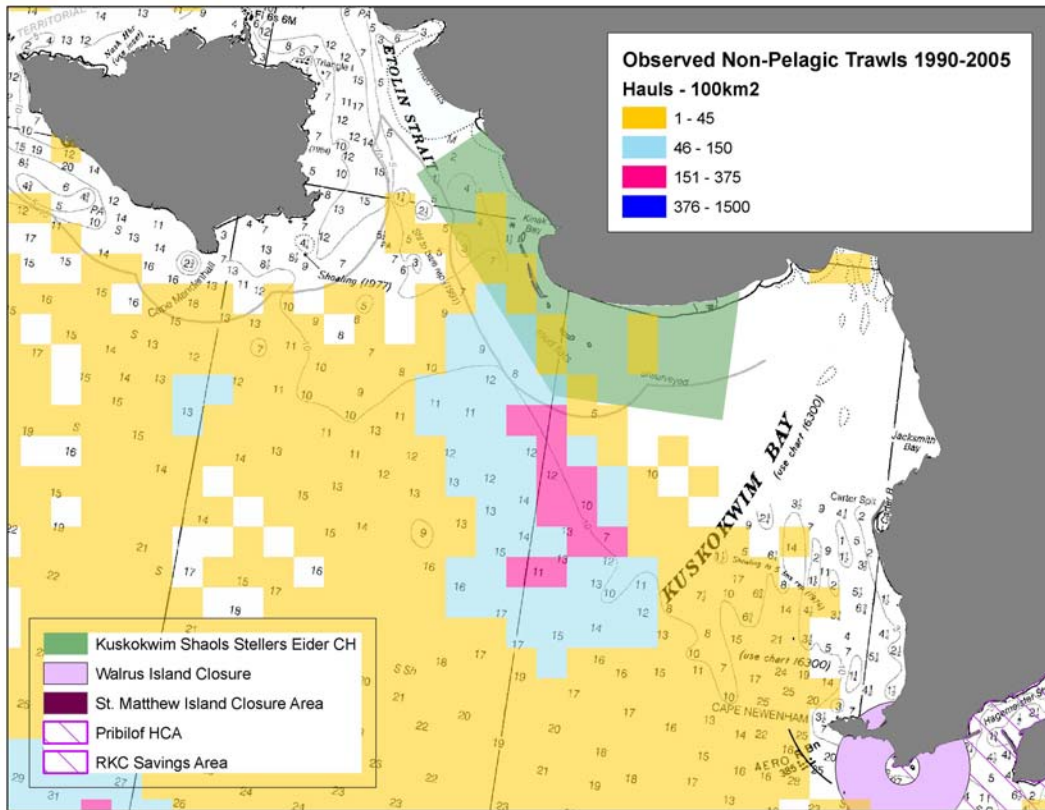


Figure 4.1-9. Steller's Eider Critical Habitat and Non-pelagic Trawl Effort (Cathy Coon, NPFMC March 2007)

Figure 4.1-10 shows the overlap of the closures under Alternative 2 and options 2 and 3 and the Steller's eider critical habitat in the Kuskokwim area. Closure under option 4 extends to the same area as option 3. Alternative 2 and option 3 would prohibit non-pelagic trawling in the entire Steller's eider critical habitat area. Option 4 would allow non-pelagic trawling only under an EFP. Depending on the location of the study in the Northern Research Area, an ESA consultation with the USFWS for any effects on Steller's eider critical habitat may be necessary before issuing an EFP. Option 4 would therefore provide some protection to critical habitat, but not as much as the closures specified under Alternative 2 and option 3. Options 2 would include a closure in the Etolin Strait area near Kipnuk and may provide additional protection to Steller's eider critical habitat in this portion of the area. Options 1 and 5 would have no effects because they are not near this critical habitat area.

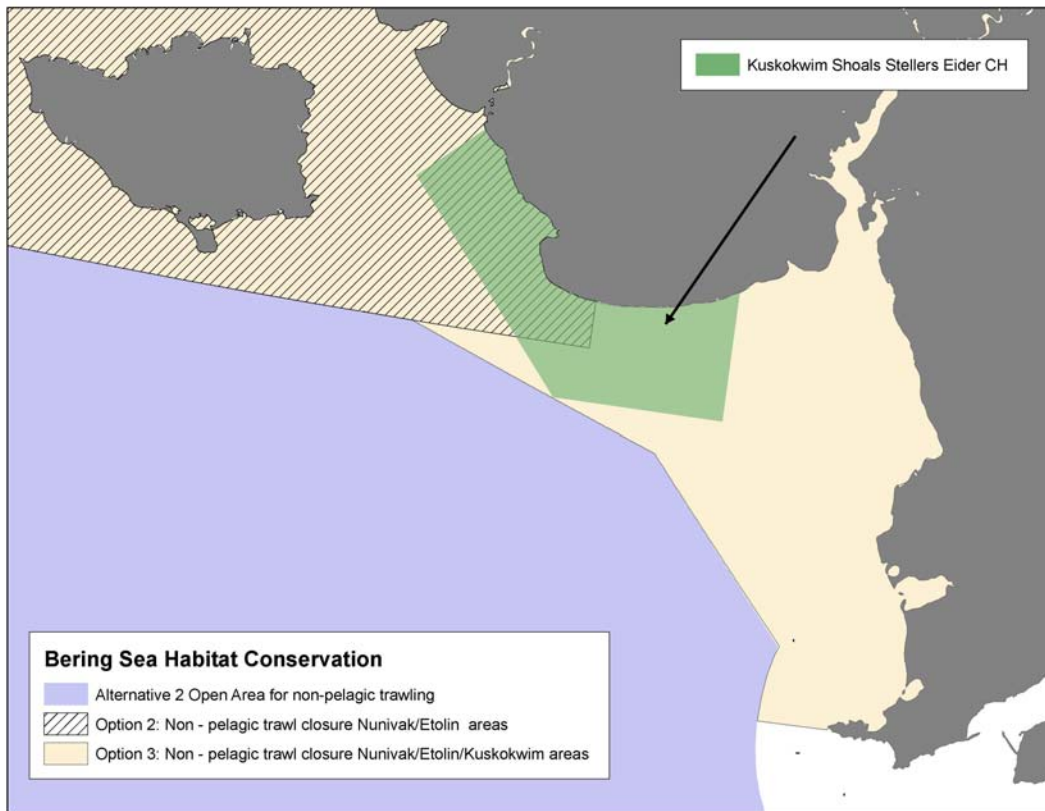


Figure 4.1-10. Alternative 2 and options 2 and 3 Closures and Steller's Eider Critical Habitat (Cathy Coon, NPFMC March 2007)

As described under the spectacled eider discussion above, the impacts of the closures would depend on the prey needed by the foraging ducks, the potential for recovery from trawling effects, fishing intensity, and the sediment types. Diet information specific to this critical habitat area is not available (Greg. Balogh, USFWS, pers. comm. March 2007). Studies of Steller's eider diet from other locations indicate that they eat mollusks and crustaceans in shallow waters (USFWS 2006). Figure 4.1-8 shows the sediments occurring in critical habitat are mud and sandy mud which may result in longer recovery times after trawling activities than gravel sediments. The water depth is less than 5 fathoms for much of the critical habitat area and it appears that much of the trawling effort is in the waters deeper than 5 fathoms (Figure 4.1-8). Steller's eiders use this critical habitat in the fall while molting so any interaction with fishing vessels may cause stress to the animal as they are unable to fly away from the vessels. The closure of all or a portion of this area would reduce the potential for vessel interaction and may be beneficial to the eiders compared to status quo.

Under Alternative 3, undisturbed benthic habitat available to seabirds for prey in the Bering Sea likely would increase more than the status quo, due to the changes in the amount of contact of the trawl sweeps to the sea bed in the flatfish fisheries. This alternative would likely have a less adverse effect on benthic habitat compared to the status quo because the proposed flatfish trawl sweep modification would radically decrease the amount of surface directly contacted per hour of bottom trawling (Craig Rose, AFSC pers. comm.. February 2007). For spectacled eiders, this alternative would be more protective than the status quo, but less protective than Alternative 2 and options 4 and 5 that would close all or portions of the eider critical habitat to non-pelagic trawling. The closure of the area around St. Matthews Island under option

1 is likely more beneficial to benthic habitat than Alternative 3 because it would eliminate any potential for benthic disturbance in this area.

For the Steller's eiders and other birds that may depend on the benthic habitat, Alternative 3 is likely more protective of critical habitat than Alternative 1 because non-pelagic trawling has been observed in this area, and the gear modification would reduce potential impact on the benthic habitat compared to status quo. The non-pelagic trawl closures of all or portions of Steller's eider critical habitat under Alternative 2 and options 2, 3, and 4 would be more protective of prey than Alternative 3 which may result in some impact, but much less than status quo. Because the area fished with non-pelagic gear is only a portion of the critical habitat and is not in the nearshore location, the potential beneficial effects of the gear modification for prey availability and benthic habitat are not likely substantial, and therefore, the effects of Alternative 3 on prey availability and benthic habitat are likely insignificant.

Any beneficial impacts of the alternatives and options for seabirds dependent on benthic habitat is likely to be isolated to those locations where trawling may occur and locations used for foraging so that overall impacts on prey availability and benthic habitat is not likely to be substantive. Trawling in habitat used by benthic foragers is relatively low compared to trawling efforts in other portions of the Bering Sea. Closures in areas with little or no trawling and gear modification to protect the benthic habitat are not likely to have a substantive impact on the overall availability of benthic prey species and on the benthic habitat that supports these species. Therefore, the effects of Alternatives 2, 3, and options 1 through 5 on prey availability and benthic habitat are insignificant.

4.1.6.3 Salmon

The status description of salmon is in the Alaska Groundfish Harvest Specifications EIS and adopted by reference for this analysis (NMFS 2007a). The majority of salmon taken in the groundfish fisheries is in the pollock fishery. The non-pelagic trawl fishery took only 5 percent of the total salmon bycatch in the 2006 BSAI groundfish fisheries (Mecum 2007). The Lower Columbia River and Upper Willamette River stocks of Pacific salmon are listed under the ESA and occur in the Bering Sea. Very few of these stocks are taken in the BSAI trawl fisheries and are likely taken in pollock trawl fishing due to the large amount of Chinook salmon bycatch in the pelagic trawl fishery compared to the non-pelagic trawl fisheries (NMFS 2006e and Mecum 2007). Because the alternative and options are not likely to affect non-pelagic trawl fishing activities in a manner that would change salmon bycatch amounts (no change in basic gear type, broad location, or amount of harvest), it is unlikely this action would have any effect on ESA-listed salmon beyond those effects already considered in previous consultations (NMFS 2007b) nor any affect on salmon bycatch in general for the BSAI groundfish fisheries.

4.1.7 Ecosystem

The proposed action could affect the marine ecosystem through removals of fish biomass or alteration of the habitat. Three primary means of measurement of ecosystem change are evaluated here: predator-prey relationships, energy flow and balance, and ecosystem diversity. The criteria used to evaluate the significance of the effects on the ecosystem from the proposed action are provided in Table 4.1-10 Significance thresholds for fishery induced effects on ecosystem attributes. The reference point for predator-prey relationships against which the criteria are compared are fishery induced changes outside the natural level of abundance or variability for a prey species relative to predator demands. The reference point for energy flow and balance will be based on bottom gear effort (qualitative measure of unobserved gear mortality particularly on bottom organisms) and a quantitative assessment of trends in retained catch levels over time in the area. The reference point for ecosystem diversity will be a qualitative assessment whether removals of one or more species (target, nontarget) effects overall species or functional diversity of the area.

Table 4.1-10 Significance thresholds for fishery induced effects on ecosystem attributes.

Effect	Criteria			
	Significantly Negative (-)	Insignificant (I)	Significantly Positive (+)	Unknown (U)
Predator-prey relationships	A decline outside of the natural level of abundance or variability for a prey species relative to predator demands.	No observed changes outside the natural level of abundance or variability for a prey species relative to predator demands	Increases of abundance or variability for a prey species relative to predator demands	Magnitude and/or direction of effects are unknown
Energy flow and balance:	Long-term changes in system biomass, respiration, production or energy cycling, due to removals.	No observed changes in system biomass, respiration, production or energy cycling, due to removals.	Increases in system biomass, respiration, production or energy cycling, due to lack of removals.	Magnitude and/or direction of effects are unknown
Ecosystem Diversity	Removals from area decreases either species diversity or the functional diversity outside the range of natural variability. Or loss in one or more genetic components of a stock that would cause the stock biomass to fall below minimum biologically acceptable limits	No observed changes outside the natural level for species diversity, functional diversity or genetic components of a stock.	Non-removal from the area increases the species diversity or functional diversity or improves the genetic components of a stock.	Magnitude and/or direction of effects are unknown

Fisheries can remove predators, prey, or competitors and thus alter predator-prey relationships relative to an unfished system. Fishing has the potential to impact food webs, but each ecosystem must be examined to determine how important the potential impacts to the food webs are for that ecosystem. A review of fishing impacts to marine ecosystems and food webs of the North Pacific under the status quo and other alternative management regimes was provided in the programmatic groundfish SEIS (NMFS 2004).

Fishing may alter the amount and flow of energy in an ecosystem by removing energy and altering energetic pathways through the return of discards and fish processing offal back into the sea. From an ecosystem point of view, total fishing removals are a small proportion of the total system energy budget and are small relative to internal sources of interannual variability in production.

Fishing can alter different measures of diversity. Species level diversity, or the number of species, can be altered if fishing removes a species from the system. Fishing can alter functional or trophic diversity if it selectively removes a trophic guild member and changes the way biomass is distributed within a trophic guild. Fishing can alter genetic level diversity by selectively removing faster growing fish or removing spawning aggregations that might have different genetic characteristics than other spawning aggregations. Large, old fishes may be more heterozygous (i.e., have more genetic differences or diversity) and some stock structures may have a genetic component, thus one would expect a decline in genetic diversity due to heavy exploitation.

Section 4.3.8.6 of the EFH EIS provided an analysis of the effects of Alternative 1 (through its evaluation of EFH – Action 3 Alternatives 4 and 5 for effects on the ecosystem (NMFS 2005). The scale of the proposed action is similar in area (Bering Sea region) and the impacts of this action to the ecosystem are similar, and the findings of the effects between the three alternatives (besides the status quo) are also similar for effects on marine ecosystems.

Predator-Prey Relationships– No effect on predator prey relationships is expected for Alternative 2, 3 and 4 or the Options. No substantial changes would be anticipated in biomass or numbers in prey populations, nor would there be an increase in the catch of higher trophic levels, or the risk of exotic species introductions. No large changes would be expected in species composition in the ecosystem. The trophic level of the catch would not be much different from the status quo, and little change would be expected in the species composition of the groundfish community, or in the removal of top predators. Alternative 2 would likely have the same insignificant effects on predator-prey relationships because of the small spatial difference between the alternatives and the same types of species and amounts expected to be harvested to that of status quo. Alternative three would like have a slight positive effect on predator prey relationships because the gear modification would results in less contact with the seafloor. Predator Prey relationships are no well documented in the northern portion of the Bering Sea. Alternative 3 would have an insignificant effect on predator-prey relationships. Additionally option 4 would provide additional protection by creating a Northern Bering Sea Research Closure area, that would only allow expansion of the fishing fleet with an experimental fishing or an exempted fishing permit in the northward portion of the Bering Sea that has not been fished and has undisturbed bottom habitat.

Energy Flow and Balance – The amount and flow of energy in the ecosystem would be the same as the status quo with regard to the total level of catch biomass removals from groundfish fisheries. No substantial changes in groundfish catch or discarding would be expected. Therefore the effects on energy flow and balance under Alternatives 2, 3 and the options are the same and insignificant.

Diversity – A net change in bottom trawling would not occur along the Bering Sea shelf and slope by either the open area approaches identified in Alternative 2, or that of gear modification identified in Alternative 3. . Thus, species level diversity would remain the same relative to the status quo, and is rated as insignificant. The proposed creation a Northern Bering Sea Research Closure area Option 4, would only allow expansion of the fishing fleet only by experimental fishing or an exempted fishing permit in the northward portion of the Bering Sea that has not been fished and has undisturbed bottom habitat only after careful review and a request. Species diversity is not well documented in the northern portion of the BS.

However a slight positive impact is likely to help to maintain or enhance productive fish habitat and sustain fish populations that occur in these northern areas. Structural habitat diversity supported by living substrates would provide substantial protection. Genetic diversity could increase slightly if older, more heterozygous individuals were left in the populations.

4.2 Cumulative Effects

This section analyzed the cumulative effects of the actions considered in this environmental assessment. A cumulative effects analysis includes the effects of past, present and reasonably foreseeable future action (RFFA). The past and present actions are described in several documents and are adopted by reference. These include the PSEIS (NMFS 2004), the EFH EIS (NMFS 2005) and the harvest specifications EIS (NMFS 2007). This analysis provides a brief review of the RFFA that may affect environmental quality and result in cumulative effects. Future effects include harvest of federally managed fish species and current habitat protection from federal fishery management measures, harvests from state-managed fisheries and their associated protection measures, efforts to protect endangered species by other federal agencies, and other non-fishing activities and natural events.

The most recent analysis of RFFAs for the groundfish fisheries is in the harvest specifications EIS (NMFS 2007). No additional RFFAs have been identified for this proposed action. The RFFAs are described in the Harvest Specifications EIS section 3.3 (NMFS 2007), are applicable for this analysis, and are adopted by reference. A summary table of these RFFA is provided below (Table 4.2-1). The table summarizes the RFFAs identified applicable to this analysis that are likely to have an impact on a

resource component within the action area and timeframe. Actions are understood to be human actions (e.g., a proposed rule to designate northern right whale critical habitat in the Pacific Ocean), as distinguished from natural events (e.g., an ecological regime shift). CEQ regulations require a consideration of actions, whether taken by a government or by private persons, which are reasonably foreseeable. This is interpreted as indicating actions that are more than merely possible or speculative. Actions have been considered reasonably foreseeable if some concrete step has been taken toward implementation, such as a Council recommendation or the publication of a proposed rule. Actions simply “under consideration” have not generally been included because they may change substantially or may not be adopted, and so cannot be reasonably described, predicted, or foreseen. Identification of actions likely to impact a resource component within this action’s area and time frame will allow the public and Council to make a reasoned choice among alternatives.

Table 4.2-1 Reasonable foreseeable future actions.

Ecosystem-sensitive management	<ul style="list-style-type: none"> Increasing understanding of the interactions between ecosystem components, and on-going efforts to bring these understandings to bear in stock assessments, Increasing protection of ESA-listed and other non-target species components of the ecosystem, Increasing integration of ecosystems considerations into fisheries decision-making
Fishery rationalization	<ul style="list-style-type: none"> Continuing rationalization of Federal fisheries off Alaska, Fewer, more profitable, fishing operations, Better harvest and bycatch control, Rationalization of groundfish in Alaskan waters, Expansion of community participation in rationalization programs
Traditional management tools	<ul style="list-style-type: none"> Authorization of groundfish fisheries in future years, Increasing enforcement responsibilities, Technical and program changes that will improve enforcement and management
Other Federal, State, and international agencies	<ul style="list-style-type: none"> Future exploration and development of offshore mineral resources Reductions in United States Coast Guard fisheries enforcement activities Continuing oversight of seabirds and some marine mammal species by the USFWS Expansion and construction of boat harbors Expansion of State groundfish fisheries Other State actions Ongoing EPA monitoring of seafood processor effluent discharges
Private actions	<ul style="list-style-type: none"> Commercial fishing Increasing levels of economic activity in Alaska’s waters and coastal zone Expansion of aquaculture

RFFA that may affect target and prohibited species are shown in Table 4.2-1. Ecosystem management, rationalization and traditional management tools are likely to improve the protection and management of target and prohibited species and are not likely to result in significant effects when combined with the direct and indirect effects of Alternative 2 open area approach, Alternative 3 gear modification, and any of the closure Options 1-5 considered. The Council is pursuing methods of reducing salmon and halibut bycatch through FMP amendments and exempted fishing permits to allow testing of salmon and halibut excluder devices. Other government actions and private actions may increase pressure on the sustainability of target and prohibited fish stocks either through extraction or changes in the habitat or may decrease the market through aquaculture competition, but it is not clear that these would result in significant cumulative effects. Any increase in extraction of target species would likely be offset by

federal management. These are further discussed in sections 4.1.3 and 7.3 of the harvest specifications EIS (NMFS 2007).

RFFA for non-specified and forage species include ecosystem-sensitive management, traditional management tools, and private actions. Impacts of ecosystem-sensitive management and traditional management tools are likely to be beneficial as more attention is brought to the taking of non-specified species in the fisheries and accounting for such takes. Private action includes the taking of grenadiers in a targeted fishery elsewhere, but any directed fishing for grenadiers would likely be controlled by emergency action if necessary. Because these RFFAs are primarily beneficial or not likely to cause an effect, the cumulative effect on non-specified species is insignificant for all alternatives analyzed.

RFFA for marine mammals and seabirds include ecosystem-sensitive management, rationalization, traditional management tools, actions by other federal, state and international agencies, and private actions, as detailed in sections 8.4 and 9.3 of the harvest specifications EIS (NMFS 2007). Ecosystem-sensitive management, rationalization, and traditional management tools are likely to increase protection to marine mammals and seabirds by considering these species more in management decisions and by improving the management of the fisheries through the observer program, catch accounting, seabird avoidance measures, and vessel monitoring systems (VMS). Any action by other entities that may impact marine mammals and seabirds will likely be offset by additional protective measures for the federal fisheries to ensure ESA-listed mammals and seabirds are not likely to experience jeopardy or adverse modification of critical habitat. Direct mortality by subsistence harvest is likely to continue, but these harvests are tracked and considered in the assessment of marine mammals and seabirds. The cumulative effect of these impacts in combination with Alternative 2 is remain similar to the status quo and is not likely to be significant. The cumulative effect of these impacts in combination with Alternative 3 is likely to be primarily beneficial and is not likely to be significant because of the limited costs and habitat benefits of Alternative 3. Options 1, 2, 3, and 5 would provide additional habitat protection by small areas closures. Option 4 would provide additional habitat protections by creating a Northern Bering Sea Research Closure area, that would only allow expansion of the fishing fleet only by experimental fishing or an exempted fishing permit in the northward portion of the Bering Sea that has not been fished and has undisturbed bottom habitat only after careful review and a request. Since this area is not currently utilized there would be a slight positive cumulative effect although the rating would still be insignificant.

RFFA for habitat and the ecosystem include ecosystem-sensitive management, rationalization, traditional management tools, actions by other federal, state and international agencies, and private actions, as detailed in sections 10.3 and 11.3 of the harvest specifications EIS (NMFS 2007). Ecosystem-sensitive management, rationalization, and traditional management tools are likely to increase protection to ecosystems and habitat by considering ecosystems and habitat more in management decisions and by improving the management of the fisheries through the observer program, catch accounting, seabird and marine mammal protection, gear restrictions, and VMS. The Council is currently considering an analysis of the effects of fishing on EFH in the Bering Sea to determine if protection measures are warranted. Continued fishing under the harvest specifications is likely the most important cumulative effect on EFH but the EFH EIS (NMFS 2005) has determined that this effect is minimal. The Council is also considering improving the management of non-specified species incidental takes in the fisheries to provide more protection to this component of the ecosystem. Any increase in fishing activities in state waters would likely result in a reduction in fishing in federal waters, offsetting potential impacts to EFH. Nearshore impacts of coastal development and the management of the Alaska Water Quality Standards may have an impact on EFH, depending on the nature of the action and the level of protection the standards may afford. Development in the coastal zone is likely to continue, but Alaska overall is lightly developed compared to coastal areas elsewhere and therefore overall impact to EFH are not likely to be great. The BSAI and GOA pollock, Pacific cod, halibut, and sablefish fisheries recently received Marine Stewardship Certification for ensuring harvests is conducted in a manner that maintains structure, productivity, function, and diversity of the ecosystem. Other groundfish fisheries are likely to strive for

this honor to improve markets. Overall the cumulative effects on habitat and ecosystems are beneficial and not likely to result in significant impacts in combination with the impacts from Alternative 2. The cumulative effect of these impacts in combination with Alternative 3 is likely to be primarily beneficial and is not likely to be significant because of the limited costs and habitat benefits of Alternative 3. Additionally Alternative 3 option 1 would provide additional habitat protections by creating a Northern Bering Sea Research Closure area, that would only allow expansion of the fishing fleet only by experimental fishing or an exempted fishing permit in the northward portion of the Bering Sea that has not been fished and has undisturbed bottom habitat only after careful review and a request. Since this area is not currently utilized there would be a slight positive cumulative effect although the rating would still be insignificant.

Changes in the Bering Sea due to global warming may be of a concern to the organisms that live within this environment. The causes of global warming may be due to the release of carbon to the atmosphere from the burning of fossil fuels. The impacts of global warming in the Bering Sea can include a rise in sea surface temperature, retreat of sea ice and acidification of marine waters.

The following information is from the January 9, 2007 *Federal Register* notice regarding the proposed listing of polar bears (72 FR 1064). This is a recent, general description of the potential changes in sea ice and the marine ecosystem due to Arctic warming.

All models predict continued Arctic warming and continued decreases in the Arctic sea ice cover in the 21st century (Johannessen 2004, p. 328) due to increasing global temperatures, although the level of increase varies between models. Comiso (2005, p. 43) found that for each 1° Centigrade (C) (1.6 °F) increase in surface temperature (global average) there is a corresponding decrease in perennial sea ice cover of about 1.48 million km² (.57 million mi²). Further, due to increased warming in the Arctic region, accepted models project almost no sea ice cover during summer in the Arctic Ocean by the end of the 21st century (Johannessen et al. 2004, p. 335). More recently, the [National Snow and Ice Data Center] cautioned that the Arctic will be ice-free by 2060 if current warming trends continue (Serreze [and Rigor] 2006, p. 2). The winter maximum sea ice extent in 2005 and 2006 were both about 6 percent lower than average values, indicating significant decline in the winter sea ice cover. In both cases, the observed surface temperatures were also significantly warmer and the onset of freeze-up was later than normal. In both years, onset of melt also happened early (Comiso in press). A continued decline would mean an advance to the north of the 0 °C (32 °F) isotherm temperature gradient, and a warmer ocean in the peripheral seas of the Arctic Ocean. This in turn may result in a further decline in winter ice cover. Predicted Arctic atmospheric and oceanographic changes for time periods through the year 2080 include increased air temperatures, increased precipitation and run-off, and reduced sea ice extent and duration (ACIA 2005, tables on pp. 470 and 476).

A recent study of the Bering Sea, one of the most productive marine ecosystems on the planet, concluded “[a] change from arctic to subarctic conditions is underway in the northern Bering Sea” (Grebmeier et al. 2006, p. 1461). This is being caused by warmer air and water temperatures, and less sea ice. “These observations support a continued trend toward more subarctic ecosystem conditions in the northern Bering Sea, which may have profound impacts on Arctic marine mammal and diving seabird populations as well as commercial and subsistence fisheries” (Grebmeier et al. 2006, p. 1463).

With the increase in atmospheric carbon dioxide, additional carbon dioxide may be absorbed by marine waters resulting in acidification (The Royal Society 2005). The acidification may have an impact on those organisms that depend on calcium carbonate for skeletal structure, such as copepods, pteropods, and clams. The cumulative effect of human inputs of carbon into the atmosphere that may acidify marine waters, impacting benthic organisms that depend on calcium carbonate for skeletal structure and the

potential effects of bottom trawling on benthic habitat may result in adverse impacts for organisms depending directly and indirectly on the benthic habitat. The effects of acidification may be wide spread while bottom trawling effects would be limited to locations where trawling occurs. It is not possible to predict the level of impact the combined effect may have because the level of acidification and the organisms' responses are not clearly understood. No evidence exists that a significant cumulative impact is occurring at this time, but additional studies should be encouraged to provide a better understanding of future impacts.

4.3 Environmental analysis conclusions of the alternatives

The significance of impacts of the actions analyzed in this EA were determined through consideration of NEPA, NOAA Administrative Order (NAO) 216-6, 6.01b and 40 CFR Section 1508.27. Significance was determined by considering the contexts (geographic, temporal, and societal) in which the action would occur, and the intensity of the effects of the action. The evaluation of intensity included consideration of the magnitude of the impact, the degree of certainty in the evaluation, the cumulative impact when the action is related to other actions, the degree of controversy, and consistency with other laws.

For these actions, the setting is the groundfish fisheries of the BS. Any effects of these actions are limited to these areas. The effects of these actions on society within these areas are on individuals directly and indirectly participating in these fisheries and on those who use the ocean resources. Because these actions may result in the protection of a present and future resource, these actions may have impacts on society as a whole or regionally.

Intensity: Listings of considerations to determine intensity of the impacts are in 40 CFR 1508.28(b) and in the NOAA Administrative Order 216-6, Section 6. Each consideration is addressed below in order as it appears in the NMFS Instruction 30-124-1 dated July 22, 2005, Guidelines for Preparation of a FONSI. The range of the alternatives provide the focus of the responses to the questions.

1. Can the proposed action be reasonably expected to jeopardize the sustainability of any target species that may be affected by the action? *No. No significant adverse impacts were identified for Alternatives 2,3, or the options. No changes in overall harvest of target species are expected with any of the Alternatives in the proposed action (EA Section 4.1.2).*
2. Can the proposed action be reasonably expected to jeopardize the sustainability of any non-target species or prohibited species? *No. Potential effects of Alternatives 2, 3, or the options on non-target/prohibited species were expected to be insignificant and similar to status quo because no overall harvest changes to target species were expected (EA Section 4.1.4).*
3. Can the proposed action be reasonably expected to cause substantial damage to the ocean and coastal habitats and/or essential fish habitat as defined under the Magnuson-Stevens Act and identified in FMPs? *No. No significant adverse impacts were identified for Alternatives 2,3, or the options. Option 2,3,4 and 5 provides additional protection to an area in the northern Bering Sea that has not been fished and has undisturbed bottom habitat. No significant effects were expected on ocean or coastal habitat or EFH by Alternatives 2,3 or the options. (EA Section 4.1.1).*
4. Can the proposed action be reasonably expected to have a substantial adverse impact on public health or safety? *No. Public health and safety will not be affected in any way not evaluated under previous actions or disproportionately as a result of the proposed action. The proposed action for Alternative 2 will not change fishing methods (including gear types), timing of fishing or quota assignments to gear groups, which are based on previously established seasons and allocation formulas in regulations. Alternatives 3 and options 1-5 would changed some fishing methods for one sector of the bottom trawl fleet but would not have a substantial adverse impact on public health or safety.*

5. Can the proposed action be reasonably expected to adversely affect endangered or threatened species, marine mammals, or critical habitat of these species? *The only ESA-listed animal that may be impacted by the action is the western DPS of Steller sea lions. The proposed action would not change the Steller sea lion protection measures, ensuring the action is not likely to result in jeopardy or adverse modification of critical habitat for Steller sea lions. No ESA-listed seabirds were found to be affected by the proposed action. Although critical habitat for spectacled eiders would receive additional protection with implementation of a closure area or a research area north of St. Matthew. (EA Section 4.1.5).*

6. Can the proposed action be expected to have a substantial impact on biodiversity and ecosystem function within the affected area (e.g., benthic productivity, predator-prey relationships, etc.)? *No significant adverse impacts were identified for Alternatives 2,3 or the options. No significant effects were expected on biodiversity, the ecosystem, marine mammals, or seabirds (EA Section 4.0).*

7. Are social or economic impacts interrelated with natural or physical environmental effects? *No no significant adverse impacts were identified for Alternatives 2, 3, ,or the options for social or economic impacts interrelated with natural or physical environmental effects. (EA Section 4.1.3).*

8. Are the effects on the quality of the human environment likely to be highly controversial? *No, this action is limited to the Bering Sea region an area historically of value to the bottom trawl fleet. (EA Section 1.0).*

9. Can the proposed action be reasonably expected to result in substantial impacts to unique areas, such as historic or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers, essential fish habitat, or ecologically critical areas? *No. This action takes place in the geographic area of the Bering Sea. The land adjacent to this marine area may contain archeological sites of native villages. This action would occur in adjacent marine waters so no impacts on these cultural sites are expected. The marine waters where the fisheries occur contain ecologically critical areas. Effects on the unique characteristics of these areas are not anticipated to occur with this action because of the amount of fish removed by few vessels are within the total allowable catch (TAC) specified harvest levels.*

10. Are the effects on the human environment likely to be highly uncertain or involve unique or unknown risks? *The potential effects of the action are well understood because of the fish species and harvest method involved and the limited duration, harvest amounts, and area of the activity. For the Steller sea lions, enough research has been conducted to known about the animals' abundance, distribution, and feeding behavior to determine that this action is not likely to result in population effects (EA Section 4.1.5). The potential impacts of bottom trawling on habitat also are well understood as described in a previous NEPA analysis (EA Section 3.0).*

11. Is the proposed action related to other actions with individually insignificant, but cumulatively significant impacts? *Beyond the cumulative impact analyses in the 2006 and 2007 harvest specifications EA and the Groundfish Harvest Specifications EIS (NMFS 2007), no other additional past, present or future cumulative impact issues were identified. The combination of effects from the cumulative effects and this proposed action are not likely to result in significant effects for any of the environmental component analyzed and are therefore not significant. Foreseeable future impacts include socio-economic beneficial effects for this action, as described above and in Section 5.0 of the EA.*

12. Is the proposed action likely to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural or historical resources? *This action will have no effect on districts, sites, highways, structures, or objects listed or eligible for listing in the National Register of Historic Places, nor cause loss or destruction of significant scientific, cultural, or historical resources. Because this*

action is in nearshore waters to 20 nm at sea, this consideration is not applicable to this action (EA Section 1.0).

13. Can the proposed action be reasonably expected to result in the introduction or spread of a nonindigenous species? *This action poses no effect on the introduction or spread of nonindigenous species into the Aleutian Islands beyond those previously identified because it does not change fishing, processing, or shipping practices that may lead to the introduction of nonindigenous species.*

14. Will the proposed action likely establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration? *No No decisions in principle about future considerations are part of this action because the criteria previously used to examine habitat conservation of the Bering SEa were applied to this action. Pursuant to NEPA for all future action, appropriate environmental analysis documents (EA or EIS) will be prepared to inform the decision makers of potential impacts to the human environment and to implement mitigation measures to avoid significant adverse impacts.*

15. Can the proposed action be reasonably expected to threaten a violation of Federal, State, or local law or requirements imposed for the protection of the environment? *This action poses no known violation of Federal, State, or local laws or requirements for the protection of the environment. The proposed action would be conducted in a manner consistent, to the maximum extent practicable, with the enforceable provisions of the Alaska Coastal Management Program within the meaning of Section 30(c)(1) of the Coastal Zone Management Act of 1972, and its implementing regulations*

16. Can the proposed action be reasonably expected to result in adverse impacts, not otherwise identified and described above? *Beyond the analysis in the 2006 and 2007 harvest specifications EA and the Groundfish Harvest Specifications EIS (NMFS 2007), no additional direct, indirect, or cumulative impacts have been identified that would accrue from this action.*

5.0 REGULATORY IMPACT REVIEW

5.1 Introduction

This Regulatory Impact Review (RIR) describes the costs and benefits of a suite of alternatives to status quo to evaluate potential new fishery management measures to protect Essential Fish Habitat (EFH) in the Eastern Bering Sea. The analysis will tier off of the 2005 EFH Environmental Impact Statement and will consider as alternatives open and closed areas and gear modifications. The purpose of the analysis is to consider practicable and precautionary management measures to reduce potential adverse effects of fishing on EFH and to support the continued productivity of managed fish species.

A benefit/cost framework is the appropriate way to evaluate the relative economic and socioeconomic merits of the alternatives under consideration in this Regulatory Impact Review (RIR). When performing a benefit/cost analysis, the principal objective is to derive informed conclusions about probable net effects of each alternative under consideration (e.g., net revenue impacts). However, in the present case, necessary empirical data (e.g., operating costs, capital investment, debt service, opportunity costs) are not available to the analysts, making a quantitative net benefit analysis impossible. Furthermore, empirical studies bearing on other important aspects of these alternative actions (e.g., non-use value, domestic and international seafood demand) are also unavailable, and time and resource constraints prevent their preparation for use in this analysis.

Nonetheless, the following RIR uses the best available information and quantitative data, combined with accepted economic theory and practice, to provide the fullest possible assessment (both quantitative and qualitative) of the potential economic benefits and presumptive costs attributable to each alternative action. Based upon this analysis, conclusions are offered concerning the likely economic and

socioeconomic effects of each of the alternatives. This analytical approach is consistent with applicable policy and established practice for implementing Executive Order (EO) 12866.

5.2 What is a Regulatory Impact Review?

The preparation of an RIR is required under Presidential Executive Order (E.O.) 12866 (58 FR 51735: October 4, 1993). The requirements for all regulatory actions specified in E.O. 12866 are summarized in the following Statement from the E.O.:

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 nonetheless essential to consider. Further, in choosing among alternative regulatory approaches agencies should select those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach.

E.O. 12866 requires that the Office of Management and Budget (OMB) review proposed regulatory programs that are considered to be “significant.” A “significant regulatory action” is one that is likely to:

- 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, local or tribal governments or communities;
- Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
- Raise novel legal or policy issues arising out of legal mandates, the President’s priorities, or the principles set forth in this Executive Order.

5.3 Statutory Authority

Under the Magnuson-Stevens Act, the United States has exclusive fishery management authority over all marine fishery resources found within the Exclusive Economic Zone (EEZ), which extends between 3 and 200 nautical miles from the baseline used to measure the territorial sea. The management of these marine resources is vested in the Secretary of Commerce (Secretary) and in the Regional Councils. In the Alaska Region, the Council has the responsibility for preparing Fishery Management Plans (FMPs) for the marine fisheries it finds that require conservation and management and for submitting their recommendations to the Secretary. Upon approval by the Secretary, the National Marine Fisheries Service (NMFS) is charged with carrying out the federal mandates of the Department of Commerce with regard to marine and anadromous fish. The groundfish fisheries in the EEZ off Alaska are managed under the FMP for the Groundfish Fisheries of the Gulf of Alaska (GOA) and the FMP for the Groundfish Fisheries of the Bering Sea and Aleutian Island (BSAI). The crab fisheries in the EEZ off Alaska are managed under the FMP for the Crab Fisheries of the BSAI. The scallop fisheries in the EEZ off Alaska are managed under the FMP for the Scallop Fisheries of Alaska. The halibut fishery is managed by the International Pacific Halibut Commission (IPHC), which was established by a Convention between the governments of Canada and the United States. The IPHC’s mandate is research on and management of the stocks of Pacific halibut within the Convention waters of both nations.

Actions taken to amend FMPs or implement other regulations governing these fisheries must meet the requirements of federal laws and regulations. In addition to the Magnuson-Stevens Act, the most important of these are the Halibut Act, the National Environmental Policy Act (NEPA), the Endangered

Species Act (ESA), the Marine Mammal Protection Act (MMPA), EO (EO 12866), the Regulatory Flexibility Act (RFA), the Migratory Bird Treaty Act of 1918, and EO 13186 on the Responsibilities of Federal Agencies to Protect Migratory Birds.

5.4 Purpose and Need for Action

The purpose of this analysis is to evaluate impacts of alternatives to further conserve fish habitat in the Eastern Bering Sea. In February 2005, the Council took final action on the EFH EIS (NMFS 2006a) to adopt a suite of measures to conserve EFH in the GOA and AI from potential impacts due to fishing. At the time of final action, the Council took no action to implement additional conservation measures in the Eastern Bering Sea, as the analysis found such additional measures were neither required by law. Further, the alternatives considered for Bering Sea habitat conservation required additional ‘fine-tuning’ before they could be considered as practicable measures. Alternatives to modify gear did not have sufficient research to understand what the scale of beneficial effects on habitat, and the alternatives for the open areas had left out historically important and lucrative fishing grounds, and included rotating closures that were found to have questionable merit. So to address these issues, the Council notified the public that it planned to take a more focused examination of potential measures to further conserve fish habitat, including EFH, in the Eastern Bering Sea by initiating a separate analysis that would tier off of the EFH EIS. This analysis provides an examination of a range of reasonable alternatives to conserve fish habitat in the Eastern Bering Sea.

The need for this analysis is the recognition that additional analysis beyond the EFH EIS is needed to consider measures for the conservation of fish habitat in the Bering Sea. New information on potential gear modifications to protect bottom habitat has become available since the EFH EIS and allows for a gear modification alternative that could not have been considered in the EFH EIS. The Council wishes to protect fish habitat in support of commercial fisheries and subsistence activities in the Eastern Bering Sea, ensuring consistency with national standard 8 of section 301 of the Magnuson-Stevens Fishery Conservation and Management Act. Thus, evaluation of additional measures, and possible implementation of them, provides a precautionary approach in light of incomplete knowledge of fish dependence upon habitat, and the effects of fisheries on that habitat. The problem statement adopted by the Council for this analysis is provided below:

Problem Statement: The Council intends to evaluate potential new fishery management measures to protect Essential Fish Habitat (EFH) in the Bering Sea. The analysis will tier off of the 2005 EFH Environmental Impact Statement and will consider as alternatives open and closed areas and gear modifications. The purpose of the analysis is to consider practicable and precautionary management measures to reduce potential adverse effects of fishing on EFH and to support the continued productivity of managed fish species.

5.5 Alternatives Considered

A detailed presentation of the alternatives, including a thorough discussion of the development of the alternatives including background information on both the open/closed area and gear modification approaches is presented in the Section 2.1 of the EA. A discussion of alternatives considered for analyses but rejected is provided in Section 2.3 of the EA.

Alternative 1: Status quo. No additional measures would be taken to conserve benthic habitat.

Alternative 2: Open area approach. This alternative would prohibit non-pelagic trawling outside of a designated ‘open area’. Non-pelagic trawling would be prohibited in the northernmost shelf area and the deepwater basin area of the Bering Sea. There is only one open area analyzed, which is based on the EFH EIS area, modified using non-pelagic trawl effort distribution data through 2005. Note that the open area

approach will contain the boundaries for the Etolin Strait Area as negotiated by representatives of these coastal communities and the flatfish industry.

Alternative 3: Gear modifications. This alternative would require gear modifications for all non-pelagic trawl gear used in flatfish target fisheries. Specifically, this alternative would require discs on non-pelagic trawl sweeps to reduce seafloor contact and/or increase clearance between the sweep and substrate. A performance standard of at least 2.5 inches elevation of the sweep from the bottom would be required

The below options could be selected in combination with any Alternative more than one option can be chosen.

Option 1. Close the area around Saint Matthew to non-pelagic trawling. This area would be configured such that the area near St. Matthew Island is closed to conserve blue king crab habitat

Option 2. Close an area to non-pelagic trawling around around Nunivak Island with the southern border extending along the nearshore portion of Etolin Strait . This area would be configured such that the area around Nunivak Island and Etolin Strait is closed to conserve nearshore habitats, and minimize potential interactions with community use and subsistence fisheries taking place in the nearshore areas.

Option 3. Close an area to non-pelagic trawling around around Nunivak Island with the southern border extending along the nearshore portion of Etolin Strait and Kuskokwim Bay. This area would be configured such that the area in southern Etolin Strait and Kuskokwim Bay is closed to conserve nearshore habitat and minimize potential interactions with community use and subsistence fisheries taking place in the nearshore areas. The boundaries of this closure area are the result of negotiations by representatives of the flatfish industry and coastal communities.

Option 4: Close an area to non-pelagic trawling from the northern boundary line of the open area under Alternative 2, stretching from the Russian border around the southern end of St. Matthew Island to and around the southern portion of Nunivak Island and across Kuskokwim Bay to Cape Newenham and designate it as the Northern Bering Sea Experimental Fishing Area. The Council requests the NOAA/NMFS Alaska Fisheries Science Center design an adaptive management experiment in the closed northern area described under this option to study the effects of non-pelagic trawling in previously untrawled areas. The study should include open and closed areas and appropriate monitoring to study fishing impacts on benthic communities and ecological process, particularly as this relates to juvenile snow crab. The adaptive management experiment design will include review by the SSC. NMFS will provide the draft adaptive management experiment design to the Council for review within 18 months following the Federal Register publication of the final rule for this action.

Option 5: Close the area to non-pelagic trawling around St. Lawrence Island. This area would be configured such that the area around St. Lawrence Island is closed to non-pelagic gear to conserve blue king crab habitat and minimize potential interactions with community use and subsistence fisheries taking place in nearshore areas.

5.6 Description of the Fisheries

5.6.1 Existing Conditions in the Fishery

This section describes the conditions in the BSAI groundfish fishery under the current management regime. Because the status quo alternative would continue the current management structure, its retention

is unlikely to result in substantial change in the fisheries. This section also provides much of the status quo baseline that is used to assess the effects of Bering Sea Habitat Conservation alternatives under consideration. Beginning with a brief description of the current management regime, this section provides a description of the subject fisheries. A more detailed description of the H&G Trawl CP sector is provided. Product markets and estimated historic first wholesale prices are described. Finally, a brief description of community dependence, and a description of the Western Alaska Community Development Quota program are provided.

5.6.1.1 Management of the Fisheries

The BSAI management area encompasses the U.S. Exclusive Economic Zone (EEZ) of the eastern Bering Sea and that portion of the North Pacific Ocean adjacent to the Aleutian Islands west of 170° W. longitude. The northern boundary of the Bering Sea is the Bering Strait, defined as a straight line from Cape Prince of Whales to Cape Dezhneva, Russia.

The fishing year for the trawl fisheries under consideration in this action is divided, by regulation, into three parts: the 'A' season runs from January 20 through April 1; the 'B' season from April 1 through June 10; and finally, the 'C' season is open June 10 through November 1.

Both the trawl and non-trawl fisheries are prosecuted under a single TAC. The TAC specifications for the primary allocated species, and PSC specifications, are recommended by the Council at its December meeting, for the following fishing year(s). The recommendations are based on Stock Assessment Fishery Evaluation reports prepared by Council BSAI Groundfish Plan Team. The Secretary, after receiving recommendations from the Council, determines up to 2 years of TACs and apportionments. The TAC for each of the allocated species is reduced by 15 percent to form the reserve and CDQ allocations. One-half of the reserve is used for CDQ allocations. The remaining portion of the reserve is used for: a) correction of operational problems in the fishing fleets, to promote full and efficient use of groundfish resources, b) adjustments of species TACs according to changing conditions of stocks during fishing year, and c) apportionments.

Since 1994, the Atka mackerel quota has been split during the annual specifications into three separate area allocations based on the most recent biomass estimates. The three areas are the Bering Sea/eastern Aleutian Islands (Bering Sea and Area 541), the central Aleutian Islands (area 542), and the western Aleutian Islands (Area 543). In 1999, Area 542 and Area 543 were further split into critical habitat and non-critical habitat areas, due to Endangered Species Act (ESA) Steller sea lion concerns. In addition, up to 2 percent of the Atka mackerel TAC in the eastern Aleutian Islands District/Bering Sea subarea may be allocated to vessels using jig gear in the areas noted above. In 2005, the Council recommended and NMFS approved allocating 1 percent to vessels using jig gear.

A Federal groundfish license is required for vessels participating in any Federal BSAI groundfish fishery, other than fixed gear sablefish. The LLP limits the number, size, and specific operation of vessels that may be deployed in certain groundfish fisheries under the Council's jurisdiction. For a person to qualify for an LLP permit, the person must own a vessel that has documented harvests of groundfish during two periods, the general qualification period and the endorsement qualification period. In addition to the area/species endorsements, the LLP license is designated for use on either a catcher/processor or catcher vessels and for a specific vessel length category. LLP licenses may be transferred subject to the vessel designations and area/species endorsements.

Table 5.6-1 shows the number of LLP licenses issued for the BSAI by trawl sector. There are 64 trawl licenses designated as catcher processors that are endorsed for the BSAI area. Twenty of these licenses are currently registered to AFA trawl CP vessels operating in the BSAI. The remaining 44 trawl CP licenses are either currently registered to H&G Trawl CP vessels that currently operate in the BSAI and/or GOA, or they are registered to other vessels but are not being used in either area. Of the 44 H&G Trawl

CP licenses, 22 also have Gulf of Alaska endorsements. There are 152 trawl licenses designated for catcher vessels that are endorsed for BSAI area. One hundred and two of these licenses are currently registered to AFA trawl catcher vessels leaving 50 licenses that are registered to Non-AFA trawl catcher vessels.

Table 5.6-1 BSAI trawl LLP licenses by trawl sector

Sector	BS only LLP	AI only LLP	BSAI LLP	Total License
AFA Trawl CP	1	0	19	20
H&G Trawl CP	6	1	37	44
Total Trawl CP Licenses	7	1	56	64
AFA Trawl CV	59	0	43	102
Non-AFA Trawl CV	44	2	4	50
Total Trawl CV Licenses	103	2	47	152

Source: NMFS Groundfish LLP database. Current as of July 13, 2005.

Inseason management credits both directed harvest and incidental harvest against the TAC for groundfish species, to ensure that they are not over harvested. The directed fishery for any groundfish species is closed when the directed fishing amount is harvested, reserving the remainder of the TAC for incidental catch in other groundfish fisheries. NOAA Fisheries allows vessels to retain incidental catch of groundfish species (if the TAC has not been reached) taken in other directed fisheries that are open, up to the maximum retainable amount (MRA). If the fishery is closed to directed fishing and the TAC is reached, NOAA Fisheries issues a prohibition on retention for that species and all catch of that species must be discarded. If a fishery is closed to directed fishing for one of these species, the ABC has been taken, and the harvest is approaching the overfishing level, then NOAA Fisheries could close target fisheries that have the potential to incidentally harvest that species.

Pacific halibut, Pacific herring, Pacific salmon and steelhead, king crab, and Tanner crab are prohibited species and, as such, must be avoided while fishing for groundfish. Incidental catch of the prohibited species must be returned to the sea with a minimum of injury, except when their retention is authorized by other applicable law. PSC is apportioned between trawl and non-trawl fisheries. The halibut PSC limit for trawl gear is currently 3,675 mt. The PSC limits for *C. bairdi* and *C. opilio* crab are dependent upon the abundance of these species of crab, while the PSC limit for red king crab is dependent on the abundance and spawning biomass of red king crab.

All vessels participating in the groundfish fisheries are required to retain all catch of pollock and Pacific cod, when directed fishing for those species is open, regardless of gear type employed and target fishery. When directed fishing for an IR/IU species is prohibited, retention of that species is required only up to any maximum retainable amount in effect for that species. No discarding of whole fish of these species is allowed, either prior to or subsequent to that species being brought on board the vessel, except as required in the regulations. At-sea discarding of any processed product from any IR/IU species is also prohibited, unless required by other regulations. The no action alternative also includes the revision of the pollock MRA in the BSAI, which was implemented on June 2004. Under this revision, the enforcement period for pollock harvest in the BSAI was modified from enforcement at anytime during a fishing trip, to enforcement at the time of offload.

All IR/IU species caught in the BSAI must be either 1) processed at sea, subject to minimum product recovery rates, or 2) delivered in their entirety to onshore processing plants for which similar processing requirements are implemented by State regulations.

5.6.2 Description of BSAI Groundfish Fisheries

In the BSAI, the rock sole, flathead sole, and ‘other’ flatfish fisheries are almost exclusively prosecuted by catcher processors using bottom trawl gear. Although the fisheries are open to other vessel categories and gear types, very few rock sole, flathead sole, and/or ‘other’ flatfish are harvested by other types of vessels. Vessels participating in these fisheries generally fish for rock sole during the roe season until the first seasonal halibut bycatch cap is reached. Generally, after the rock sole roe fishery closes, these vessels shifted to several different targets; notably Atka mackerel, yellowfin sole, and Pacific cod. Vessels also can go into the GOA to fish for rex sole, with the proper licenses and endorsements.

The directed Atka mackerel fishery is a bottom trawl fishery that occurs off the continental shelf in the Eastern Bering Sea (EBS) and in the passes between the islands of the central and western Aleutians.

Thirty-five species of rockfish (genus *Sebastes* and *Sebatolobus*) occur in the BSAI, of which eight are commercially important at present. In recent years, the only BSAI rockfish species open for directed fishing has been the Pacific Ocean perch complex, which includes Pacific Ocean perch, sharpchin, northern, shortraker, and roughey rockfish. In the BSAI, directed fishing for these species are mostly conducted by catcher processors using bottom trawl gear, or by catcher vessels using hook and line gear.

Provided below are detailed descriptions of the fisheries targeting the primary species that would be affected under the proposed action. Generally, data are presented for each BSAI groundfish fishery for 1995 through 2006. Limited catch data are reported for earlier years, in order to provide a more complete historical perspective on catch. Catch data for each fishery are provided by gear type.

The most recent descriptions of the BSAI groundfish fisheries are from the *Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Bering Sea/Aleutian Islands Regions* (NPFMC 2005). Please see this document for further details on the groundfish fisheries in the BSAI.

5.6.2.1 Yellowfin Sole Fishery

The yellowfin sole is one of the most abundant flatfish species in the eastern Bering Sea and is the target of the largest flatfish fishery in the United States. The resource inhabits the eastern Bering Sea shelf and is considered one stock. Abundance in the Aleutian Islands region is negligible.

The directed fishery typically occurs from spring through December. Yellowfin sole have been caught with bottom trawls on the Bering Sea shelf, since the fishery began in 1954. Yellowfin sole were overexploited by foreign fisheries in 1959-62 when catches averaged 404,000 mt, annually. As a result of reduced stock abundance, catches declined to an annual average of 117,800 mt, from 1963-71, and further declined to an annual average of 50,700 mt, from 1972-77. The lower yield in this latter period was partially due to the discontinuation of the Soviet fishery. In the early 1980s, after the stock condition had improved, catches again increased reaching a recent peak of over 227,000 mt in 1985. During the 1980s, there was also a major transition in the characteristics of the fishery. Yellowfin sole were traditionally taken exclusively by foreign fisheries and these fisheries continued to dominate through 1984. However, U.S. fisheries developed rapidly during the 1980s, in the form of joint ventures, and during the last half of the decade began to dominate and then take all of the catch as the foreign fisheries were phased out of the eastern Bering Sea. Since 1990, only domestic harvesting and processing has occurred.

The 1997 catch of 181,389 mt was the largest since the fishery became completely domestic, then decreased to 101,201 mt in 1998. The 2006 catch totaled 97,954 mt. The yellowfin sole harvest in 2006 has been constrained by several closures due to the attainment of halibut PSC and TAC limits: April 20-May 20, June 8-July 19, June 19-July 19, and August 8-December 31. Table 5.6-2 provides total catch of yellowfin sole in the BSAI by gear from 1995 to 2006. Table 5.6-3 provides the number of vessels with retained catch of yellowfin sole in the BSAI by sector for 1995 to 2003.

Table 5.6-2 Total catch of yellowfin Sole in the BSAI by Gear Type, in mt, 1995-2006.

Year	Trawl	Hook and Line	Pot	Total
1995	124,611	60	81	124,752
1996	129,254	148	256	129,658
1997	181,081	237	71	181,389
1998	100,783	260	111	101,154
1999	67,099	150	71	67,320
2000	83,491	288	70	83,849
2001	62,731	618	46	63,395
2002	72,391	570	38	72,999
2003	74,119	573	90	74,782
2004	67,565	596	77	68,238
2005	93,601	706	75	94,382
2006	97,454	454	46	97,954

Source: NMFS Weekly Production and Observer Reports.

Table 5.6-3 Number of vessels with retained catch (mt) of yellowfin sole for all sectors from 1995 to 2003.

Year	Sector	Number of Vessels	Retained tons (mt)	Percent of total
1995	H&G Trawl CPs	30	46,558	60%
	AFA Trawl CPs	19	14,558	19%
	AFA CVs	42	10,159	13%
	All other sectors	55	6,841	9%
	Total	146	78,117	100%
1996	H&G Trawl CPs	28	48,520	61%
	AFA Trawl CPs	19	21,687	27%
	AFA CVs	28	5,906	7%
	All other sectors	39	3,450	4%
	Non AFA Trawl CVs	3	^a	^a
Total	117	79,563	100%	
1997	H&G Trawl CPs	27	90,135	71%
	AFA Trawl CPs	14	17,163	14%
	AFA CVs	27	14,196	11%
	All other sectors	33	5,865	5%
	Non AFA Trawl CVs	3	^a	^a
Total	104	127,359	100%	
1998	H&G Trawl CPs	23	53,705	83%
	AFA Trawl CPs	19	10,379	16%
	AFA CVs	27	282	0%
	All other sectors	49	88	0%
	Total	118	64,453	100%
1999	H&G Trawl CPs	23	35,711	84%
	AFA Trawl CPs	16	5,628	13%
	AFA CVs	18	1,209	3%
	All other sectors	25	5	0%
	Total	82	42,552	100%
2000	H&G Trawl CPs	21	42,993	82%
	All other sectors	25	5,583	11%
	AFA Trawl CPs	14	2,334	5%
	AFA CVs	67	1,524	3%
	Total	127	52,435	100%
2001	H&G Trawl CPs	22	43,580	97%
	AFA Trawl CPs	14	1,217	3%
	All other sectors	23	18	0%
	AFA CVs	41	0	0%
	Total	100	44,814	100%
2002	H&G Trawl CPs	22	51,516	97%
	AFA Trawl CPs	15	1,341	3%
	All other sectors	30	10	0%
	AFA CVs	33	0	0%
	Total	100	52,867	100%
2003	H&G Trawl CPs	22	54,306	95%
	AFA Trawl CPs	13	2,988	5%
	All other sectors	40	8	0%
	AFA CVs	59	0	0%
	Total	134	57,303	100%

^a Data was withheld to protect confidentiality

Source: Data summarized from 1995-2003 NMFS Weekly Production Reports and 1995-2003 ADFG groundfish fish tickets. The 2003 fish ticket data should be considered preliminary.

5.6.2.2 Rock Sole Fishery

The northern rock sole is distributed primarily on the eastern Bering Sea continental shelf and in much lesser amounts in the Aleutian Islands region. Rock sole are important as the target of a high value roe fishery, occurring in February and March, which accounts for the majority of the annual catch. Rock sole

catches from 1989 -2003 have averaged 49,480 mt annually. The 2003 catch of 35,395 mt was only 32 percent of the ABC of 110,000 mt (80 percent of the TAC). The 2006 catch total is 36,435 mt. Thus, rock sole remain lightly harvested in the Bering Sea and Aleutian Islands. During the 2006 fishing season, rock sole harvesting was closed in the Bering Sea and Aleutian Islands due to halibut bycatch restrictions on February 21, April 13, and August 8. Table 5.6-4 provides total catch of rock sole in the BSAI by gear from 1995 to 2006. Table 5.6-5 provides the number of vessels with retained catch by sector for 1995 to 2003.

Table 5.6-4 Total catch of rock sole in the BSAI by Gear Type, in mt, 1995-2006.

Year	Trawl	Hook and Line	Pot	Total
1995	54,982	46	-	55,028
1996	46,859	60	8	46,927
1997	67,526	36	2	67,564
1998	33,590	51	1	33,642
1999	40,449	60	2	40,511
2000	49,232	31	1	49,264
2001	29,222	31	2	29,255
2002	41,299	30	2	41,331
2003	36,113	36	7	36,156
2004	45,463	30	1	45,494
2005	37,313	56	1	37,370
2006	36,408	25	2	36,435

Source: NMFS Weekly Production and Observer Reports

Table 5.6-5 Number of vessels with retained catch (mt) of rock sole for all sectors from 1995 to 2003.

Year	Sector	Number of Vessels	Retained tons (mt)	Percent of total
1995	H&G Trawl CPs	32	12,564	87%
	AFA Trawl CPs	20	717	5%
	All other sectors	69	607	4%
	AFA CVs	47	487	3%
	Non AFA Trawl CVs	3	^a	^a
	Total	171	14,375	100%
1996	H&G Trawl CPs	29	12,438	95%
	AFA Trawl CPs	19	406	3%
	All other sectors	62	110	1%
	AFA CVs	30	82	1%
	Total	140	13,035	100%
1997	H&G Trawl CPs	28	19,421	89%
	AFA CVs	49	1,092	5%
	All other sectors	28	763	4%
	AFA Trawl CPs	19	482	2%
	Non AFA Trawl CVs	4	0	0%
	Total	128	21,758	100%
1998	H&G Trawl CPs	23	9,336	95%
	AFA Trawl CPs	18	476	5%
	AFA CVs	46	8	0%
	All other sectors	20	0	0%
	Total	107	9,820	100%
1999	H&G Trawl CPs	23	9,901	96%
	All other sectors	18	329	3%
	AFA Trawl CPs	15	39	0%
	AFA CVs	35	32	0%
	Total	91	10,300	100%

Year	Sector	Number of Vessels	Retained tons (mt)	Percent of total
2000	H&G Trawl CPs	22	10,509	88%
	All other sectors	23	1,260	11%
	AFA Trawl CPs	14	118	1%
	AFA CVs	80	90	1%
	Non AFA Trawl CVs	4	11	0%
	Total	143	11,988	100%
2001	H&G Trawl CPs	22	13,128	99%
	AFA Trawl CPs	16	115	1%
	All other sectors	25	29	0%
	AFA CVs	70	2	0%
	Total	133	13,274	100%
	2002	H&G Trawl CPs	22	16,501	100%
AFA Trawl CPs		16	26	0%
AFA CVs		60	7	0%
Non AFA Trawl CVs		4	4	0%
Total		102	16,537	100%
2003		H&G Trawl CPs	22	13,382	100%
	Non AFA Trawl CVs	8	23	0%
	AFA CVs	86	10	0%
	All other sectors	28	3	0%
	AFA Trawl CPs	13	3	0%
	Total	157	13,421	100%

^a Data was withheld to protect confidentiality

Source: Data summarized from 1995-2003 NMFS Weekly Production Reports and 1995-2003 ADFG groundfish fish tickets. The 2003 fish ticket data should be considered preliminary.

5.6.2.3 Flathead Sole Fishery

Hippoglossoides sp. (which include flathead sole and Bering flounder) are managed as a unit stock in the Bering Sea and Aleutian Islands and were formerly a constituent of the “other flatfish.” In June 1994, the Council requested the Plan Team to assign a separate ABC for flathead sole in the BSAI, rather than combining flathead sole with other flatfish as in past assessments. This request was based on a change in the directed fishing standards to allow increased retention of flatfish.

The resource remains lightly harvested as the 2006 catch is only 92 percent of the 2006 TAC of 19,500 t. Although flathead sole receive a separate ABC and TAC they are still managed in the same PSC classification as rock sole and ‘other’ flatfish and receive the same apportionments and seasonal allowances of prohibited species. In recent years, the flathead sole fishery has been closed prior to attainment of the TAC due to the bycatch of halibut. Substantial amounts of flathead sole are discarded overboard in various eastern Bering Sea target fisheries. Table 5.6-6 depicts the annual total catch of flathead sole in the BSAI, from 1995 to 2006, by gear. Table 5.6-7 provides the number of vessels with retained catch of flathead sole in the BSAI, from 1995 to 2003.

Table 5.6-6 Total catch of flathead sole in the BSAI by Gear Type, in mt, 1995-2006.

Year	Trawl	Hook and Line	Pot	Total
1995	14,456	255	2	14,713
1996	17,065	272	7	17,344
1997	20,357	347	-	20,704
1998	23,970	415	-	24,385
1999	17,588	254	-	17,842
2000	19,687	295	1	19,983
2001	17,333	253	-	17,586
2002	14,764	344	-	15,108
2003	13,453	373	-	13,826
2004	14,465	498	1	14,964
2005	15,525	625	1	16,151
2006	17,339	531	1	17,871

Table 5.6-7 Number of vessels with retained catch (mt) of flathead sole for all sectors from 1995 to 2003.

Year	Sector	Number of vessels	Retained tons (mt)	Percent of total
1995	H&G Trawl CPs	32	6,161	92%
	AFA Trawl CPs	20	241	4%
	AFA CVs	48	218	3%
	All other sectors	70	81	1%
	Non AFA Trawl CVs	3	a	a
	Total		173	6,700	100%
1996	H&G Trawl CPs	29	8,641	96%
	AFA CVs	40	251	3%
	AFA Trawl CPs	19	57	1%
	All other sectors	37	10	0%
	Non AFA Trawl CVs	6	1	0%
	Total		131	8,959	100%
1997	H&G Trawl CPs	28	10,103	94%
	AFA CVs	50	337	3%
	All other sectors	32	223	2%
	AFA Trawl CPs	19	70	1%
	Non AFA Trawl CVs	2	a	a
	Total		131	10,733	100%
1998	H&G Trawl CPs	23	15,505	98%
	AFA Trawl CPs	19	247	2%
	All other sectors	59	59	0%
	AFA CVs	59	39	0%
	Non AFA Trawl CVs	6	0	0%
	Total		166	15,850	100%
1999	H&G Trawl CPs	23	11,631	99%
	All other sectors	30	131	1%
	AFA Trawl CPs	15	22	0%
	AFA CVs	64	9	0%
	Total		132	11,794	100%

Year	Sector	Number of vessels	Retained tons (mt)	Percent of total
2000	H&G Trawl CPs	20	12,037	94%
	All other sectors	28	737	6%
	Non AFA Trawl CVs	7	1	0%
	Total	55	12,775	100%
2001	H&G Trawl CPs	22	12,135	100%
	All other sectors	36	30	0%
	AFA Trawl CPs	15	0	0%
	AFA CVs	79	0	0%
	Total	152	12,165	100%
2002	H&G Trawl CPs	22	9,918	100%
	All other sectors	31	15	0%
	AFA Trawl CPs	15	10	0%
	AFA CVs	68	1	0%
	Non AFA Trawl CVs	7	0	0%
	Total	143	9,944	100%
2003	H&G Trawl CPs	22	9,124	100%
	All other sectors	35	30	0%
	AFA CVs	91	9	0%
	Non AFA Trawl CVs	8	1	0%
	Total	156	9,165	100%

^a Data was withheld to protect confidentiality

Source: Data summarized from 1995-2003 NMFS Weekly Production Reports and 1995-2003 ADFG groundfish fish tickets. The 2003 fish ticket data should be considered preliminary.

5.6.2.4 Atka Mackerel Fishery

Atka mackerel became a reported species group in the BSAI Groundfish FMP in 1978. The patterns of the Atka mackerel fishery generally reflect the behavior of the species: (1) the fishery is highly localized and usually occurs in the same few locations; (2) the schooling semi-pelagic nature of the species makes it particularly susceptible to trawl gear fished on the bottom; and (3) trawling occurs almost exclusively at depths less than 200 m. In the early 1970s, most Atka mackerel catches were made in the western Aleutian Islands (west of 180° W. longitude). In the late 1970s and through the 1980s, fishing effort moved eastward. A majority of landings occurred near Seguam and Amlia Islands. In 1984 and 1985, the majority of landings came from a single 1/2° latitude by 1° longitude block bounded by 52° 30' N. and 53° N. latitude, and 173° W. longitude in Seguam Pass (73 percent in 1984, 52 percent in 1985).

Prior to 1992, ABCs for Atka mackerel were allocated to the entire Aleutian management district with no additional spatial management. However, because of increases in the ABC, beginning in 1992, the Council recognized the need to disperse fishing effort throughout the range of the stock to minimize the likelihood of localized depletions. In 1993, an initial Atka mackerel TAC of 32,000 mt was caught by March 11, almost entirely south of Seguam Island (Seguam Bank). This initial TAC release represented the amount of Atka mackerel that the Council thought could be appropriately harvested in the eastern portion of the Aleutian Islands subarea (based on the assessment for 1993; Lowe 1992), since there was no mechanism in place at the time to spatially allocate TACs in the Aleutians to minimize the likelihood of localized depletions. In mid-1993, however, Amendment 28 to the BSAI Groundfish FMP became effective, dividing the Aleutian Island subarea into three districts at 177° W. and 177° E. longitudes for the purposes of spatially apportioning TACs. On August 11, 1993, an additional 32,000 mt of Atka mackerel TAC was released to the Central (27,000 mt) and Western (5,000 mt) districts. Since 1994, the BSAI Atka mackerel TAC has been allocated to the three regions based on the average distribution of biomass estimated from the Aleutian Islands bottom trawl surveys. Amendment 34 allocates up to 2 percent of the Atka mackerel TAC specified for the eastern BSAI to vessels using jig gear.

In June 1998, the Council passed a fishery regulatory amendment that proposed a four-year timetable to temporally and spatially disperse and reduce the level of Atka mackerel fishing within Steller sea lion critical habitat in the Aleutian Islands. Temporal dispersion was accomplished by dividing the BSAI Atka mackerel TAC into two equal seasonal allowances, an A-season beginning January 1 and ending April 15, and a B-season from September 1 to November 1. Spatial dispersion was accomplished through a planned 4-year reduction in the maximum percentage of each seasonal allowance that could be caught within critical habitat in the Central and Western Aleutian Islands. This was in addition to bans on trawling within 10 nm of all sea lion rookeries in the Aleutian district and within 20 nm of the rookeries on Seguam and Agligadak Islands (in area 541), which were instituted in 1992. The goal of spatial dispersion was to reduce the proportion of each seasonal allowance caught within critical habitat to no more than 40 percent by the year 2002. No critical habitat allowance was established in the eastern subarea because of the year-round 20 nm trawl exclusion zone around the sea lion rookeries on Seguam and Agligadak Islands that minimized effort within critical habitat. The regulations implementing this four-year phased-in change to Atka mackerel fishery management became effective on 22 January 1999 and lasted only 3 years (through 2001). In 2002, new regulations affecting management of the Atka mackerel, pollock, and Pacific cod fisheries went into effect. Furthermore, all trawling was prohibited in critical habitat from 8 August 2000 through 30 November 2000 by the Western District of the Federal Court because of violations of the Endangered Species Act (ESA).

As part of the plan to respond to the Court and comply with the ESA, NOAA Fisheries and the Council formulated new regulations for the management of Steller sea lion and groundfish fishery interactions that went into effect in 2002. The objectives of temporal and spatial fishery dispersion, cornerstones of the 1999 regulations, were retained. Season dates and allocations remained the same (A season: 50 percent of annual TAC from 20 January to 15 April; B season: 50 percent from 1 September to 1 November). However, the maximum seasonal catch percentage from critical habitat was raised from the goal of 40 percent in the 1999 regulations to 60 percent. To compensate, effort within critical habitat in the Central (542) and Western (543) Aleutian fisheries was limited by allowing access to each subarea to half the fleet at a time. Vessels fishing for Atka mackerel are randomly assigned to one of two teams, which start fishing in either area 542 or 543. Vessels may not switch areas until the other team has caught the critical habitat allocation assigned to that area. In the 2002 regulations, trawling for Atka mackerel was prohibited within 10 nm of all rookeries in areas 542 and 543; this was extended to 15 nm around Buldir Island and 3 nm around all major sea lion haulouts. Steller sea lion critical habitat east of 178°W in the Aleutian district, including all critical habitat in subarea 541 and a 1° longitude-wide portion of subarea 542, is closed to directed Atka mackerel fishing. Seasonal and spatial fishery dispersion for 2005 and 2006 are shown in Table 5.6-8.

Table 5.6-8 2005 and 2006 seasonal and spatial allowances, gear shares, and CDQ reserve of the BSAI Atka Mackerel TAC (amounts are in metric tons).

Subarea and component	2005 and 2006 TAC	CDQ Reserve	CDQ reserve HLA limit ³	ITAC	Seasonal Allowance ¹			
					A season ²		B season ²	
					Total	HLA limit ³	Total	HLA limit ³
Western AI District (543)	20,000	1,500	900	18,500	9,250	5,550	9,250	5,550
Central AI District (542)	35,500	2,663	1,598	32,838	16,419	9,851	16,419	9,851
EAI (541)/BS subarea ⁴	7,500	563	.....	6,938	.....	.....	.....	.....
Jig (1%) ⁵	.....	.....	.....	69	.....	.....	.....	.....
Other gear (99%)	.....	.....	.....	6,868	3,434	.....	3,434	.....
Total	63,000	4,725	.....	58,275	29,103	.....	29,103	.....

¹The seasonal allowances of Atka mackerel are 50% in the A season and 50% in the B season.

²The A season is January 1 (January 20 for trawl gear) to April 15 and the B season is September 1 to November 1.

³Harvest Limit Area (HLA) refers to the amount of each seasonal allowance that is available for fishing inside the HLA.

In 2005 and 2006, 60% of each seasonal allowance is available for fishing inside the HLA in the Western and Central Aleutian Districts.

⁴Eastern Aleutian District and the Bering Sea subarea.

⁵Regulations require that up to 2 percent of the Eastern Aleutian District and the Bering Sea subarea ITAC be allocated to jig gear.

The amount of this allocation is 1 percent. The jig gear allocation is not apportioned by season.

Table 5.6-9 provides the annual total catch of Atka mackerel in the BSAI from 1995 to 2006 by gear. Table 5.6-10 provides the number of vessels and the annual total catch of Atka mackerel in the BSAI by trawl sector 1995 to 2003. Figure 5.6-1 presents annual trawling harvest of Atka mackerel by Aleutian Islands subarea.

Table 5.6-9 Catch of Atka mackerel in the BSAI by gear type, in mt, 1995-2006.

Year	Trawl	Hook and Line	Pot	Total
1995	81,413	61	81	81,555
1996	103,853	36	54	103,943
1997	65,755	40	50	65,845
1998	55,768	90	15	55,873
1999	53,561	71	11	53,643
2000	42,293	138	9	42,440
2001	56,249	270	17	56,536
2002	41,945	43	53	42,041
2003	54,052	21	206	54,279
2004	54,814	36	105	54,955
2005	61,760	24	251	62,035
2006	61,452	10	364	61,826

Source: NMFS Weekly Production and Observer Reports

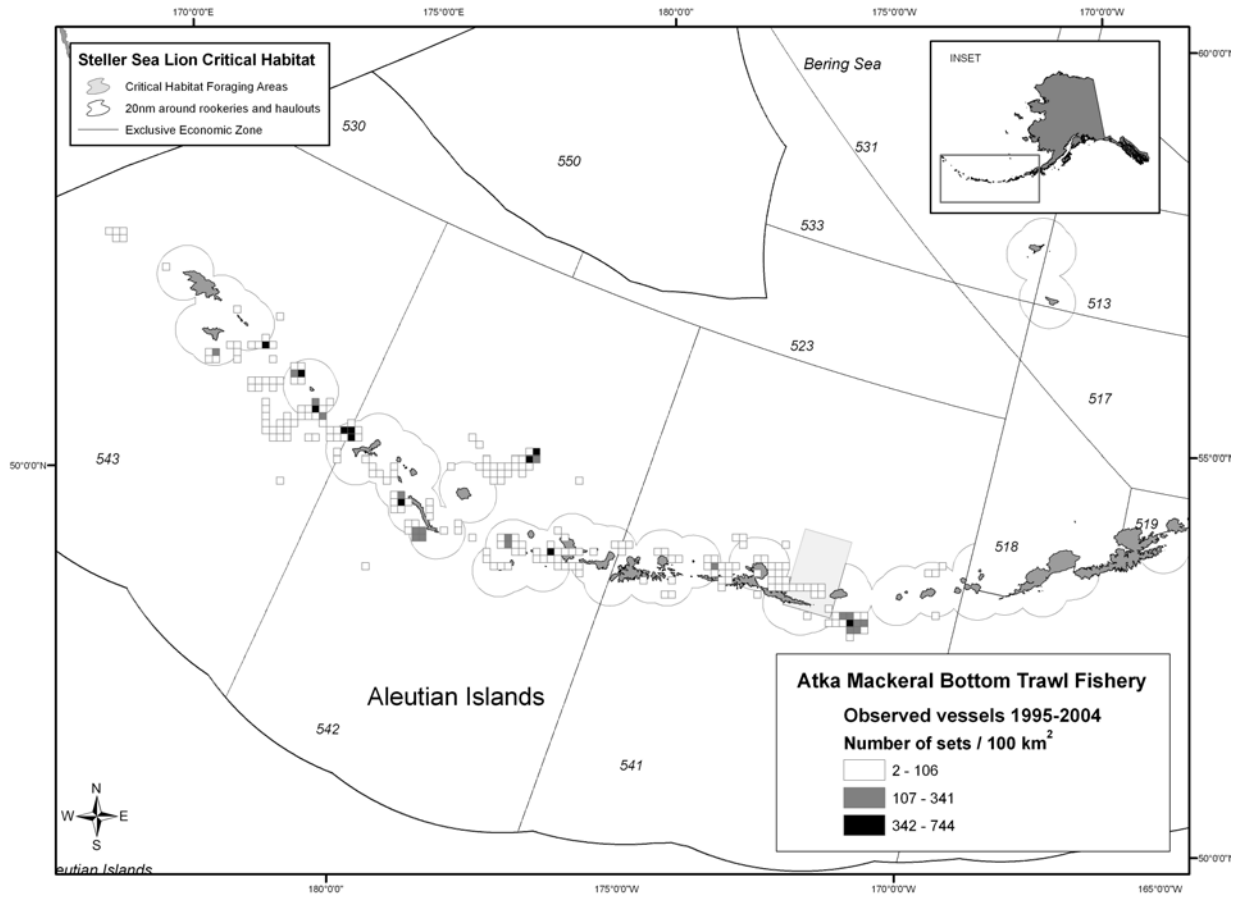
Table 5.6-10 Number of vessels and retained catch (mt) of Atka mackerel in the BSAI by trawl sector from 1995 to 2003.

Year	Sectors	Number of vessels	Retained tons	Percent of total
1995	H&G Trawl CP	15	52,200	85%
	All other sectors	4	7,440	12%
	AFA Trawl CP	8	1,824	3%
	AFA CV	11	16	0%
	Total	38	61,480	100%
1996	H&G Trawl CP	18	77,627	92%
	All other sectors	20	5,503	7%
	AFA Trawl CP	4	1,392	2%
	AFA CV	18	13	0%
	Total	60	84,535	100%
1997	H&G Trawl CP	11	42,344	79%
	All other sectors	19	7,527	14%
	AFA Trawl CP	4	3,869	7%
	AFA CV	3	^a	
	Total	37	53,741	100%
1998	H&G Trawl CP	21	39,911	84%
	All other sectors	18	7,380	16%
	AFA CV	26	0	0%
	Total	65	47,292	100%
1999	H&G Trawl CP	19	44,212	99%
	AFA Trawl CP	10	438	1%
	All other sectors	9	1	0%
	AFA CV	12	0	0%
	Total	50	44,652	100%
2000	H&G Trawl CPS	16	36,424	100%
	All other sectors	8	3	0%
	Non AFA Trawl CV	1	^a	
	Total	25	36,426	100%
2001	H&G Trawl CP	18	45,527	100%
	All other sectors	20	73	0%
	AFA CV	27	16	0%
	Total	65	45,616	100%
2002	H&G Trawl CP	17	31,125	100%
	AFA CV	47	78	0%
	All other sectors	9	2	0%
	Non AFA Trawl CV	2	^a	
	Total	75	31,205	100%
2003	H&G Trawl CP	17	37,757	100%
	AFA CV	72	86	0%
	AFA Trawl CP	13	3	0%
	All other sectors	22	0	0%
	Non AFA Trawl CV	6	0	0%
	Total	130	37,848	100%

^a Data was withheld to protect confidentiality

Source: Data summarized from 1995-2003 NMFS Weekly Production Reports and 1995-2003 ADFG groundfish fish tickets. The 2003 fish ticket data should be considered preliminary.

5.6-1 Annual harvest of Atka mackerel inside and outside Steller Sea lion critical habitat by Aleutian Islands subarea (541, 542, and 543) from 1995 to 2004.



5.6.2.5 Pacific Ocean Perch Fishery

Pacific Ocean perch (POP), and four other associated species of rockfish (northern rockfish; roughey rockfish; shorttraker rockfish; and sharpchin rockfish) were managed as the POP complex in the two distinct areas from 1979 to 1990. In 1991, the Council separated POP from the other red rockfish in order to provide protection from possible overfishing. Of the five species in the former POP complex, Pacific Ocean perch has historically been the most abundant rockfish in this region and has contributed most to the commercial rockfish catch. Since 2001, Pacific Ocean perch in the Bering BSAI area have been assessed and managed as a single stock.

Pacific Ocean perch were highly sought by Japanese and Soviet fisheries and supported a major trawl fishery throughout the 1960s. Apparently, these stocks were not productive enough to support such large removals. Catches continued to decline throughout the 1960s and 1970s, reaching their lowest levels in the mid 1980s. With the gradual phase-out of the foreign fishery in the U.S. Exclusive Economic Zone, a small joint-venture fishery developed, but was soon replaced by a domestic fishery by 1990. In 1990, the domestic fishery recorded the highest Pacific Ocean perch removals since 1977.

Estimates of retained and discarded Pacific Ocean perch from the fishery have been available since 1990. The eastern Bering Sea region generally shows a higher discard rate than in the Aleutian Islands region. For the period from 1990 to 2003, the Pacific Ocean perch discard rate in the eastern Bering Sea averaged

about 33 percent, and the 2003 discard rate was 52 percent. In contrast, the discard rate from 1990 to 2002 in the Aleutian Islands averaged about 15 percent, and the 2003 discard rate was 16 percent.

There has been little change in the distribution of observed Aleutian Islands POP catch from the foreign and joint venture fisheries (years 1977-1988) and the domestic fishery (years 1990-present) with respect to fishing depth and management area. Management area 541 contributes the largest share of the observed catch in each fishery, with 46 percent and 41 percent in the foreign/joint venture and domestic fisheries, respectively. In contrast, area 543 contributes the largest share of the catch in the 2002 fishery due to the spatial allocation of harvest quotas. Although the catch by management area between the two time periods was similar, variations appeared to occur within each of these periods. For example, area 543 contributed a large share of the catch in the late 1970s foreign fishery, as well as the domestic fishery from the mid-1990s to the present. In the late 1980s to the early 1990s, area 541 contributed a large share of the catch, and prompted management changes to spatially allocate POP harvest. Note that the extent to which the patterns of observed catch can be used as a proxy for patterns in total catch is dependent upon the degree to which the observer sampling represents the true fishery. In particular, the proportions of total POP caught that were actually sampled by observers were very low in the foreign fishery, due to low sampling ratio prior to 1984.

Table 5.6-11 provides annual total catch of BSAI Pacific Ocean perch from 1995 to 2006 by gear. Table 5.6-12 provides the total number of vessels with retained catch of BSAI Pacific Ocean perch by sector from 1995 to 2003.

Table 5.6-11 Total catch of Pacific Ocean perch in the BSAI by gear type, in mt, 1995-2006.

Year	Trawl	Hook and Line	Pot	Total
1995	11,492	17	1	11,510
1996	15,679	2	1	15,682
1997	13,465	-	-	13,465
1998	10,003	-	-	10,003
1999	12,260	-	-	12,260
2000	9,018	10	-	9,028
2001	8,807	5	-	8,812
2002	10,526	3	-	10,529
2003	13,914	2	1	13,917
2004	10,826	2	-	10,828
2005	10,420	2	-	10,422
2006	12,851	1	1	12,853

Source: NMFS Weekly Production and Observer Reports

Table 5.6-12 Number of vessels and annual retained catch (mt) of BSAI Pacific Ocean perch for all sectors from 1995 to 2003.

Year	Sectors	Number of Vessels	Retained tons	Percent of total
1995	H&G Trawl CPs	14	8,053	98%
	AFA Trawl CPs	17	198	2%
	AFA CVs	10	8	0%
	All other sectors	3	a	a
	Total	44	8,259	100%
1996	H&G Trawl CPs	14	8,950	99%
	AFA Trawl CPs	14	122	1%
	AFA CVs	14	6	0%
	All other sectors	4	1	0%
	Total	46	9,079	100%
1997	H&G Trawl CPs	10	10,325	100%
	AFA CVs	16	30	0%
	All other sectors	6	13	0%
	AFA Trawl CPs	14	0	0%
	Total	46	10,368	100%
1998	H&G Trawl CPs	12	7,702	100%
	AFA Trawl CPs	7	1	0%
	AFA CVs	13	1	0%
	All other sectors	2	a	a
	Total	34	7,703	100%
1999	H&G Trawl CPs	12	9,580	100%
	All other sectors	2	a	a
	Total	14	9,580	100%
2000	H&G Trawl CPs	10	6,996	100%
	All other sectors	1	a	a
	Non AFA Trawl CVs	1	a	a
	Total	12	6,996	100%
2001	H&G Trawl CPs	11	6,320	100%
	All other sectors	5	0	0%
	Total	16	6,320	100%
2002	H&G Trawl CPs	11	8,249	100%
	Total	11	8,249	100%
2003	H&G Trawl CPs	10	9,823	96%
	AFA Trawl CPs	2	a	a
	Total	12	9,823	96%

^a Data was withheld to protect confidentiality

Source: Data summarized from 1995-2003 NMFS Weekly Production Reports and 1995-2003 ADFG groundfish fish tickets. The 2003 fish ticket data should be considered preliminary.

5.6.2.6 Other BSAI Groundfish Fisheries

The only other groundfish target fishery that is affected by the proposed allocation is the Pacific cod fishery, therefore it is the only fishery discussed here.

Presently, the Pacific cod stock is exploited by a multiple-gear fishery, including trawl, longline, pot, and jig components. From 1980 through 2005, TAC averaged about 77 percent of ABC, and aggregate commercial catch averaged about 88 percent of TAC. In 9 of these 26 years (35 percent), TAC equaled ABC exactly, and in 5 of these 26 years (19 percent), catch exceeded TAC (by an average of 4%). Changes in ABC over time are typically attributable to three factors: 1) changes in resource abundance, 2) changes in management strategy, and 3) changes in the stock assessment model. For example, from 1980 through 2005, six different assessment models were used, though the present model has remained unchanged since 1992 (except for the addition of a new fishery selectivity era beginning in 2000). Historically, the great majority of the BSAI catch has come from the eastern Bering Sea area. During the most recent five-year period (2000-2004), the eastern Bering Sea accounted for an average of about 83

percent of the BSAI catch. Table 5.6-13 provides annual total catch of BSAI Pacific cod from 1995 to 2006 by gear type.

Table 5.6-13 Total catch of Pacific Cod in the BSAI by Gear Type, in mt, 1995-2006.

Year	Trawl	Hook and Line	Pot	Total
1995	121,530	103,199	20,299	245,028
1996	113,089	94,968	32,617	240,674
1997	111,212	124,406	22,047	257,665
1998	81,308	98,286	13,657	193,251
1999	67,190	79,021	16,150	162,361
2000	73,476	85,177	18,783	177,436
2001	50,752	96,945	16,507	164,204
2002	78,178	89,968	15,054	183,200
2003	78,576	94,325	21,960	194,861
2004	81,946	96,465	17,108	195,519
2005	72,237	115,752	17,038	205,027
2006	70,102	98,286	18,672	187,060

Source: NMFS website <http://www.fakr.noaa.gov/sustainablefisheries/catchstats.htm>.

Current regulations specify that catches of Pacific cod will be allocated according to gear type as follows: the trawl fishery will be allocated 47 percent, the fixed gear (longline and pot) fishery will be allocated 51 percent, and the jig fishery will be allocated 2 percent; of the fixed gear allocation, the longline fishery will be allocated 80.3 percent (not counting catcher vessels less than 60 ft LOA), the pot fishery will be allocated 18.3 percent (not counting catcher vessels less than 60 ft LOA), and fixed-gear catcher vessels less than 60 ft LOA will be allocated 1.4 percent. Typically, as the harvest year progresses, it becomes apparent that one or more gear types will be unable to harvest their full allotment(s) by the end of the year. This is addressed by reallocating TAC between gear types in September of each year. Most often, such reallocations shift TAC from the trawl, jig, and (sometimes) pot components of the fishery to the longline catcher/processors. The longline catcher/processors typically receive 15,000-20,000 mt per year through such transfers.

5.6.3 Description of the Trawl Sectors

5.6.3.1 Description of the Non-AFA Trawl Catcher Processor Sector

The H&G Trawl CP sector is the most diverse of the processing sectors in the BSAI and the only sector that consistently targets a significant amount of flatfish. The H&G Trawl CP fleet consists of a relatively wide variety of vessels that range from 103 ft to 295 ft in length. Although 44 vessels are licensed in the BSAI H&G Trawl CP sector, in recent years (2001 to present) 22 vessels have been active in the sector in the BSAI. Six of the 22 (27%) of the BSAI H&G Trawl CP sector are considered smaller (<125 ft) vessels and 16 (73%) are considered larger vessels (>125 ft). As would be expected, the smaller vessels (<125 ft) are relatively less productive than the larger vessels (> 125 ft) generating approximately 13 percent of catch over the period 1995 to 2005 (Table 5.6-14).

Table 5.6-14 Fishing Activity in the H&G Trawl CP Sector in 1995-2005, by Size Class

Length Class	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Number of Vessels											
< 125'	8	8	7	10	7	8	6	6	6	7	6
> 125'	24	21	18	16	16	16	16	16	16	16	16
Total	32	29	25	26	23	24	22	22	22	23	22
Total Groundfish Catch (1,000 mt)											
< 125'	19.2	34.5	50.6	37.4	34.3	42.7	30	44	41	50	42
> 125'	284	293	303	234	234	251	240	241	230	250	259
Total	303	328	354	271	268	294	270	285	271	300	301
Percent of HT-CP Total Groundfish Catch											
< 125'	6.3	10.5	14.3	13.8	12.8	14.5	11.2	15.5	15.1	16.8	13.9
> 125'	93.7	89.5	85.7	86.2	87.2	85.5	88.8	84.5	84.9	83.2	86.1

Source: NPFMC Sector Profiles Database for data from 1995 to 2001 and COAR data for 2002-2005.

The following information on employment for the H&G Trawl CP sector is from the *Alaska Groundfish Fisheries Final Programmatic Supplemental Environmental Impact Statement* that was published on June 2004. The average crew size for a H&G Trawl CP vessel is about 34 persons, which is about one-third of the average employment on a surimi catcher processor and less than half of the average crew of a fillet catcher processor. A typical crew might include a captain, a mate, two engineers (one each for the vessel and processing equipment), a cook/housekeeper, two to three crew members dedicated to the deck, a processing foreman and assistant, and about 25 processing workers. On some vessels two or three crew members may split their time between processing and deck work. Any variation in crew size usually is the result of a change in the number of processing workers employed. An annual average of 1,022 FTE positions were generated by this vessel class during the 1992-2001 period, and estimated yearly payments to labor average \$55 million.

5.6.3.2 History of the H&G Trawl CP Sector

The first US-flagged trawl catcher processors were head and gut factory trawlers, and entered the fishery in 1980. [Paul MacGregor 2003, Mary Furuness 2003] These boats focused their effort primarily on Pacific cod, rockfish, sablefish, and flatfish. Pollock, while ubiquitous, were not generally targeted because of their relatively low value.

A key development in the history of the factory trawler was the 1983 introduction and rapid acceptance of high-speed at-sea filleting machinery, such as the Baader 182 and other similar machinery by Toyo [Wulff 2003]. These machines made at-sea processing of pollock into fillets and subsequent processing into surimi economically feasible [Wulff 2003]. Vessels that were large-enough and met Coast Guard stability and load line requirements to install this machinery, were able to tap into the huge pollock resource in the Bering Sea. Other trawl CPs, typically smaller vessels without loadline certifications, were limited largely to head and gut, or frozen in the round processing.

The 1987 Anti-reflagging Act also contributed to the growth of the U.S. flagged trawl CP fleet. The act prohibited vessels that were not originally constructed in the U.S. from being re-flagged as a U.S. vessel. There was, however, a three-year window in which vessels that were already under conversion/construction in foreign shipyards were allowed to enter [IAI 1994].

The coincidental timing of the introduction of the Baader and the conversions provisions in the Anti-Reflagging Act led to a dramatic increase in the number of U.S. flagged trawl CPs operating in the Alaskan EEZ off Alaska. In 1986, NMFS reported 12 active U.S. trawl CPs operating in the Alaskan EEZ off Alaska. However, the number of U.S. trawl CPs doubled in 1987 [IAI, 1994], and by 1990, there were a total of 72 U.S. flagged trawl CPs operating in these waters [NPFMC 1995]. Although the exact number of H&G Trawl CP vessels was not explicitly tracked at the time, estimates developed in 1995 for the Groundfish and Crab License Limitation program [NPFMC, 1995] indicated that there were a total of 23 H&G Trawl CP vessels in 1988—12 of which fished only with trawl gear and 11 of which reported fishing with both trawl and non-trawl gears. The same source indicated that in 1990, a total of 33 vessels were H&G Trawl CP vessels, 17 of which had reported only using trawl gear.

The H&G Trawl CP sector operates in an intensely competitive environment in which the actions of one vessel or one company can have significant negative effects on all of the other vessels and companies in the sector. Because of this highly competitive environment, operators are forced to fish as hard and fast as possible, before another company's activities, or the activities of the fleet as a whole, force a fishery closure.

The primary factor contributing to this environment is the regulated common property nature of the fishery resource itself. Under these management rules, when the season begins, each vessel must race to catch as much fish as possible, before the TAC or a PSC limit is reached and the fishery closes. If an individual vessel or company slows its activity, say, to avoid catches of unwanted fish, or areas of high concentrations of PSCs, they will very likely suffer a loss of revenue, particularly if other vessels or companies do not fish in equivalently conservative ways.

While the race-for-fish problem is endemic throughout a number of fisheries in the North Pacific, for the H&G Trawl CP sector, it is only one of many factors that contribute to the aggressive fishing practices of the sector. Other contributing factors are listed below:

- The products produced by the H&G Trawl CP sector are relatively few and the number of wholesale buyers in the market is quite limited.
- The demand for these products is relatively small, and prices are very sensitive to fluctuations in quantity. [NPFMC, 2001]
- Most companies have semi-exclusive agreements with purchasers
- There are relatively few fishing vessels participating in the sector to date and even fewer companies—a total of 12 companies owning or operating the 26 qualified vessels, 16 of which are concentrated in 4 companies.

Other sectors have also been plagued by the common property nature of the fisheries in the North Pacific. This was particularly true of the pollock industry. However, the pollock fishery was rationalized with approval of the American Fisheries Act in 1998 by the U.S. Congress. The AFA created exclusive pollock allocations to AFA eligible vessels and allowed the formation of cooperatives in both offshore and inshore sectors. Non-AFA vessels that took pollock as incidental catch were prohibited from targeting pollock, and now operate year-round under MRAs for pollock—retained pollock may not exceed 20 percent of other retained groundfish between consecutive offloads.

The AFA has also resulted in an additional burden on the H&G Trawl CP sector. Because of the combination of AFA and IR/IU regulations, the H&G Trawl CP sector is continually struggling to comply with conflicting pollock regulations. Under IR/IU provisions, a vessel operating in this sector **must** retain all pollock it catches. That is, unless their pollock catch exceeds 20 percent of the total retained non-pollock groundfish. At which point, they must discard all pollock in excess of that amount, just as long as they do not discard so much as to fall below the MFA 20 percent standard because, that would place them in violation of IR/IU.

Bycatch² and waste reduction initiatives included in the 1996 reauthorization of the Magnuson Stevens Act resulted in the Council's approval of IR/IU for the BSAI (Amendment 49). The IR/IU measures for pollock and Pacific cod were implemented in 1998 for both the GOA and BSAI and were initially directed primarily at the surimi and fillet trawl CPs. In approving the IR/IU Amendments, the Council also approved IR/IU for flatfish, but recognized that the H&G Trawl CP sector would be unable to meet the IR/IU standard in the near term, and advised NOAA Fisheries to delay implementation of the flatfish portions of the regulations until 2003. In October 2002, the Council initiated Amendment 80 that would provide specific groundfish allocations to the non-AFA trawl CP sector and allow the formation of cooperatives. If approved, Amendment 80 would allow participants in the non-AFA trawl CP sector to focus less on harvest maximization and more on optimizing the value of their harvest and in turn would allow reduction in incidental catch, improved retention and improved utilization.

5.6.3.3 Other Trawl Sectors

Other trawl sectors that are qualified to harvest flatfish in the BS include the AFA Trawl CP and the AFA Trawl CV fleets. Although both fleets could potentially be affected by the proposed action to protect BS fishery habitat, the weight and gross revenue from flatfish harvests in the BS by both of the AFA Trawl fleet sectors is minor relative to their baseline gross annual revenues and the revenue at risk analyses produced no revenue at risk from the proposed action for these fleet components over the 2003 to 2005 period examined.

A thorough description of the AFA Trawl sectors is provided in the EA/RIR/IRFA for Amendment 80 (http://www.fakr.noaa.gov/npfmc/current_issues/bycatch/AM80506noAPX.pdf).

5.6.4 Value of BSAI Groundfish Fisheries

Relative to first wholesale value, the H&G Trawl CP sector is more diversified across fisheries than other sectors. Two primary fisheries have historically contributed relatively equal shares of the first wholesale value for the H&G Trawl CP fleet. Atka mackerel at \$21 million, and yellowfin sole at \$32 million, were two of the largest contributors to sector gross revenue in 2003, contributing 14 percent and 19 percent, respectively to first wholesale value (Table 5.6-15). Other fisheries which have historically contributed a significant share of the total first wholesale value for the H&G Trawl CP fleet are Pacific cod, rock sole, flathead sole, other BSAI groundfish, and Gulf groundfish.

² The term “bycatch” was redefined in the reauthorization process. Prior to the 1996 MSA, bycatch was synonymous with incidental catch. Each term was, at the time, also distinct from “discarded” catch. The 1996 MSA action formally altered this by redefining bycatch to mean “*incidental catch that is discarded*”.

Table 5.6-15 Wholesale product value (millions of dollars) by BSAI target fishery and GOA groundfish for the H&G Trawl CP sector, 1995-2003.

Species	1995	1996	1997	1998	1999	2000	2001	2002	2003
AI Pacific Ocean perch	9.6	6.8	8.0	3.5	5.0	4.1	3.7	5.0	6.4
BSAI Alaska plaice	2.7	1.6	0.8	0.8	0.0	0.3	0.1	0.0	0.0
BSAI Arrowtooth	0.1	0.4	0.3	0.8	1.2	3.1	1.6	1.5	1.9
BSAI Atka mackerel	40.6	65.5	33.6	17.1	20.8	19.4	42.1	23.0	20.7
BSAI Flathead sole	7.8	13.0	11.2	14.0	10.7	11.7	10.6	10.3	8.4
BSAI Other groundfish	13.3	12.5	6.1	8.7	12.4	18.0	15.2	17.0	15.4
BSAI Pacific cod	11.3	14.4	11.9	22.3	29.2	34.1	29.3	33.2	35.1
BSAI Rock sole	27.8	27.7	26.5	13.3	14.4	15.7	15.3	21.3	16.6
BSAI Yellowfin sole	35.7	31.5	51.1	22.4	16.2	23.9	21.5	29.9	31.6
Gulf Groundfish	25.2	28.7	17.5	17.2	22.5	22.7	15.1	19.7	21.8
Total	174.1	202.1	166.9	120.1	132.5	152.9	154.4	160.8	157.7

Source: NMFS

5.6.4.1 BSAI Groundfish Products and Secondary Processing Activity

This section describes primary and secondary products produced in the BSAI groundfish fisheries. The discussion provides an aggregated perspective and does not examine production on a sector-by-sector basis. This section is based mainly on information provided in the document, *Alaska Groundfish Fisheries Final Programmatic Supplemental Environmental Impact Statement* (NMFS 2004b).

Primary Products

Groundfish harvested in the fisheries off Alaska fisheries are made into a wide range of primary, secondary, and ancillary products. In this analysis primary product is defined as the product form after the initial stage of processing.¹ By this definition, all products produced directly from raw fish are considered primary products. These products may be table-ready (i.e., final product), but more often they are reprocessed before they are sent to retail markets or foodservice establishments. Secondary processing is defined as any processing that occurs after the primary products have been transferred to a different facility. Secondary processing includes the production of kamaboko from surimi and the production of breaded fish sticks from fillets.

Table 5.6-16 shows the various primary products by weight, made from three of the BSAI groundfish categories of interest in the subject action, during the 1998-2003. A large percentage of flatfish are frozen whole, while a small percentage, primarily yellowfin sole, are made into kiriti, a steak-like product. Atka mackerel is primarily produced as a headed and gutted or whole product. Most flatfish, by volume, are also headed and gutted, in some instances with the roe left intact, when present. It should be noted that comparing products by weight can be misleading. For example, fillets are typically skinless and boneless product, so a 5-lb yellowfin sole might yield 1.25 lbs of fillets. The price per pound for fillets is higher than for head-and-gut product, primarily because fillets require less secondary processing (i.e., engender more “value-added” by the initial processor).

¹ This definition of primary processing differs from definitions used by processors when they report production to NOAA Fisheries in Weekly Processor Reports. In weekly reports processors differentiate primary products, such as fillets or surimi, from ancillary products, such as roe and fish meal.

Table 5.6-16 Volume of Selected BSAI Groundfish Products, by Species and Product Type (1,000 mt), 1998–2003.

Species/Product	1998	1999	2000	2001	2002	2003	2004	2005
Flatfish								
Whole fish	31.35	9.64	11.88	7.75	13.1	10.2	12.02	20.6
Head and gut	37.81	36.44	42.32	35.16	45.84	48.82	54.93	60.72
Kirimi	6.3	4.21	6.37	6.15	2.86	3.68	1.81	1.62
Filletts	-	-	-	-	-	0	-	-
Other products	0.86	0.7	0.85	0.42	0.74	0.73	0.83	1.14
Atka mackerel								
Whole fish	4.87	10.1	2.92	4.81	3.27	7.13	5	0.89
Head and gut	21.9	22.18	22.49	26.66	18.53	20.72	24.75	32.74
Rockfish								
Whole fish	0.04	1.73	0.17	0.46	0.71	0.74	0.33	0.4
Head and gut	4.45	5.04	4.3	2.94	4.58	5.77	5	4.63
Other products	0.01	0.02	0.01	2.14	0	0.04	0.02	0.02

Source: NMFS

Overview of Secondary Processing Activities

During the period covered in this analysis (1995-2003) there were no major secondary processors of these species operating in Alaska. Groundfish harvested in Alaska is most often exported as headed and gutted, although some leaves as whole frozen fish, for example. How much remain in the U.S. and how much is shipped abroad varies from year to year.

5.6.4.2 Product Flows and Markets for BSAI Flatfish, and Rockfish Species

H&G Trawl CP sector currently produces, almost exclusively, high quality whole and head and gut products. Catch is typically processed quickly after it is brought on board, maintaining relatively high quality across the fleet. At times, however, quality may suffer, because of the race for fish, which could compel participants to bring catch on board more quickly than it can be efficiently processed, simple in an effort to maintain share of the total catch. A large majority of the primary processed output of this fleet is shipped to Asia for reprocessing, while a small portion of the output remains in the U.S., going directly to domestic markets. Historically, much of the production that is Asia bound has been shipped to Japan and Korea. In recent years, however, China has played a more prominent role in the reprocessing of groundfish from the H&G Trawl CP sector. In particular, a large portion of the flatfish, Atka mackerel, and AI POP harvested from the BSAI is shipped to China, where it is reprocessed into finished products and then exported to final consumer markets around the world. In addition, some of the various groundfish species are reprocessed in Thailand and Vietnam. After reprocessing, production from the fisheries reaches a variety of markets, including the U.S., Europe, Japan, and other Asian countries.

In addition to these generalities, some greater definition of markets for specific species and products is discernable. While the general pattern of production for the fleet is similar across all species and products, a few specific markets exist for particular products of the sector. In flatfish markets, the size (grade) of the fish is extremely important to the product flow. In general, there are four or five grades of flatfish with each grade having a specific market. Smaller grades (S and M) are shipped directly to Japan where the product is used in lunch boxes. Larger grades (L, 2L, & 3L) are typically first shipped to China for reprocessing before being shipped to the U.S. and European markets. A typical H&G Trawl CP vessel will often processed up to 10 species per trip (including incidental catch species), with four or five grades per species.

Other distinguishable markets have developed for rock sole with roe, Atka mackerel, and AI POP. The major market for rock sole with roe is Japan; most rock sole with roe is shipped frozen whole directly to Japan, where it is reprocessed. Most of this production remains in the Japanese consumer market. Rock sole without roe generally follows the same path as flatfish. Atka mackerel is more popular in Japan and Korea than elsewhere; most of the fleet's production is exported to Japan or Korea for secondary processing and consumption. Nearly all of the AI POP harvested in the BSAI is exported to China, where it is reprocessed and then shipped to Japan for final consumption.

While these production trends can be discerned, on the whole, it is difficult to assess the distribution of the sector's production among consumer markets, as much of the reprocessed fish enters the world market. As a consequence, effects of production of the fleet on consumer markets are far reaching and difficult to estimate.

5.6.5 Community Information

5.6.5.1 Regulatory Context

Analysis of community engagement, dependency, and impacts is guided by National Standard 8 under the Magnuson-Stevens Act, along with associated guidelines. National Standard 8 states that:

Conservation and management measures shall, consistent with the conservation requirements of this [Magnuson-Stevens] Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities and (B) to the extent practicable, minimize adverse economic impacts on such communities (Sec. 301(a)(8)).

The Magnuson-Stevens Act defines a 'fishing community' as "...a community which is substantially dependent on or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew, and United States fish processors that are based in such community" (Sec. 3 [16]). NMFS further specifies in the National Standard guidelines that a fishing community is "...a social or economic group whose members reside in a specific location and share a common dependency on commercial, recreational, or subsistence fishing or on directly related fisheries dependent services and industries (for example, boatyards, ice suppliers, tackle shops)" (63 FR 24235, May 1, 1998). 'Sustained participation' is defined by NMFS as "...continued access to the fishery within the constraints of the condition of the resource" (63 FR 24235, May 1, 1998). Consistent with National Standard 8, this section identifies potentially affected regions and communities through characterization of community engagement with relevant aspects of the fishery and characterizes the nature and magnitude of community dependence on the fishery. To provide a context for subsequent impact analysis, summary information on the relevant engaged and/or dependent communities is also provided.

Additional community or social impact analysis is also required under Executive Order 12898 on Environmental Justice. That analysis is found in Section 6.4 of this document.

5.6.5.2 Community Engagement and Dependence

Community engagement in a particular fishery is typically described through links to one or more fishery sectors, including catcher vessels, catcher processor vessels, floating processors, motherships, and/or shore processors, as well as through a range of support service industry links, such as vessel repair and supply businesses and the like. Dependence is normally described in terms of the relative importance of the specific fishery being considered relative to the overall fishery activities that take place within a

region or community as well as the relative role of fishery activities to the overall economic or social structure of a given region or community. Relatively recent and detailed characterizations of patterns of community and regional engagement in and dependency on the North Pacific groundfish fishery have appeared in the *Alaska Groundfish Fisheries Final Programmatic Supplemental EIS* (NMFS 2004), *Sector and Regional Profiles of the North Pacific Groundfish Fishery* (Northern Economics and EDAW 2001), and in a technical paper (Downs 2003) supporting the *Final EIS for Essential Fish Habitat Identification and Conservation in Alaska* (NMFS 2005). This section will provide limited additional information specific to those aspects of the fishery potentially affected by the proposed management alternatives.

5.6.5.3 Community Engagement

As noted in sector discussions above, however, current fishery efforts subject to change under the currently proposed management alternatives being analyzed in this document are exclusively concentrated in the H&G trawl CP sector. Therefore, the discussion in this section will concentrate on the ties of this sector to specific communities and regions through vessel homeporting and/or ownership links and location of vessel support service activities, as community ties to other sectors, such as catcher vessels, catcher processors other than H&G trawl CPs, floating processors, motherships, and/or shore processors would not be materially affected by the proposed management alternatives.

A review of relevant data from the years 2003, 2004, and 2005 show a total of 28 unique H&G trawl CPs had at least some level of fishing effort in any of the areas potentially affected under any of the alternatives, options, or suboptions. Homeport information from vessel records is one way of looking at the ties of these specific vessels to particular communities but is subject to a number of limitations described in more detail below.

Homeport information from vessel records for these 28 vessels is displayed in Table 5.6-17. This table further breaks out vessels that fished in any of the relevant areas in only one or two of the base years 2003-2005 in comparison to vessels that fished these areas in all three base years. As shown, over half of the participating vessels were homeported in Seattle and over two-thirds of the vessels were homeported outside of the state of Alaska. Among Alaska communities, Dutch Harbor/Unalaska and Juneau represent the homeports with the most consistent fishing effort as measured by number of vessels across all three base years, but Anchorage and Kodiak also show up as having some homeport activity as well.

Table 5.6-17 H&G Trawl CP Homeport Data by Base Year Category

Homeport	Fished in 1 or 2 Base Years (2003, 2004, and/or 2005)		Fished All 3 Base Years (2003-2005)	
	Number of Vessels	Percent of Total Vessels	Number of Vessels	Percent of Total Vessels
Seattle, WA	16	57.1%	12	57.1%
Rockland, ME	3	10.7%	3	14.3%
Dutch Harbor, AK	3	10.7%	3	14.3%
Anchorage, AK	2	7.1%	0	0.0%
Kodiak, AK	2	7.1%	1	4.8%
Juneau, AK	2	7.1%	2	9.5%
Total Vessels	28	100.0%	21	100.0%

Table 5.6-18 provides homeport information on the relevant H&G trawl CP vessels broken out by vessel size class. This table shows while medium class vessels are relatively evenly distributed across the various homeport communities, fully three-quarters of the relevant larger vessels are homeported in Seattle alone.

Table 5.6-18 H&G Trawl CP Homeport Data by Vessel Size Class (Any Base Year)

Homeport	Medium Vessels (60-124.9 ft)		Large Vessels (125 feet +)	
	Number of Vessels	Percent of Total Vessels	Number of Vessels	Percent of Total Vessels
Seattle, WA	3	27.3%	13	76.5%
Rockland, ME	2	18.2%	1	5.9%
Dutch Harbor, AK	2	18.2%	1	5.9%
Anchorage, AK	2	18.2%	0	0.0%
Kodiak, AK	2	18.2%	0	0.0%
Juneau, AK	0	0.0%	2	11.8%
Total Vessels	11	100.0%	17	100.0%

Table 5.6-19 provides information on total revenues by homeport (within the confines of data confidentiality constraints) for H&G trawl CP vessels for the Bering Sea and for the Bering Sea, Aleutian Islands, and Gulf of Alaska fisheries combined. Seattle is the only homeport that can be shown individually, as all other ports either have fewer than three vessels or the locally based fleet is owned by fewer than three entities.

Table 5.6-19 H&G Trawl CP Revenue by Area and by Vessel Homeport

Homeport	Number of Vessels	Bering Sea Revenue, All 3 Base Years (2003-2005)		BS, AI, & GOA Revenue, All 3 Base Years (2003-2005)	
		Revenue	Percent of Revenue	Revenue	Percent of Revenue
Seattle	16	\$213,321,250	59.4%	\$351,744,050	63.8%
Other	12	\$146,018,067	40.6%	\$199,604,427	36.2%
Total	28	\$359,339,317	100.0%	\$551,348,477	100.0%

As mentioned above, however, homeport information from vessel records is of limited analytic utility. This is due to individuals completing vessel documentation with no guidelines on what to enter in the homeport field (e.g., community of residence of vessel owner, port of greatest activity for the vessel, port where vessel spends most off-season time, etc.) so that it is highly likely that homeport does not mean the same thing from vessel to vessel. Knowledge of the industry would indicate that Bering Sea fishing-related H&G trawl CP vessel port activity is even more concentrated in Seattle, and secondarily in Dutch Harbor/Unalaska, than homeport records alone would imply. It is common knowledge, for example, that multiple vessels owned and/or managed by a single entity that are listed as homeported in Seattle have for a number of years been based year-round out of Dutch Harbor/Unalaska, except for infrequent trips to Seattle when major maintenance or repairs are needed. These vessels alone outnumber the vessels listed as actually homeported in Dutch Harbor/Unalaska, such that homeporting records, taken at face value, would tend to understate the activity of these several vessels in Dutch Harbor/Unalaska and overstate their activity in Seattle. It is also common knowledge within the industry that the vessels listed as homeported on the U.S. east coast have operated out of Seattle rather than their listed homeport for a substantial number of years. Further, at least some of the vessels listed as homeported in other Alaska communities are at least as closely tied with Seattle as with those Alaska communities. In general, it is safe to say that port-related activity associated with the Bering Sea fishery pursuits of the relevant component of the H&G trawl CP fleet is highly concentrated in Seattle and Dutch Harbor/Unalaska.

Location of vessel ownership is also sometimes used to ascribe connections of vessels to particular communities, with the reasoning that revenue flows (and therefore a range of direct and indirect economic

and social activity) would tend to follow ownership patterns. Given that ownership relationships are often complex, accessible existing data do not allow a quantitative analysis based on this type of information. Qualitative knowledge of the industry in general and relevant vessels specifically, however, would indicate that ownership ties of the relevant portion of the H&G trawl CP fleet are more heavily concentrated in and around the Seattle area than homeport information may be taken to imply. Further, an ownership analysis of this fleet undertaken for a simultaneously occurring Amendment 80 impact assessment would indicate that nearly all vessels potentially affected by these Bering Sea EFH alternatives have at least some ownership ties to the greater Seattle/Washington inland waters area (or the east coast in the case of three vessels).

In terms of engagement of support service sector businesses by the H&G trawl CP fleet when pursuing Bering Sea fisheries, no third-party data breaking out expenditures of this fleet are readily accessible. According to a recent industry-sponsored expenditure survey of the H&G trawl CP sector (Northern Economics 2006), however, landing taxes as well as community sales, use, and hotel taxes within Alaska are highly concentrated in Dutch Harbor/Unalaska. Further, from other discussions with industry, it appears that a very large proportion of product (perhaps 75 to 90 percent, depending on the operation) produced by the H&G trawl CP fleet from the Bering Sea in general, and the area potentially affected by the proposed alternatives in particular, has in recent years been offloaded in Dutch Harbor/Unalaska. Some Bering Sea offloads to trampers do take place elsewhere, such as offloads for yellowfin sole at anchor in calm waters around St. Paul (mostly to foreign flag trampers that then typically go to Dutch Harbor/Unalaska to clear customs). According to industry sources, the large majority (perhaps between 60 to 90 percent, again depending on the operation) of shipments occur via tramper, with the balance moving by container vessel. In addition to activity at the shipping enterprises themselves, offloading and shipment-related activity in Dutch Harbor/Unalaska require the use of locally based vessel pilots, company agents, and stevedores and related enterprises.

Dutch Harbor/Unalaska has also traditionally been the location for Bering Sea H&G trawl CP fleet refueling, re-supply (including groceries), crew changes, and other in-region support as needed, including gear storage, logistical support, and use of local cold storage capacity during peak seasons, among other types of support. In recent years, the overall season has lasted from late January through mid to late September, with frequent port calls common for given vessels during this time. A number of H&G trawl CP vessels, irrespective of homeport and/or ownership community, also spend the off-season in Dutch Harbor/Unalaska, leaving the community only for active fishing periods or to return to Seattle for major maintenance and repair needs. It is important to note that while offloading does also occur near St. Paul, this activity does not take place in the community as it does in Dutch Harbor/Unalaska, nor does St. Paul provide substantial support services to the fleet outside of serving as a staging area for crew changes, with crew ferried out to (and back from) the H&G trawl CP in small boats as the larger vessels do not tie up at community docks. St. Paul also sees at least some limited fuel and light supply sales as well. Other communities along the western coast of mainland Alaska may also act as locations for crew changes in a similar manner similar to St. Paul, including Togiak and Platinum. None of these communities, however, provide support services to the fleet in the diverse ways or on the order of magnitude that is seen in Dutch Harbor/Unalaska.

In terms of the potential for other community engagement once shipment of product from Dutch Harbor/Unalaska takes place, industry sources indicated that foreign flag trampers typically move product to China (for secondary processing and subsequent reshipping to many points around the world, including elsewhere in Asia, Europe, and the United States), Japan (for consumption within that country), and Korea (for either consumption within the country or subsequent reshipment abroad). Domestic trampers typically move product along the west coast of North America into Canada and the United States. Container vessels typically move product to Asia, Europe, or Seattle. Domestic U.S. shipments, whether by domestic tramper or container, typically consist of rex sole headed to selected urban markets, and a range of soles and cod fish to east coast markets. Reportedly less product ships directly to domestic ports

from Dutch Harbor/Unalaska than in the past, but more product reaches the United States after secondary processing in China than was previously the case. With the de-emphasis on domestic secondary processing, community engagement with the fishery outside of Alaska or Seattle is perhaps less concentrated in specific locales than was previously the case, although overall domestic economic returns may in fact have increased during this time.

While Adak has grown in importance as a support port for the H&G trawl CP fleet in recent years, this support has been largely associated with the Aleutian Islands fishery activity rather than Bering Sea area activity. Similarly, support activity for this fleet also occurs in Kodiak, but this activity is more closely associated with Gulf of Alaska fisheries than Bering Sea fisheries affected by the proposed management alternatives.

In terms of ties between crew/employees and specific communities, earlier work indicates that for the H&G trawl CP sector as a whole, much of crew recruiting is done with greater Seattle as a point of hire, although it is not uncommon for newspaper advertisements for open positions to be placed in other urban markets throughout the Pacific Northwest and other urban centers such as Denver, Minneapolis, or Chicago. Individual employees are commonly drawn from several states along the west coast and in the Pacific Northwest area of the United States, as well as from areas outside the country, including Mexico, South America, Southeast Asia, and Russia. For those several vessels with CDQ agreements, the majority of these agreements commonly stipulate employment goals whereby a number of crew positions are targeted to be filled by Alaska CDQ community residents, but is not apparent in the available data how many of these hires have taken place on the vessels potentially affected by the various management alternatives. As in a number of other sectors, vessel crew positions tend to be relatively stable. While no independent data are accessible to track these trends, interviews with industry suggest, in contrast to some other CP sectors, turnover rate among processing crew is also relatively low. Industry representatives suggest that this phenomenon may be related to the relatively small crew sizes, a more varied catch, and the degree of expertise required to successfully process many different species of fish over the course of a season. Information is not available for the specific vessels potentially affected by the proposed alternatives, but it is assumed that they follow similar employment patterns, such that crew employment and income are not tightly concentrated in any particular community within or outside of the greater Seattle area.

5.6.5.4 Community Dependence

As noted in the engagement discussion, most activity associated with the potentially affected Bering Sea H&G trawl CP fleet accrues to Seattle, Washington and Dutch Harbor/Unalaska, Alaska. Additionally, based on homeport information, some additional activity may accrue to Anchorage, Kodiak, and Juneau, Alaska as well as to Rockland, Maine.

Anchorage, Kodiak, Juneau, and Rockland

Anchorage, Kodiak, and Juneau are relatively large and, especially by Alaska standards, relatively economically and socially diversified communities. Located on the mainland in south-central Alaska, Anchorage is the main urban center of the state, with 269,070 inhabitants as of the 2000 census. Demographically diverse, about 10 percent of the population reported they were Alaska Native/Native American in whole or in part in that census. Anchorage is the state's center of commerce, with most of the state's important economic sectors represented one way or another in community, as the regional headquarters of major business entities if not the site of direct extractive activities. Anchorage is involved in a number of ways with the fishing industry, is home to an active fleet, and in 2000 was home to nearly a dozen processing entities, including small-scale niche processors. In 2000, 773 Anchorage residents held 1,042 commercial fishing permits and 1,388 of its residents were registered as crewmen. A total of 57 resident vessel owners fished federal fisheries that year, with the fleet involved in most Alaskan fisheries (Sepez et al., 2005).

Kodiak, located on Kodiak Island about 250 miles southwest of Anchorage in the Gulf of Alaska, had 6,334 residents as of the 2000 census. Demographically diverse, about 13 percent of the population reported they were Alaska Native/Native American in whole or in part in that census. Kodiak's economy is largely tied to commercial fishing, although it is considerably more diversified than major fishing ports farther west in the Gulf or on the Bering Sea. Kodiak is homeport to the largest fishing fleet in the state and is one of the major processing centers in the state, with multiple large plants. There were 1,569 commercial fishing permits issued to residents of Kodiak in 2000, and a reported 1,263 licensed crew members residing in the community. There were 256 resident vessel owners participating in the federal commercial fisheries that year as well, participating in a full range of fisheries (Sepez et al., 2005).

Juneau is located on Alaska's southeast mainland coast facing Douglas Island in the eastern Gulf of Alaska, approximately 575 miles southeast of Anchorage. As of the 2000 census, Juneau, the state's third largest city, had 30,711 inhabitants. Demographically diverse, about 17 percent of the population reported they were Alaska Native/Native American in whole or in part in that census. As the state's capitol, the public administration sector of the economy predominates, although tourism and commercial fishing are also locally important economic sectors. In addition to having a sizeable local fleet, Juneau was also home to a half-dozen processing plants in 2000. In that same year, 552 Juneau residents held 962 commercial fishing permits, and 466 of Juneau's residents were registered as crewmen. A total of 81 local vessel owners participated in a full range of federal fisheries in 2000 (Sepez et al., 2005).

Rockland is located on Maine's southeast coast, just north of Owls Head and approximately 70 miles east of Portland. As of the 2000 census, Rockland had 7,609 inhabitants, with little demographic diversity as approximately 98 percent of the population reported themselves as white, non-Hispanic in that census. Rockland is officially designated a "micropolitan" area by the U.S. Bureau of the Census, acting as a service center for the surrounding rural population and offering amenities commonly found in more populated, urban centers. Once focused on shipbuilding, commercial fishing and lobstering, and granite quarrying, the economy of Rockland has more recently become dominated by the service industry and tourism.

For Anchorage, Kodiak, and Juneau, the two H&G trawl CP vessels homeported in each community that may be affected by the proposed management alternatives are not themselves a substantial portion of the fishery sector upon which these diversified communities are dependent to greater or lesser degrees, and none of these communities participate in the fisheries as CDQ communities. Further, as developed above, attributing a large portion of affected Bering Sea fisheries activities to homeport locations likely overstates the relative importance of these specific communities. As a result, Anchorage, Kodiak, and Juneau, for the purposes of this specific analysis, will not be further considered as fishery-dependent communities with respect to the proposed management alternatives.

Similarly, Rockland, Maine will not be further analyzed as a potentially fishery-dependent community with respect to the portion of the Bering Sea H&G trawl CP fishery sector that may be affected by the proposed management actions. This is because the only apparent ties of the fishery to that community are ownership/homeport ties of three vessels that reportedly have spent the last several years away from this east coast community.

Dutch Harbor/Unalaska and Seattle

Dutch Harbor/Unalaska is located in the Aleutian Islands, approximately 800 miles southwest of Anchorage and 1,700 miles northwest of Seattle. Unalaska is the 11th largest city in Alaska, with 4,178 residents as of the 2000 census. Demographically diverse, about 9 percent of the population reported they were Alaska Native/Native American in whole or in part in that census. There is relatively little local economic diversification outside of the commercial fishing and closely related industries, but the

community has prospered as the number one port in the country in terms of volume of catch landed annually since 1992, and as either the number one or number two port in the country in terms of annual value of catch landed since 1988. It is clear that, by any definition, contemporary Dutch Harbor/Unalaska is heavily dependent on the commercial fishing industry. The most current, comprehensive baseline commercial fishing community profile for Dutch Harbor/Unalaska was recently prepared for the North Pacific Research Board and the NPFMC (EDAW and Northern Economics 2005), although the earlier produced *Steller Sea Lion Protection Measures Final SEIS* (NMFS 2001) contains additional detailed information on fishing sector demographics.

Specifically, Dutch Harbor/Unalaska is in a unique position with respect to the Bering Sea and Aleutian Islands fisheries. It is the site of both the most intense direct and indirect fishery economic sector activity among all the communities in the region. While having a modest local fleet, more BSAI groundfish and crab are processed in the community than in any other port, and the support service sector is developed to a greater degree in Dutch Harbor/Unalaska than any other community on the Bering Sea. Dutch Harbor/Unalaska is a community whose economy is strongly tied to Bering Sea commercial fisheries in general, as well as the regional community most closely associated with the H&G trawl CP fleet in particular. As a result, Dutch Harbor/Unalaska is considered individually in the subsequent analysis of community impacts potentially resulting from the fishery management alternatives under consideration. Dutch Harbor/Unalaska is not a CDQ member community.

Seattle has a complex relationship to the fishery. Similar to a pattern described in recent NPFMC and NMFS groundfish fishery-related documents (e.g., the *Alaska Groundfish Fisheries Final Programmatic SEIS* [NMFS 2004], *Impacts of the American Fisheries Act* [NPFMC 2001], and the *Steller Sea Lion Protection Measures Final SEIS* [NMFS 2001]), what makes Seattle an analytic challenge, in terms of a community assessment directly related to the Bering Sea H&G trawl CP fishery, is its scale and diversity. As of the 2000 census, the population of the Seattle-Tacoma consolidated metropolitan statistical area was over 3.5 million residents in an area much more demographically and economically complex and diversified than any Alaskan community.

Like its relationship to the North Pacific groundfish fishery in general, Seattle's relationship to the specific potentially affected fisheries is a paradox. When examined from a number of different perspectives, Seattle is arguably more involved in the Alaska groundfish fishery in general and the Bering Sea H&G trawl CP sector in particular, than any other community. One example is the large absolute number of "Seattle" jobs within the fishery compared to all other communities, whether counted in terms of current residence, community of origin, or community of original hire – setting aside where the jobs are actually performed. In this sense, Seattle is more engaged in the potentially affected fisheries than any other community. On the other hand, when examined from a comparative perspective, it could be argued that the fishery is less important or vital for Seattle than for the other communities considered. Using the same example, the ratio of the number of Alaska groundfish fishery-related jobs in greater Seattle compared to the total number of jobs in the same area is quite small in contrast with analogous ratios for the much smaller community of Dutch Harbor/Unalaska. In this sense, Seattle is less dependent on the fishery than perhaps a number of other communities, and certainly less dependent on the fishery at the community level than is Dutch Harbor/Unalaska in particular. It is important to note, however, that the fishery itself, as measured in many ways, is dependent upon Seattle, even if Seattle, as a community, is not dependent upon the fishery (which is not to say that a number of the industry sectors based in Seattle are not dependent upon the fishery). Given these relationships and its high level of engagement in, if not dependency on the relevant fisheries, Seattle is considered individually in the subsequent analysis of community impacts potentially resulting from the fishery management alternatives under consideration.

5.6.5.5 Other Community Considerations

Other Community Considerations

During public testimony before the AP, the issue of the potential for gear conflict between H&G trawl CP vessels operating in proposed (and currently) open trawl areas near some small western Alaska communities and small fishing vessels, especially halibut vessels, from those communities was raised. This concern was brought forward by residents of the Etolin Strait/Kuskokwim Bay area. Information provided by industry would indicate that informal discussions over past perceived gear conflicts in this area have occurred, and an informal working understanding has been reached between industry and the local fishermen, whereby H&G trawl CP vessel operators have voluntarily agreed amongst themselves at present to confine their trawl activities south of certain limitation lines in this area. Public testimony would indicate that local groups want to shape Bering Sea EFH alternatives such that open trawl area boundaries would formally take into account spatial gear conflict avoidance measures in addition to habitat conservation driven goals. For reasons related to their proximity to various alternative open and closed areas detailed in the analysis of alternatives discussion, this issue focuses on the western Alaska communities of Kipnuk, Cheformak, and Platinum. In addition, information on the nearby communities of Mekoryuk, Savoonga, Gambell, Goodnews Bay, Kwigillingok, Umkumuite, Nightmute, and Tanunak is provided (Figure 5.6-2). All of these communities are predominantly and traditionally Yup'ik Eskimo communities.

Saint Lawrence Island

There currently is no non-pelagic trawl effort as far north as St. Lawrence Island. However, in 1997 a large vessel commercial crab fishery was introduced in the area. Subsistence crab harvests began declining and during 1983 commercial vessels reportedly disrupted subsistence seal hunting activities near St. Lawrence (ADF&G 1985). Subsequently a regulation was adopted for the Alaska Board of Fisheries in 1984 to close waters to commercial crab fishing within ten miles of all inhabited islands within the St. Lawrence Island Section (St. Lawrence Island, Little Diomed and King Island) (Kohler and Soong, 2005). The intent of the regulations was to protect stocks targeted by local subsistence fishers and reduce impacts on marine mammal subsistence harvests.

Villagers of Little Diomed and St. Lawrence Island have traded and sold winter caught blue king crab to residents of Nome and other villages for years. ADF&G does not have an accurate estimate of the magnitude of this trade. Remoteness of villages contributes to the lack of harvest records. Current regulations allow a commercial harvest and sale of king crab from near shore during winter (Kohler and Soong, 2005).

The area near St. Lawrence Island is part of the generalized winter (November through March) migration pattern of the Bowhead Whale. Areas to the north and west of St. Lawrence Island are used by the Alaska Eskimo whaling community for hunting and search areas (North Slope Borough, 2003).

Western Communities

Some Western communities in the vicinity of the open area alternative and Options 2 & 3 in this analysis have utilized halibut, herring, salmon, marine mammals and other marine resources as a portion of their subsistence catches throughout recorded history. The local economy of these communities is characterized as ‘ a mixed, subsistence-based economy’ referring to their use of local, wild resources obtained by hunting and fishing with some income security by primarily seasonal and intermittent wage employment, combined with the commercial sale of halibut, salmon, herring, and furs, and cottage industries (Wolfe and Walker 1987). Mekoryuk, on Nunivak Island has several residents with commercial halibut permits, and the town has a halibut plant active in the community. Over 200 short tons of herring were harvested annually for subsistence use by communities in the Nelson and Nunivak Island districts and the Kuskokwim Bay area combined (ADF&G 1991). ADF&G does not have an accurate estimate of the magnitude of subsistence use in these areas. Remoteness of villages contributes to the lack of harvest records. Specific catch and locations of harvested marine mammals are not provided in this summary.

Additional information of the socioeconomic environment relative to this action is provided in Chapter 5 of this analysis. A detailed review of the management of groundfish fisheries is provided in the PSEIS (NMFS 2004a), and the environmental effects of the BSAI groundfish fisheries are explained in detail the 2006 TAC specifications EIS (NMFS 2006).

Kipnuk is located on the west bank of the Kugkaktlik River in the Yukon-Kuskokwim Delta. It is 85 miles southwest of Bethel, a few miles inland from the Bering Sea, and about 490 miles west-southwest of Anchorage. In 2000, Kipnuk had a total of 644 residents, of whom 98 percent reported they were Alaska Native or Native American in whole or in part. The economy of Kipnuk is based on a combination of commercial fishing and subsistence fishing and hunting, with most employment opportunities being seasonal. In 2000 there was no processing plant in the community, nor were there any registered landings. In that same year, 97 local residents held 135 commercial fishing permits, there were 82 registered crewmembers in the community, and there were seven local vessel owners operating in federal fisheries. Chefornak also participates in Bering Sea fisheries as a member of the Coastal Villages Region Fund CDQ group (Sepez et al. 2005).

Chefornak is located on the south bank of the Kinia River, near its mouth at Etolin Strait. It is 98 miles southwest of Bethel and 490 miles west-southwest of Anchorage. As of the 2000 census there were 394 residents of Chefornak, of whom 98 percent reported they were Alaska Native or Native American in whole or in part. Commercial fishing is a mainstay of the local economy that otherwise offers relatively limited employment opportunities, and subsistence fishing and hunting are important to nearly all residents of the community. In 2000 there was one commercial fishing processing plant in Chefornak. In that same year, 27 local residents held a total of 56 commercial fishing permits, there were 21 registered crew members in the community, and there were 8 vessel owners residing in the community who operated in Federally managed fisheries. Chefornak also participates in Bering Sea fisheries as a member of the Coastal Villages Region Fund CDQ group (Sepez et al. 2005).

Platinum is located on the south spit of Goodnews Bay on the Bering Sea coast. It is 123 miles southwest of Bethel. In 2000, there were 41 residents in 17 households, of whom 93 percent reported they were Alaska Native or Native American in whole or in part. Commercial fishing is the base of economic activity in Platinum, with many residents using subsistence resources as a supplement to their incomes. In 2000, there was no processing plant in the community, nor were there any registered landings. In that same year, 9 local residents held a total of 16 commercial fishing permits (10 herring permits and 6 salmon permits), and 7 permits were fished. There were also 7 registered crew members in the community, and 8 vessel owners with operations in Federal fisheries. Platinum also participates in Bering Sea fisheries as a member of the Coastal Villages Region Fund CDQ group (Sepez et al. 2005).

Mekoryuk is located on the mouth of Shoal Bay, on the north shore of Nunivak Island in the Bering Sea. It is about 30 miles off the coast, about 149 air miles west of Bethel and 553 air miles west of Anchorage. In 2000, there were 210 reported residents of Mekoryuk, of whom nearly 97 percent reported they were Alaska Native or Native American in whole or in part. Employment in the community is provided primarily by the school, City, Village Corporation, commercial fishing, construction, and service industries. A major employer is the Nuniwarmiut Reindeer and Seafood Products Company. Many families also earn income from Native crafts or trapping, and most are involved in subsistence and have fish camps. In 2000, a total of 113 commercial fishing permits were issued to residents of the community (86 of which were fished), and 50 residents were licensed crew members. A total of 51 permits were issued for commercial halibut fishing, 60 permits for herring, and one permit each for saltwater finfish and salmon fishing. Also in 2000, 37 residents owned vessels involved in Federal fisheries. No vessels delivered landings to Mekoryuk in 2000; however, a halibut plant is now active in the community. The plant is operated by Coastal Villages Region Fund, the CDQ group representing the community (Sepez et al. 2005).

Goodnews Bay is located in Goodnews Bay, a small inlet off Kuskokwim Bay in the Bering Sea. It is approximately 116 air miles south of Bethel and 400 miles west of Anchorage. In 2000, Goodnews Bay had 230 residents and 71 households, of which 94% reported being Alaska Native or Native American in whole or in part. The economy in Goodnews Bay is based primarily on subsistence hunting and fishing, and a significant number of residents also hold commercial fishing permits. The salmon and herring fisheries of Goodnews Bay are particularly important, with a total of 28 salmon permits and 23 herring permits held by residents of the community. In addition, one halibut permit was issued in 2000. In 2000, there were 9 vessels with operations in non-Federal fisheries that resided in the community, and 37 registered crew members. There are no docking facilities in the community, although locals use boats and skiffs extensively during the summer months. In 2000, there were also no commercial fish processors located in Goodnews Bay, and therefore, no registered landings. The community is part of the Coastal Villages Region Fund CDQ group (Sepez et al. 2005).

Savoonga is located on the northern coast of St. Lawrence Island in the Bering Sea, 164 miles west of Nome. It lies 39 miles southeast of Gambell. When the Alaska Native Claims Settlement Act (ANCSA) was passed in 1971, Gambell and Savoonga decided not to participate, and instead opted for title to the 1.136 million acres of land in the former St. Lawrence Island Reserve. The island is jointly owned by Savoonga and Gambell. In 2000, Savoonga had 643 residents, of which 96% reported being Alaska Native or Native American in whole or in part. The economy of Savoonga is largely based upon subsistence hunting of marine mammals and fish, with some cash income. Eight residents hold commercial fishing permits, and Norton Sound Seafood Products operates in Savoonga. Reindeer harvests occur, but the herd is not managed. Fox are trapped as a secondary source of income, and residents are known for their quality ivory carvings (Alaska DCCED, 2007). Savoonga is part of the Norton Sound Economic Development Corporation CDQ group.

Gambell is located on the northwest cape of St. Lawrence Island, 200 miles southwest of Nome, in the Bering Sea. The City is 36 miles from the Chukotsk Peninsula, Siberia. In 2000, Gambell had 649 residents, of which 96% reported being Alaska Native or Native American in whole or in part. Like Savoonga, the economy in Gambell is largely based upon marine subsistence harvests: seal, walrus, fish and bowhead and gray whales. Fox are trapped as a secondary source of cash income, and ivory carving provides income as well. Some reindeer roam free on the island, but most harvesting occurs out of Savoonga. Ivory carving is a popular source of income (Alaska DCCED, 2007). Gambell is also part of the Norton Sound Economic Development Corporation CDQ group.

Kwigillingok is on the western shore of the Kuskokwim Bay on the Bering Sea, near the mouth of the Kuskokwim River. It is 77 miles southwest of Bethel and 388 miles west of Anchorage. In 2000, Kwigillingok had 338 residents in 73 households, 98% of which recognized themselves as being Alaska Native or Native American in whole or in part. The economy in the community is dominated by commercial fishing, particularly the herring and salmon fisheries, and most residents also rely on subsistence hunting and fishing. In 2000, there were 14 resident vessel owners with operations in State-managed fisheries and 1 resident vessel owner involved in Federal fisheries. There were also 26 registered crew member, and 37 local residents who held a total of 53 commercial fishing permits (7 halibut; 20 herring; 26 salmon). In 2000, there were no commercial fish processors and thus no registered landings. The community is part of the Coastal Villages Region Fund CDQ group (Sepez et al. 2005).

Nightmute is located on Nelson Island in the Bering Sea, about 100 miles west of Bethel. In 2000, there were 208 residents in 47 households, with 95% of the population recognizing themselves as all or part Alaska Native or Native American. Commercial fishing is a major part of the economy in Nightmute, with the local school system being another major source of employment. Similar to the previous communities discussed, most Nightmute residents also supplement their incomes with subsistence hunting and fishing. In 2000, 15 vessel owners with operations in Federal fisheries resided in Nightmute,

along with 3 vessel owners with operations in State-managed fisheries. In addition, there were 22 registered crew members in the community, and 31 residents held a total of 44 commercial fishing permits (20 halibut; 18 herring; 6 salmon). In 2000, there were no commercial fish processors and thus no registered landings. The community is part of the Coastal Villages Region Fund CDQ group (Sepez et al. 2005).

Tununak is also located on Nelson Island (northeast coast) on a small bay. The community is 115 miles northwest of Bethel and 519 miles northwest of Anchorage. In 2000, there were a total of 325 residents, of whom 97% recognized themselves as all or part Alaska Native or Native American. The Tununak economy centers around commercial fishing, school district employment, village council employment, and income generated from trapping and crafts. Subsistence is also a significant part of the community, including marine mammals and fish. In 2000, 78 commercial fishing permits were held by residents (41 halibut; 33 herring; 1 saltwater finfish; 3 salmon), and 23 residents were licensed crew members. Twenty-eight vessel owners participated in Federal fisheries; 2 vessel owners participated in the salmon fishery. No vessels delivered to Tununak in 2000, although a processor is present. Coastal Villages Seafood, Inc, a subsidiary of the CDQ group, processes halibut and salmon. The community is part of the Coastal Villages Region Fund CDQ group (Sepez et al. 2005).

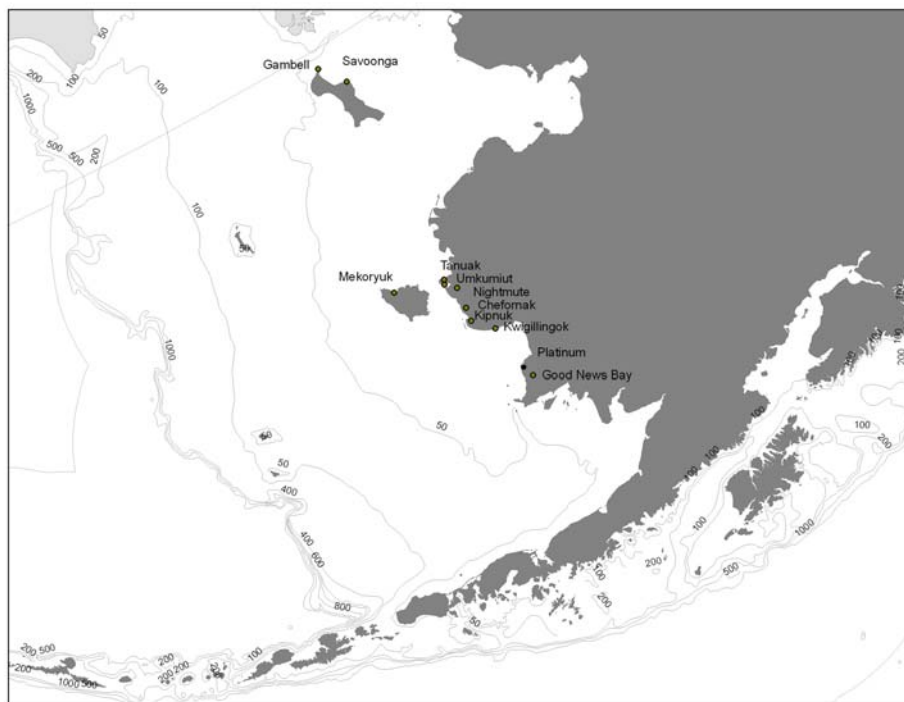


Figure 5.6-2. Location of 11 western communities of Kipruk, Cheforvak, and Platinum. In addition, information on the nearby communities of Mekoryuk, Savoonga, Gambell, Goodnews Bay, Kwigillingok, Umkumiute, Nightmute, and Tanunak,

5.6.6 Description of the Western Alaska Community Development Quota (CDQ) Program

This section provides general information about the Western Alaska CDQ Program. More detailed information about the CDQ Program and CDQ groups may be found at: the NOAA Fisheries, Alaska Region web site at <http://www.fakr.noaa.gov/cdq/default.htm>, the Alaska Department of Commerce, Community and Economic Development web site at <http://www.dced.state.ak.us/bse/CDQ/cdqstats.htm>, and the Bering Sea Fishermen’s Association’s web site <http://www.cdqdb.org>.

5.6.6.1 Establishment and Purpose of the CDQ Program

The Western Alaska CDQ Program was created in 1992 as part of the inshore/offshore allocations of pollock in the BSAI fishery. As stated in the BSAI Groundfish FMP, the purpose of the CDQ Program is as follows:

The Western Alaska Community Development Quota Program is established to provide fishermen who reside in western Alaska communities a fair and reasonable opportunity to participate in the Bering Sea/Aleutian Islands groundfish fisheries, to expand their participation in salmon, herring, and other nearshore fisheries, and to help alleviate the growing social economic crisis within these communities. Through the creation and implementation of community development plans, western Alaska communities will be able to diversify their local economies, provide community residents with new opportunities to obtain stable, long-term employment, and participate in the Bering Sea/Aleutian Islands fisheries which have been foreclosed to them because of the high capital investment needed to enter the fishery.

As implemented, the purpose of the CDQ Program is to help western Alaska communities strengthen their local economies by investing in both commercial fisheries and other fisheries-related projects, and to provide residents with education, training, and job opportunities in the fishing industry. The original CDQ Program regulations went into effect on November 18, 1992 and have been amended numerous times since then. In 1996, the Magnuson-Stevens Act institutionalized the program as part of the BSAI Groundfish FMP.

The fishery resources allocated under the CDQ Program are under Federal jurisdiction, but the program is jointly managed by NOAA Fisheries and the State of Alaska (State). The State is primarily responsible for the day-to-day administration and oversight of the economic development aspects of the program and for recommending quota allocations for each CDQ applicant. NOAA Fisheries is primarily responsible for fisheries management aspects of the groundfish and halibut CDQ fisheries and broad program oversight. The specific criteria used to evaluate applications and make CDQ allocation recommendations are implemented in State regulations. The Alaska Regional Administrator, NOAA Fisheries, acting on behalf of the U.S. Secretary of Commerce, and the Council review the State's recommendations and make the final decision about allocations among CDQ applicants.

5.6.6.2 CDQ Communities and Groups

The CDQ Program communities are predominantly Alaska Native villages. The communities are typically remote, isolated settlements with few natural assets with which to develop and sustain a viable diversified economic base. Basic community and social infrastructure is often underdeveloped or lacking, and transportation and energy costs are high. Historically, economic opportunities have been few, unemployment rates have been chronically high, and these communities (and the region) have been economically depressed.

While the CDQ communities border very productive fishing grounds, they were unable to exploit this proximity as the BSAI groundfish fisheries developed. The full development of the domestic fishing and processing industry in these fisheries occurred relatively quickly between 1976 and 1990. However, the very high capital investment required to compete in these fisheries precluded small communities from participating in them. The CDQ Program serves to ameliorate some of these circumstances by extending an opportunity to qualifying communities to directly benefit from the productive harvest and use of these publicly owned resources.

Currently, 65 communities participate in the CDQ Program, based on eligibility criteria listed in both the Magnuson-Stevens Act and Federal regulation. The eligible communities have formed six non-profit corporations (CDQ groups) to manage and administer the CDQ allocations, investments, and economic

development projects. The six CDQ groups are Aleutian Pribilof Island Community Development Association (APICDA), Bristol Bay Economic Development Corporation (BBEDC), Central Bering Sea Fishermen's Association (CBSFA), Coastal Villages Region Fund (CVRF), Norton Sound Economic Development Corporation (NSEDC), and Yukon Delta Fisheries Development Association (YDFDA).

5.6.6.3 CDQ Program Allocations, Harvest, and Value

Since 1992, the CDQ Program has expanded several times and now includes allocations of pollock, halibut, sablefish, crab, all of the remaining groundfish species (cod, Atka mackerel, flatfish, and rockfish), and prohibited species catch allowances (i.e., as bycatch allowances for salmon, halibut, and crab). CDQ Program allocations vary by species. While originally set at 7.5 percent, Congress increased the pollock CDQ allocation to 10 percent in 1998 as part of the American Fisheries Act. The percentage of other catch limits allocated to the CDQ Program (as CDQ reserves) is determined by: the BSAI Crab Rationalization Program (10 percent of crab species, except for Norton Sound red king crab, which is 7.5 percent. See 70 FR 10174, March 2, 2005); the BSAI FMP for all other groundfish and prohibited species (7.5 percent, except 20 percent for fixed gear sablefish); and, 50 CFR 679 for halibut (20 percent to 100 percent, depending on management area).

Establishment of the annual groundfish CDQ reserves is an extension of the groundfish harvest specifications process. Once annual BSAI species categories and TAC amounts are established, an initial TAC amount of 85 percent of the aggregated BSAI TACs is calculated for all species, except pollock and fixed gear sablefish. The remaining 15 percent of annual TAC is equally split between the CDQ Program and a non-specified groundfish reserve. This is the basis for the annual 7.5 percent groundfish CDQ reserve, which is then apportioned back among the TAC categories in place for a given year, based on the proportion each TAC category contributes to the aggregate BSAI TAC limit. The BS and AI pollock TACs each contribute 10 percent to CDQ reserves, while the fixed gear sablefish TAC contributes 20 percent to a CDQ reserve. A parallel process is used to allocate 7.5 percent of each BSAI prohibited species catch limits to the CDQ Program as prohibited species quota (PSQ). Annual groundfish CDQ and PSQ allocations for 1998 to 2004 are available at the NOAA Fisheries web site cited in the introductory paragraph to Section 3.3.5. The process establishing PSQ reserves is similar.

Each CDQ group is eligible to receive a percentage allocation of each CDQ reserve and prohibited species quota (PSQ) reserve as recommended by the State and approved by the NOAA Fisheries. The percentages can vary by CDQ group, management area, and species. Such percentages are reviewed and amended on a periodic basis. Under the current regulations, all groundfish (except for squid and "other species," as discussed in Section 3.4) and prohibited species caught by vessels fishing for a particular CDQ group accrues against that group's CDQ and PSQ allocations. Besides squid and "other species," none of the groundfish or prohibited species caught in the groundfish CDQ fisheries accrue against the non-CDQ apportionment of TAC or PSC limits. The CDQ groups must manage their catch to stay within each of their annual CDQ allocations, as they are prohibited from exceeding them. This may have a bearing on how successfully or aggressively CDQ groups prosecute some target species.

The 2004 CDQ allocations included approximately 187,000 metric tons of groundfish, over 2 million pounds of halibut, and approximately 3 million pounds of crab. CDQ allocations provide a revenue stream for CDQ groups in a variety of ways, including the direct catch and sale of quota, leasing quota to various harvesting partners, and income from investments that are funded by the proceeds of harvesting annual allocations. The six CDQ groups had total revenues in 2003 of approximately \$87 million, primarily from pollock royalties. Since 1992, the CDQ groups have accumulated net assets worth approximately \$231 million (as of 2003), including ownership of small local processing plants, catcher vessels, and catcher/processors that participate variously in the groundfish, crab, salmon, and/or halibut fisheries.

One of the most tangible direct benefits of the CDQ Program has been employment opportunities for western Alaska village residents. CDQ groups have had some successes in securing career track

employment for many residents of qualifying communities, and have opened opportunities for non-CDQ Alaskan residents, as well. Jobs generated by the CDQ program included work aboard a wide range of fishing vessels, internships with the business partners or government agencies, employment at processing plants, and administrative positions. In recent years, annual CDQ-related employment has ranged from 1,339 people in 1999, to 2,080 in 2003. CDQ wages in those same years has ranged from \$10.6 million to \$11.9 million. CDQ groups continue to explore the means to provide both continuing and additional employment opportunities for local residents.

5.7 Analysis of the Alternatives

This analysis of the alternatives begins with a treatment of impact categories not thought to be affected by the proposed alternatives. This is done to simplify and focus the discussion on those impact categories where impacts, either positive or negative, are likely. Finally, this section concludes with a summary of the analyses of the alternatives.

The analyses of the direct economic impact of the area closures on fleet sectors considered in the alternatives uses a “revenue at risk” approach. Revenue at risk is the amount of gross revenue estimated to be at risk for the fleet sector for each alternative compared with the estimated total gross revenue generated by the fleet sector with all gear types, all retained species and all areas off Alaska. Under each alternative the revenue at risk is that portion of total gross revenue that has been caught in an area proposed for closure under the Bering Sea Habitat Conservation measures. Revenue at risk can be mitigated, to the extent possible, by relocating fishing effort from the proposed closed area to fishing grounds remaining open under the proposed habitat conservation measures. For the H&G Trawl CP sector, baseline total gross revenue and gross revenue at risk are calculated by applying round weight equivalent first whole prices to retained round weight catch by species. Round weight equivalent first whole prices are estimated by NMFS from fleet reported product mix and values by species. A similar revenue at risk analyses was conducted in the evaluation of EFH alternatives and is described in greater detail in the EFH EIS (NMFS, 2005).

The analyses of proposed gear modification impacts on the fleet sectors estimates additional gear, maintenance and operational costs where possible. Estimates of additional costs were derived from gear manufacturers that supply the H&G Trawl CP fleet sector.

5.7.1 Impact Categories Not Affected by the Alternatives

5.7.1.1 AFA Trawl CP and CV Sectors

Other trawl sectors that are qualified to harvest flatfish in the BS include the AFA Trawl CP and the AFA Trawl CV fleets. Although both fleets could potentially be affected by the proposed action to protect BS fishery habitat, the volume and gross revenue from flatfish harvests in the BS by both of the AFA Trawl fleet sectors is minor relative to their baseline first wholesale and ex-vessel gross annual revenues produced in their main target fisheries for pollock and Pacific cod. The analyses of the alternatives for the proposed action produced no gross revenue at risk for these fleet components over the 2003 to 2005 period examined.

5.7.1.2 CDQ Fisheries

Annual CDQ allocations include flatfish that are typically harvested under contract by vessels in the H&G Trawl CP sector. The CDQ flatfish allocations are harvested in the same general area as the open access flatfish harvests. However, analyses of the alternatives for the Bering Sea Habitat Conservation action produced no gross revenue at risk for the CDQ harvest of flatfish over the 2003 to 2005 period examined.

5.7.1.3 Impacts on Other Fleet Components

Area closures proposed as part of the Bering Sea Habitat Conservation action under Alternative 2, 3 and 4, may require the H&G Trawl CP sector in the BS to mitigate first wholesale gross revenue at risk by transferring fishing effort from the closed area to the area remaining open. The transfer of fishing effort could potentially affect other fleet components fishing in the same area such as the AFA Trawl CP, AFA Trawl CV, Fixed Gear CP and Fixed Gear CV fleets. However, the analyses of the alternatives for the proposed action produced relatively small catch volumes and gross revenues at risk, that any impacts on other fleet components from mitigation actions by the H&G Trawl CP sector would be negligible.

5.7.2 Impacts of the Alternatives

5.7.2.1 Alternative 1: Status Quo/No Action

Under the status quo, no additional measures would be taken to conserve benthic habitat in the Bering Sea at this time. There would be no changes to existing open fishing area and no gear modifications to non-pelagic trawl gear would be required. There would be no revenue at risk or increased gear or operational costs under Alternative 1. Economic impacts would be associated with reduced pristine habitat for managed species, which may reduce fish populations and catches in the future.

5.7.2.2 Alternative 2: Open Area Approach

This alternative would prohibit trawling with bottom trawl gear outside of a designated open area. Bottom trawling would be thus prohibited in the northernmost shelf area and the deepwater basin area of the Bering Sea. Alternative 2 would close roughly an area at 366,390 sq. km. or 46.3% of the 791,731 sq. km. of BS benthic habitat currently open to bottom trawling (shelf area to the 1,000 m depth contour) and all of the 160,938 sq. km. BS basin (depth >1,000 m). Economic benefits may result should fish populations increase as a result of protecting relatively pristine benthic habitat used by fish.

Table 5.7-1 provides the revenue and percent of baseline revenue at risk at risk under Alternative 2; these values are approximate, as the final boundary in the vicinity of Etolin Strait remains undefined. From 2003 through 2005, first wholesale gross revenue at risk from the proposed area closure area under Alternative 2 averaged \$1.71 million or 0.85% of status quo gross revenue and ranged from a low of \$0.22 million or 0.09% of status quo gross revenue in 2005 to a high of \$3.66 million or 1.87% of status quo gross revenue in 2004. Flatfish and Pacific cod represented the largest first wholesale gross revenue at risk over the three-year period. Retained flatfish represented the largest first wholesale gross revenue at risk with \$3.04 million or 3.62% of the \$83.98 million status quo first wholesale gross revenue in 2004 and \$0.98 million or 1.34% of the \$72.72 million of status quo first wholesale gross revenue in 2003. In 2004, retained Pacific cod revenue at risk represented \$0.51 million or 1.09% of the \$46.39 million status quo first wholesale revenue. In 2005, no one species had more than \$0.14 million or 0.12% of first wholesale gross revenue at risk under area closures proposed by Alternative 2. The first wholesale gross revenue at risk under the proposed action could be mitigated by additional fishing effort in the area remaining open to NPT.

In terms of potential community impacts accruing from impacts to H&G trawl CP vessels homeported in the various communities, the level of revenue at risk as a percent of total combined revenues from all Bering Sea, Aleutian Islands, and Gulf of Alaska fisheries, by vessel, may be examined. Two vessels had 5 percent or more of this combined revenue at risk for any year 2003-2005 under Alternative 2. Both vessels had revenue at risk at this level only for 2004, both had revenues at risk less than 7 percent, and both were homeported in communities other than Seattle. A total of 15 vessels had a combined revenue at risk greater than or equal to 1 percent but less than 5 percent in any of the base years (3 in 2003 only [but one of these vessels had more than 5 percent revenue at risk in 2004], 2 in 2003 and 2004, 10 in 2004 only, and none in 2005). Of the vessels with combined revenue at risk greater than or equal to 1 percent

but less than 5 percent, 8 were homeported in Seattle and 7 were homeported in other communities. Due to the combination of relatively low levels of dependence by these specific homeport communities outside of Seattle on this sector (as detailed in Section 5.6.5 of the RIR) and the low levels of revenue at risk, no significant community impacts related to vessel homeport activities are foreseen, nor are significant community impacts considered likely in Seattle simply due to the relatively low level of revenues at risk.

In terms of potential community impacts accruing to Bering Sea regional communities through fleet related support service activities, H&G trawl CP vessel revenue at risk for the Bering Sea fisheries alone is likely more relevant than combined revenue at risk for Bering Sea, Aleutian Island, and Gulf of Alaska fisheries. Only 1 vessel had 10 percent or more of their Bering Sea revenue at risk for any year 2003-2005 (this occurred in 2003 and revenue at risk was less than 11 percent). A total of 6 vessels had 5 percent or more but less than 10 percent of Bering Sea revenue at risk for any year 2003-2005 under Alternative 2 (1 in 2003 only, 1 in 2003 and 2004, 4 in 2004 only, and none in 2005). A total of 7 vessels had a Bering Sea revenue at risk greater than or equal to 1 percent but less than 5 percent in any of the base years (1 in 2003 only [but this same vessel more than 5 percent revenue at risk in 2004], 6 in 2004 [one of which had more than 5 percent revenue at risk in 2003 and another of which had more than 10 percent revenue at risk in 2003], and none in 2005). Regional community support sector impacts, if any, would accrue almost exclusively to Dutch Harbor/Unalaska. While some individual vessel operations may experience a small but noticeable impact on Bering Sea revenues if revenues at risk cannot be recouped or at least partially offset through a redirection of fishing effort, given the small overall proportion of Bering Sea revenue at risk on a fleet-wide or multi-sector basis, however, significant support service related impacts in Dutch Harbor/Unalaska are considered unlikely.

In addition to the evaluation of the effects on current fisheries, a designation of an open area could have future effects, depending on fish stock distribution and fishing distribution. Potential economic impact from the open area alternative depends to some extent on how and where fish stocks and fishers change their distributions in the future. If the fish distribution remains static, the impacts will be negligible. However, if a substantial portion of the flatfish and cod stocks redistribute outside of the open area in the future – and assuming that other stocks don't take their place – there could be some economic impacts to the fleet if they were unable to catch the TACs.

In February, the Advisory Panel requested that the analysis consider a scenario whereby a substantial portion of the fish biomass moved north, out of the proposed open area. Commercial groundfish species most likely to move into this area include rock sole, arrowtooth flounder, flathead sole, and Pacific cod. Because the current TAC for rock sole, arrowtooth flounder, and flathead sole are so much lower than the ABC, one would conclude that catches for these species under an open area approach could still be much greater than now. For reference, the 2007 catch specifications (mt) for these species were rock sole: ABC=198,000 and TAC=55,000; arrowtooth flounder: ABC =158,000 and TAC=20,000; flathead sole: ABC=79,200 and TAC=30,000. For Pacific cod, where TAC is set at ABC (176,000 mt, minus AI state water apportionment), only 2.3% of the TAC is allocated to AFA trawl catcher processors and 13.4 % of the TAC allocated to non-AFA trawl catcher processors. The remaining cod is allocated to non-trawl sectors, which would not be impacted under an open area approach, and to trawl catcher vessel sectors (22.1%), which would be only minimally impacted under the open area alternative given the distance to Dutch Harbor. One would not expect catches – or catch rates -- to be reduced by the open area alternative, at least in the foreseeable future, unless the bycatch rates of halibut relative to target species increase. However, because there are many assumptions built into the scenario of future halibut bycatch rates (future halibut biomass and distribution, future effects of flatfish c/p cooperatives, other management measures, etc.), it is impossible to speculate on what might or might not occur with bycatch rates relative to the open area alternative.

Table 5.7-1 Total H&G Trawl CP status quo first wholesale gross revenue and first wholesale gross revenue at risk under Alternative 2

Year	Revenue at Risk Category	Alternative 2 - Status Quo	Alternative 2 Option 2 Suboption Adj - Revenue at Risk	Alternative 2 Option 2 Suboption Adj - % of Status Quo Revenue at Risk
	Industry Sector			
2003	H&G Trawl CP	\$161.72	\$1.24	0.77%
2004	H&G Trawl CP	\$195.51	\$3.66	1.87%
2005	H&G Trawl CP	\$247.96	\$0.22	0.09%
Average	H&G Trawl CP	\$201.73	\$1.71	0.85%
	Retained Species			
2003	Atka Mackerel	\$21.87	\$0.00	0.00%
	Flatfish	\$72.72	\$0.98	1.34%
	Pacific Cod	\$35.91	\$0.23	0.63%
	Pollock	\$10.68	\$0.03	0.30%
	Rockfish	\$15.31	\$0.00	0.01%
	Sablefish	\$4.18	\$0.00	0.00%
	Other	\$1.06	\$0.00	0.00%
2004	Atka Mackerel	\$29.08	\$0.02	0.09%
	Flatfish	\$83.98	\$3.04	3.62%
	Pacific Cod	\$46.39	\$0.51	1.09%
	Pollock	\$14.36	\$0.09	0.64%
	Rockfish	\$17.14	\$0.00	0.01%
	Sablefish	\$4.03	\$0.00	0.01%
	Other	\$0.53	\$0.00	0.00%
2005	Atka Mackerel	\$36.52	\$0.02	0.06%
	Flatfish	\$121.33	\$0.14	0.11%
	Pacific Cod	\$44.30	\$0.05	0.12%
	Pollock	\$15.22	\$0.01	0.06%
	Rockfish	\$25.36	\$0.00	0.00%
	Sablefish	\$4.89	\$0.00	0.00%
	Other	\$0.34	\$0.00	0.00%

5.7.2.3 Alternative 3: Gear Modification Approach

This alternative would require gear modifications for all non-pelagic trawl gear used in flatfish target fisheries. Specifically, this alternative would require discs on non-pelagic trawl sweeps to reduce seafloor contact and/or increase clearance between the sweep and substrate. A performance standard of at least 2.5 inches elevation of the sweep from the bottom would be required.

In side-by side field studies conducted by NMFS, the catch of target flatfish species with the modified gear was not significantly different than the catch of unmodified gear when equipped with 6 to 8 inch

diameter disk that elevated the sweeps 2.5 inches off the seabed between disks. Gear modification resulted in a decrease of the trawl sweeps contact with seabed by about 90% and was effective in reducing trawl sweep impact effects to basketstars and sea whips (Dr. Craig Rose, pers. com. 1/3/2007. Also, see Appendix A). Since the field studies showed no significant diminishment in target flatfish species catch using the modified gear there is no first wholesale gross revenue at risk due to the proposed gear modification.

The proposed gear modifications will likely result in additional equipment costs for vessels to comply with the addition of disks to the trawl sweeps and on some vessels may result in modification to operations and/or the cost of additional deck equipment. Gear manufacturers estimate the cost of modifying a set of 50-fathom trawl sweeps on a typical H&G Trawl CP vessel at \$500 to \$1,000 for equipment and labor. H&G Trawl CP vessels reportedly replace their trawl sweeps about once a year and may have two to three sets of sweeps on board the vessel as replacement gear. The estimated total cost of trawl sweep modification to a vessel to comply with the proposed gear modification action is estimated at \$1,500 to \$3,000 per year.

Most of the vessels in the H&G Trawl CP sector are equipped with both main deck winches and a net reel. The trawl sweeps can be wound on the net reel during trawl net retrieval. However, some vessels (typically smaller vessels) do not have net reels and currently wind their trawl sweeps onto the main deck winches. The proposed gear modification of adding rubber disks to the trawl sweeps may create difficulty in passing the trawl sweep disk through the level wind on the deck winches and/or may exceed the holding capacity of the drum on the main deck winches. On these vessels, it may be necessary for the vessel to modify the main trawl winch level winds to allow passage of the disks or the addition of a net reel. The costs to modify trawl winches or add a net reel are dependent upon the individual vessel making the modifications.

5.7.2.4 Impact of the Options

The economic impacts of the options are discussed in this section. Note that the options could be selected in combination with any Alternative more than one option can be chosen. As such, the impacts may or may not be additive depending upon the combination chosen.

Option 1 would close the area around Saint Matthew to non-pelagic trawling to conserve blue king crab habitat. There has historically been some about of trawl effort, targeting Pacific cod, just to the north of St. Matthew. Maps of fishing effort by Fritz et al. (1998) indicate that a strip of area immediately north of St. Matthew has been an area with very high CPUEs for Pacific cod. It is unknown at this time how many vessels, or how much fish has been harvested by non-pelagic trawls fishing this area. At a maximum, the number of vessels targeting groundfish, and the revenue at risk, would be the same as calculated for Option 4. There may be economic benefits of Option 1 to crab fishermen associated with reduced impacts on crab; however, these effects are likely to be minor given that blue king crab bycatch is thought to be low in this area (NMFS data review by crab plan team) and the area to the north does not seem as important to blue king crab as compared with the area to the south and area within State waters.

Option 2 would close an area to non-pelagic trawling around around Nunivak Island with the southern border extending along the nearshore portion of Etolin Strait to conserve nearshore habitats, and minimize potential interactions with community use and subsistence fisheries. The area south of Nunivak Island and Etolin Strait has seen increasing effort by vessels targeting yellowfin and rock sole in recent years, but should not be impacted greatly by this option. There are opportunity costs, of course, associated with prohibiting vessels from fishing in other areas. Such impacts were previously discussed in general terms in the evaluation of Alternative 2.

Option 3 would close an area to non-pelagic trawling around around Nunivak Island with the southern border extending along the nearshore portion of Etolin Strait and Kuskokwim Bay to conserve nearshore

habitat and minimize potential interactions with community use and subsistence fisheries. Because the final boundaries of this closure area are the result of negotiations by representatives of the flatfish industry and coastal communities, it is difficult to quantify the economic impacts. Nonetheless, given the relatively limited amount of effort in the Etolin Strait portion of the closure, and virtually no effort in Kuskokwim Bay, the impacts would be relatively minor. Catch data from 2003-2005 indicate that less than 5,000 mt of flatfish (all species) were caught in the closure proposed under Option 3. However, testimony at the Council meetings has suggested that this is an important area to the fleet because the catch rates for yellowfin sole can be high while encountering low halibut bycatch rates.

Option 4 would establish a Northern Bering Sea Experimental Fishing Area, which would be entirely closed to fishing with non-pelagic trawl gear at least in the short term, until an adaptive management experiment design was developed and approved. The option would close roughly 188,157 sq. km of BS shelf (shelf area to 1,000 m depth) or 23.8% of the 791,731 sq. km. of BS benthic habitat currently open to bottom trawling (shelf area to the 1,000 m depth contour). Table 5.7-3 provides the revenue and percent of baseline revenue at risk under this option. Over the three years of data analyzed, 2003-2005, the status quo gross first wholesale revenue for the H&G Trawl CP sector averaged \$201.73 million and ranged from an annual low of \$161.72 million in 2003 to a high of \$247.96 million in 2005. Gross first wholesale revenue at risk from the proposed Northern Bering Sea Research Area closure area under this option averaged \$0.33 million or 0.16% of the three year average status quo gross revenue and ranged from a low of \$0.04 million or 0.01% of status quo gross revenue in 2005 to a high of \$0.69 million or 0.35% of status quo gross revenue in 2004. Flatfish, pollock and Pacific cod represented the largest first wholesale gross revenue at risk over the three year period but no one species exceeded \$0.40 million or 0.86% of status quo first wholesale gross revenue. The first wholesale gross revenue at risk under the proposed action could be mitigated by additional fishing effort in the area remaining open to NPT.

Option 5 would close the area to non-pelagic trawling around St. Lawrence Island to conserve blue king crab habitat and minimize potential interactions with community use and subsistence fisheries. Because there is currently no non-pelagic trawl effort as far north as St. Lawrence, there are no economic impacts to the trawl fleet given the current and historic distribution of target species. Potential future effects of a change in fish distribution were discussed under Option 4, although the impacts of Option 5 would be substantially smaller based on total area closed.

Table 5.7-2 Total H&G Trawl CP status quo first wholesale gross revenue and first wholesale gross revenue at risk under Option 4.

Year	Revenue at Risk Category	Alternative 1 - Status Quo	Option 4- Revenue at Risk	Option 4% of Status Quo Revenue at Risk
	Industry Sector			
2003	H&G Trawl CP	\$161.72	\$0.27	0.16%
2004	H&G Trawl CP	\$195.51	\$0.69	0.35%
2005	H&G Trawl CP	\$247.96	\$0.04	0.01%
Average	H&G Trawl CP	\$201.73	\$0.33	0.16%
	Retained Species			
2003	Atka Mackerel	\$21.87	\$0.00	0.00%
	Flatfish	\$72.72	\$0.08	0.10%
	Pacific Cod	\$35.91	\$0.17	0.47%
	Pollock	\$10.68	\$0.02	0.19%
	Rockfish	\$15.31	\$0.00	0.01%
	Sablefish	\$4.18	\$0.00	0.00%
	Other	\$1.06	\$0.00	0.00%
2004	Atka Mackerel	\$29.08	\$0.00	0.00%
	Flatfish	\$83.98	\$0.21	0.25%
	Pacific Cod	\$46.39	\$0.40	0.86%
	Pollock	\$14.36	\$0.07	0.50%
	Rockfish	\$17.14	\$0.00	0.01%
	Sablefish	\$4.03	\$0.00	0.00%
	Other	\$0.53	\$0.00	0.00%
2005	Atka Mackerel	\$36.52	\$0.04	0.10%
	Flatfish	\$121.33	\$0.07	0.06%
	Pacific Cod	\$44.30	\$0.23	0.53%
	Pollock	\$15.22	\$0.02	0.15%
	Rockfish	\$25.36	\$0.00	0.00%
	Sablefish	\$4.89	\$0.00	0.00%
	Other	\$0.34	\$0.00	0.00%

5.7.3 Passive Use and Productivity Benefits of the Alternatives

The alternatives discussed in this analysis address concerns that bottom trawl fishing activity may be adversely modifying habitat, faster than the habitat can renew itself. The alternatives are premised on the idea that society can consume the habitat and enjoy its ecological services (including fish production) now, or that it can defer that consumption and enjoy those services in the future. This tradeoff between present and future consumption of benthic habitat reflects the underlying investment nature of the problem the alternatives seek to address. The overarching economic options are to (a) continue (perhaps even increase) current consumption of habitat services, with consequent increased costs and reduced

benefits, or (b) invest in long-term resource productivity by deferring consumption of these assets until some future time. The expectation, not yet confirmed, for the alternatives to the status quo is that by reducing the rate of exploitation of benthic habitat (i.e., net benefits from fishing) in the short term, society will have invested in sustaining (perhaps even enhancing) habitat and will enjoy larger net benefits over the longer term. The benefits associated with the fishing impact minimization measures include: 1) passive-use (or non-use) benefits, and 2) use benefits (including non-consumptive use benefits, consumptive use benefits, non-market benefits, and market benefits) and productivity benefits

It can be demonstrated that society places economic value on relatively unique environmental assets, whether or not those assets are ever directly exploited. For example, society places real and potentially measurable economic value on simply knowing that a rare or endangered species of animal or plant is protected in the natural environment. The term ‘value’ is used, in the present context, as it would be in a cost-benefit analysis (i.e., what would people be willing to give up to preserve and/or enhance the asset being assessed?). Because no market, in the traditional economic sense, exists within which benthic habitat (at least in waters of the EEZ off Alaska) is bought, sold, or traded, there is no institutional mechanism wherein a market clearing price may be observed. Such a market clearing price would typically be used to estimate a consumer’s willingness-to-pay to obtain the goods or services being traded. Nonetheless, benthic habitat does have economic value, as demonstrated by the current public debate over its preservation and enhancement. Among those holding these values, there is no expectation of directly using this asset in the normal sense of that term. Whether referred to as passive-use, non-use, or existence value, the underlying premise is that individuals derive real and measurable utility (i.e., benefit) from the knowledge that relatively unique natural assets remain in a comparatively undisturbed state.

With respect to benthic habitat, the values at stake are what economists refer to as marginal values; that is, the values are associated with changes in the characteristics of habitat, not in the presence or absence of the habitat itself. Any region will have a wide range of characteristics. These may include the relative proportions of different sea bed types, locations of corals or other living structures, water temperature, salinity, distribution of vegetation, and so on. Fishing activity may change the nature, productivity, and value of the habitat by altering these characteristics in different ways. For example, unrestricted use of a bottom tending gear type may totally eliminate corals and alter the relative proportions of vegetation types, but leave salinity unchanged. The passive use values that society places on different regions of habitat will depend on these characteristics and can be expected to change as various combinations of characteristics of a particular region change.

While it is not possible at this time to provide an empirical estimate of the social value attributable to protection of fish habitat in the EEZ off Alaska, it is implicit in the fishing impact minimization measures that each of the alternatives to the status quo (i.e., Alternative 1) would be expected to yield an incremental social benefit over the baseline condition. That is, it is assumed that each of the alternatives yields some additional protection for benthic habitat from fishing gear impacts, compared to retention of the status quo.

In addition to these passive-use benefits, there may be benefits resulting from increased productivity of fish populations as a result of habitat conservation actions. As discussed in the EFH EIS (NMFS 2006), current knowledge permits only a highly conditional evaluation of the effects of fishing on general classes of habitat features and allows only broad connections to be drawn between these features and the life history processes of some managed species. The level of effects on the stocks or potential yields of these species cannot be estimated with current knowledge. An expectation of substantial recoveries, directly attributable to implementation of measures to minimize the effects of fishing on benthic habitat, would require the presence of a species with a clear habitat limitation and consequent poor stock condition. Alaska fisheries include no such clear cases. Therefore, no quantifiable or even qualitative measure of sustained or increased yield in production or biomass of FMP species is available for this analysis. That is, based upon currently available scientific data and understanding of these fishery and habitat resources,

it is not possible to measure any economic benefits linked to the biological or ecological changes attributable to the alternatives considered.

5.8 Summary of the Analysis of Alternatives

Though defensible quantitative estimates of potential effects are not possible at this time, the qualitative analysis provided indicates that, based on the best available information, the proposed action does not appear to have the potential to produce 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.” The proposed action would not be expected to meet or exceed the threshold for a “significant” action (as that term is defined in E.O. 12866).

6.0 INITIAL REGULATORY FLEXIBILITY ACT ANALYSIS

6.1 The Purpose of an IRFA

The Regulatory Flexibility Act (RFA), first enacted in 1980, was designed to place the burden on the government to review all regulations to ensure that, while accomplishing their intended purposes, they do not unduly inhibit the ability of small entities to compete. The RFA recognizes that the size of a business, unit of government, or nonprofit organization frequently has a bearing on its ability to comply with a Federal regulation. Major goals of the RFA are: (1) to increase agency awareness and understanding of the impact of their regulations on small business, (2) to require that agencies communicate and explain their findings to the public, and (3) to encourage agencies to use flexibility and to provide regulatory relief to small entities. The RFA emphasizes predicting impacts on small entities as a group distinct from other entities and on the consideration of alternatives that may minimize the impacts while still achieving the stated objective of the action.

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

In determining the scope, or ‘universe’, of the entities to be considered in an IRFA, the National Marine Fisheries Service (NMFS) generally includes only those entities that can reasonably be expected to be directly regulated by the proposed action. If the effects of the rule fall primarily on a distinct segment, or portion thereof, of the industry (e.g., user group, gear type, geographic area), that segment would be considered the universe for the purpose of this analysis. NMFS interprets the intent of the RFA to address negative economic impacts, not beneficial impacts, and thus such a focus exists in analyses that are designed to address RFA compliance.

Data on cost structure, affiliation, and operational procedures and strategies in the fishing sectors subject to the proposed regulatory action are insufficient, at present, to permit preparation of a “factual basis” upon which to certify that the preferred alternative does not have the potential to result in significant adverse economic impacts on a substantial number of small entities (as those terms are defined under RFA). Because, based on all available information, it is not possible to ‘certify’ this outcome, should the proposed action be adopted, a formal IRFA has been prepared and is included in this package for Secretarial review.

6.2 What is Required in an IRFA?

Under 5 U.S.C., Section 603(b) and (c) of the RFA, each IRFA is required to contain:

- A description of the reasons why action by the agency is being considered;
- A succinct statement of the objectives of, and legal basis for, the proposed rule;
- A description of and, where feasible, an estimate of the number of small entities to which the proposed rule will apply;
- A description of the projected reporting, recordkeeping and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record;
- 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 which accomplish the stated objectives (*of the proposed action*), consistent with applicable statutes, and which 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; and
4. An exemption from coverage of the rule, or any part thereof, for such small entities.

6.2.1 Reasons for Considering the Proposed Action

The purpose of this analysis is to evaluate impacts of alternatives to further conserve fish habitat in the Eastern Bering Sea. In February 2005, the Council took final action on the EFH EIS (NMFS 2006a) to adopt a suite of measures to conserve EFH in the GOA and AI from potential impacts due to fishing. At the time of final action, the Council took no action to implement additional conservation measures in the Eastern Bering Sea, as the analysis found such additional measures were neither required by law nor necessary or practicable measures. Further, the alternatives considered for Bering Sea habitat conservation required additional ‘fine-tuning’ before they could be considered as practicable measures. Alternatives to modify gear did not have sufficient research to understand what the scale of beneficial effects on habitat, and the alternatives for the open areas had left out historically important and lucrative fishing grounds, and included rotating closures that were found to have questionable merit. So to address these issues, the Council notified the public that it planned to take a more focused examination of potential measures to further conserve fish habitat, including EFH, in the Eastern Bering Sea by initiating a separate analysis that would tier off of the EFH EIS. This analysis provides an examination of a range of reasonable alternatives to conserve fish habitat in the Eastern Bering Sea.

The need for this analysis is the recognition that uncertainty exists in the conservation of fish habitat. Thus, evaluation of additional measures, and possible implementation of them, provides a precautionary approach to deal with uncertainty about our knowledge of fish dependence upon habitat, and the effects of fisheries on that habitat.

6.3 Objectives and Legal Basis of the Proposed Rule

6.3.1 Objectives of the Proposed Rule

The objective of this proposed regulatory amendment is to implement new practicable and precautionary fishery management measures to reduce adverse effects of fishing on Essential Fish Habitat (EFH) in the Bering Sea and to support the continued productivity of managed fish species.

6.3.2 Legal Basis of the Proposed Rule

Under the Magnuson-Stevens Act, the United States has exclusive fishery management authority over all marine fishery resources found within the Exclusive Economic Zone (EEZ), which extends between 3 and 200 nautical miles from the baseline used to measure the territorial sea. The management of these marine resources is vested in the Secretary of Commerce (Secretary) and in the Regional Councils. In the Alaska Region, the Council has the responsibility for preparing FMPs for the marine fisheries it finds that require conservation and management and for submitting their recommendations to the Secretary. Upon approval by the Secretary, NMFS is charged with carrying out the federal mandates of the Department of Commerce with regard to marine and anadromous fish. The groundfish fisheries in the EEZ off Alaska are managed under the FMP for the Groundfish Fisheries of the GOA and the FMP for the Groundfish Fisheries of the BSAI.

Actions taken to amend FMPs or implement other regulations governing these fisheries must meet the requirements of federal laws and regulations. In addition to the Magnuson-Stevens Act, the most important of these are the Halibut Act, the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), EO (EO 12866), the Regulatory Flexibility Act (RFA), the Migratory Bird Treaty Act of 1918, and EO 13186 on the Responsibilities of Federal Agencies to Protect Migratory Birds.

6.4 Description and Number of Small Entities to which the Proposed Rule will Apply

6.4.1 Definition of a Small Entity

The RFA recognizes and defines three kinds of small entities: (1) small businesses, (2) small non-profit organizations, and (3) 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 which is not dominant in its field of operation. The SBA has further defined a “small business concern” as one “organized for profit, with a place of business located in the United States, and which operates primarily within the United States or which makes a significant contribution to the U.S. economy through payment of taxes or use of American products, materials or labor.... A (small) business concern may be in the legal form of an individual proprietorship, partnership, limited liability company, corporation, joint venture, association, trust or cooperative, except that where the firm is a joint venture there can be no more than 49 percent participation by foreign business entities in the joint venture.”

The SBA has established size criteria for all major industry sectors in the U.S. including fish harvesting entities, for-hire entities, fish processing businesses, and fish dealers. 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 \$4 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. Finally, a wholesale business servicing the fishing industry (fish dealer) is a small businesses if it employs 100 or fewer persons on a full-time, part-time, temporary, or other basis, at all its affiliated operations worldwide.

Companies that own catcher processors act as both fish harvesters and seafood processors. NOAA Fisheries has indicated that these companies should be classified as small or large entities based on the harvester definition. However, this definition is currently being disputed, and NOAA Fisheries is currently reviewing their catcher processor definition. Some members of the fishing industry argue that they should be classified based on the processor definition. Catcher processor owners have stated that they must meet specific requirements that apply to processors that result in additional costs to their businesses. Changing the definition would reclassify many catcher processor companies from large to small entities. They would then benefit from Small Business Administration programs available to companies classified as small entities. However, until NOAA Fisheries completes their review of this issue and provides additional guidance, catcher processors will continue to be classified as small or large entities based on the current harvester definition.

The SBA has established “principles of affiliation” to determine whether a business concern is “independently owned and operated.” In general, business concerns are affiliates of each other when one concern controls or has the power to control the other, or a third party controls or has the power to control both. The SBA considers factors such as ownership, management, previous relationships with or ties to another concern, and contractual relationships, in determining whether affiliation exists. Individuals or firms that have identical or substantially identical business or economic interests, such as family members, persons with common investments, or firms that are economically dependent through contractual or other relationships, are treated as one party with such interests aggregated when measuring the size of the concern in question. The SBA counts the receipts or employees of the concern whose size is at issue and those of all its domestic and foreign affiliates, regardless of whether the affiliates are organized for profit, in determining the concern’s size. However, business concerns owned and controlled by Indian Tribes, Alaska Regional or Village Corporations organized pursuant to the Alaska Native Claims Settlement Act (43 U.S.C. 1601), Native Hawaiian Organizations, or Community Development Corporations authorized by 42 U.S.C. 9805 are not considered affiliates of such entities, or with other concerns owned by these entities solely because of their common ownership.

Affiliation may be based on stock ownership when (1) A person is an affiliate of a concern if the person owns or controls, or has the power to control 50 percent or more of its voting stock, or a block of stock which affords control because it is large compared to other outstanding blocks of stock, or (2) If two or more persons each owns, controls or has the power to control less than 50 percent of the voting stock of a concern, with minority holdings that are equal or approximately equal in size, but the aggregate of these minority holdings is large as compared with any other stock holding, each such person is presumed to be an affiliate of the concern.

Affiliation may be based on common management or joint venture arrangements. Affiliation arises where one or more officers, directors, or general partners controls the board of directors and/or the management of another concern. Parties to a joint venture also may be affiliates. A contractor and subcontractor are treated as joint ventures if the ostensible subcontractor will perform primary and vital requirements of a contract or if the prime contractor is unusually reliant upon the ostensible subcontractor. All requirements of the contract are considered in reviewing such relationship, including contract management, technical responsibilities, and the percentage of subcontracted work.

Small organizations. The RFA defines “small organizations” as any not-for-profit enterprise that is independently owned and operated and is not dominant in its field.

Small governmental jurisdictions. The RFA defines small governmental jurisdictions as governments of cities, counties, towns, townships, villages, school districts, or special districts with populations of fewer than 50,000.

6.4.2 Estimated Number of Small Entities to which Proposed Rule Applies

Fishing vessels, both catcher vessels and catcher/processors, are considered small, for RFA purposes, if their annual gross receipts, from all their economic activities combined, as well as those of any and all their affiliates anywhere in the world, (including fishing in Federally managed non-groundfish fisheries, and in Alaska managed fisheries), are less than or equal to \$4.0 million in a year. Further, fishing vessels were considered to be large if they were affiliated with an AFA fishing cooperative in 2004. The members of these cooperatives had revenues that exceeded the \$4.0 million threshold. Vessels affiliated with cooperatives have retained their separate identities for the purposes of counting numbers of entities; that is, 10 vessels affiliated with an AFA cooperative are treated as 10 large entities, not as one large entity.

The entities that would be directly regulated by the alternatives are those vessels that fish for groundfish with non-pelagic trawl gear in the eastern Bering Sea off Alaska. The Non-AFA trawl CP sector vessels are the primary participants in the BSAI, yellowfin sole, BSAI rock sole and BSAI flathead sole fisheries affected by the proposed action. From 2000-2003, they retained 92.8 percent of the total yellowfin sole that was retained, 96.9 percent of the rock sole and 98.1 percent of the flathead sole retained. The other catcher processors harvesting these species in the area affected by the proposed action are members of the AFA. During the 2004 fishing year, 3 AFA CPs owned by two companies participated in the directed fishery for yellowfin sole (PCC, 2005). In November 2004, Congress passed the FY 2005 Appropriations Act, which contained a BSAI Catcher Processor Capacity Reduction Program. That program precludes any catcher processors, other than the 26 Non-AFA trawl CPs, and the AFA trawl CPs, from directed fishing for BSAI yellowfin sole, BSAI Atka mackerel, BSAI rock sole, BSAI flathead sole, or AI Pacific ocean perch. Trawl catcher vessels rarely target these species. AFA trawl CVs may harvest up to 6.47 percent of the yellowfin sole ITAC (including yellowfin sole incidental catch in other fisheries), 3.41 percent of the rock sole ITAC, 5.05 percent of the flathead sole ITAC, less than 1 percent of the Atka mackerel ITACs and less than 1 percent of the AI Pacific ocean perch ITACs. Given these small harvest limits it is unlikely they can participate in these directed fisheries, with the possible exception of the yellowfin sole fishery. Other catch vessels have traditionally not harvested these species in the BSAI. The revenue at risk analyses produced no revenue at risk for the AFA trawl CP, AFA trawl CV or CDQ sectors over the 2003 to 2005 time period analyzed.

The only potentially significant impacts of the proposed alternatives are on the H&G Trawl CP fleet operating in the BS. It is important to note that in many vessels in this fleet are owned by several companies. As such, this analysis of large and small entities is conducted at a company level and not at an individual vessel level.

Section 5.6 of the RIR provides a description of these fisheries and estimates the numbers of unique vessels that presently participate. As shown in, approximately Table 5.6-12, approximately 22 to 24 vessels have participated in the H&G Trawl CP fishery off Alaska in recent years. Based on total annual gross revenues estimates, all but two of the H&G Trawl CP vessels should be classified as large entities under the current NMFS definition. The two AFA trawl CP companies that harvested yellowfin sole in 2004 are considered large entities. All CDQ groups and their associated communities are considered small entities according to RFA guidelines.

6.5 Description of the Projected Reporting, Record Keeping and Other Compliance Requirements of the Proposed Rule

The alternatives being considered would not directly mandate additional “reporting” or “record keeping” within the meaning of the Paperwork Reduction Act.

6.6 Identification of Relevant Federal Rules that may Duplicate, Overlap or Conflict with the Proposed Rule

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

6.7 Description of Significant Alternatives

An IRFA must consider all significant alternatives that accomplish the stated objectives of the action, consistent with applicable statutes, and simultaneously minimize any significant economic impacts of the proposed rule on small entities. “Significant alternatives” are those with potentially lesser impacts on small entities (versus large-scale entities) as a whole. The kinds of alternatives that are possible will vary based on the particular regulatory objective and the characteristics of the regulated industry. However, section 603(c) of the RFA gives agencies some alternatives that they must consider at a minimum:

1. Establishment of different compliance or reporting requirements for small entities or timetables that take into account the resources available to small entities.
2. Clarification, consolidation, or simplification of compliance and reporting requirements for small entities.
3. Use of performance rather than design standards.
4. Exemption for certain or all small entities from coverage of the rule, in whole or in part.

The alternatives accepted by the Council for consideration in this EA/RIR/IRFA are described in detail in Section 2 of the EA and are briefly described in Section 5.5 of the RIR. The RIR for this action analyzes potential economic impacts of the suite of available alternatives.

At present, the alternatives before the Council contain explicit provisions in regard to mitigating the potential adverse effects of the alternatives on directly regulated entities, the majority of which are large entities.

6.8 Impacts of the Alternatives

Though defensible quantitative estimates of potential effects are not possible at this time, the qualitative analysis provided indicates that, based on the best available information, the proposed action does not appear to have the potential to produce 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.” The proposed action would not be expected to meet or exceed the threshold for a “significant” action (as that term is defined in E.O. 12866).

7.0 CONSISTENCY WITH OTHER APPLICABLE LAWS OR POLICIES

7.1 Consistency with the Magnuson-Stevens Act

7.1.1 National Standards

Below are the 10 National Standards as contained in the Magnuson-Stevens Act (Act), and a brief discussion of the consistency of the proposed alternatives with those National Standards, where applicable.

National Standard 1 - Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery

The proposed action would close a portion of the BS yellowfin sole, rock sole, and flathead sole fishing grounds to NPT fishing and/or impose gear modifications on the NPT fishery to reduce impacts of fishing on BS fish habitat. BSAI yellowfin sole, rock sole, and flathead sole are not currently in danger of overfishing and are considered stable. In terms of achieving 'optimum yield' from the fishery, the Act defines 'optimum', with respect to yield from the fishery, as the amount of fish which:

(A) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems;

(B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and,

(C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery.

Overall benefits to the Nation may be affected by the proposed action, though our ability to quantify those effects is quite limited. Overall net benefits to the Nation would not be expected to change to an identifiable degree between the alternatives under consideration.

National Standard 2 - Conservation and management measures shall be based upon the best scientific information available.

Information in this analysis represents the most current, comprehensive set of information available to the Council, recognizing that some information (such as operational costs) is unavailable. Information previously developed on the BSAI trawl fisheries, as well as the most recent information available, has been incorporated into this analysis. It represents the best scientific information available.

National Standard 3- To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

The annual TAC is set for BSAI yellowfin sole, rock sole and flathead sole according to the Council and NMFS's harvest specification process. Atka mackerel TACs are set currently set for the Eastern Aleutian Islands/Bering Sea, Central Aleutian Islands, and Western Aleutian Islands. Pacific ocean perch TACs are set for the Bering Sea, Eastern Aleutian Islands, Central Aleutian Islands, and Western Aleutian Islands areas. NMFS conducts the stock assessment for these species and makes allowable biological catch recommendations to the Council. The Council sets the TAC for these species based on the most recent stock assessment and survey information. These BSAI stocks will continue to be managed as a single stock under the alternatives for establishing Bering Sea Habitat Conservation measures.

National Standard 4 - Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various U.S. fishermen, such allocation shall be (A) fair and equitable to all such fishermen, (B) reasonably calculated to promote conservation, and (C) carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

Nothing in the alternatives considers residency as a criteria for the Council's decision. Residents of various states, including Alaska and the Pacific Northwest, participate in the major sectors affected by these allocations. No discriminations made among fishermen based on residency or any other criteria.

National Standard 5 - Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources, except that no such measure shall have economic allocation as its sole purpose.

The wording of this standard was changed in the recent Magnuson-Stevens Act authorization, to 'consider' rather than 'promote' efficiency. Efficiency in the context of this change refers to economic efficiency, and the reason for the change, essentially, is to de-emphasize to some degree the importance of economics relative to other considerations (Senate Report of the Committee on Commerce, Science, and Transportation on S. 39, the Sustainable Fisheries Act, 1996). The analysis presents information relative to these perspectives and provides information on the economic risks associated with the closure of fishing grounds to NPT, the potential for increase in costs associated with proposed gear modifications and the economic impacts to communities.

National Standard 6 - Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

All of the alternatives under consideration in the proposed action appear to be consistent with this standard.

National Standard 7 - Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

All of the alternatives under consideration appear to be consistent with this standard.

National Standard 8 - Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.

Many of the coastal communities in Alaska and the Pacific Northwest participate in the Bering Sea groundfish fisheries in one way or another, as homeport to participating vessels, the location of processing activity, the location of support businesses, the home of employees in the various sectors, or as the base of ownership or operations of various participating entities, among others. As noted elsewhere in this analysis, however, the sector that will be exclusively or nearly exclusively directly affected by the different management alternatives is the H&G trawl CP sector. As detailed in Section 5.6.5 of the RIR, the vessels in this sector that have recently fished in the areas potentially affected by one or more of the alternatives, and the related activities of those vessels while working in the Bering Sea, are closely associated with two communities: Seattle, Washington and Dutch Harbor/Unalaska, Alaska. A summary of the level of fishery engagement and dependence in these communities is provided in Section 5.6.5 of the RIR, and references for detailed profiles of these communities are also provided in that section. Other

affected vessels in this fleet have at least some association with the communities of Anchorage, Kodiak, and Juneau, Alaska, and Rockland, Maine. A summary of relevant fishery engagement and dependency for these communities is provided in Section 5.6.5 of the RIR as well, with none of these four communities being considered substantially dependent on the incremental contributions of the two or less vessels associated with each.

An analysis of the alternatives being considered for EFH in the Bering Sea suggests that while impacts may be noticeable at the individual operation level for at least a few vessels, the impacts at the community level for any of the involved fishing communities would be well under the level of significance. The sustained participation of these fishing communities is not put at risk by any of the alternatives being considered. Economic impacts to participating communities would not likely be noticeable at the community level, so consideration of efforts directed at a further minimization of adverse economic impacts to any given community is not relevant.

It should be noted also that positive or negative indirect effects of the alternatives may be experienced in the western Alaska communities of Kipnik and Chefnak due to the exacerbation or elimination of potential gear conflicts between the directly affected (non-local) H&G trawl CP fleet and local, small scale fishing operations. Whether or not these impacts would occur is a function of many variables as discussed in the analysis of alternatives section in the RIR. It is important to note, however, that under existing conditions gear conflicts are being avoided through informal industry-community agreements in the absence of formal management direction.

National Standard 9 -Conservation and management measures shall, to the extent practicable, (A) minimize bycatch, and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

All of the alternatives under consideration in the proposed action appear to be consistent with this standard.

National Standard 10 - Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

The alternatives under consideration appear to be consistent with this standard. None of the alternatives or options proposed to modify the fishing grounds or gear of the Non-AFA Trawl CP fleet would change safety requirements for fishing vessels.

7.1.2 Section 303(a)(9) – Fisheries Impact Statement

Section 303(a)(9) of the Magnuson-Stevens Act requires that any plan or amendment include a fishery impact statement which shall assess and describe the likely effects, if any, of the conservation and management measures on a) participants in the fisheries and fishing communities affected by the plan or amendment; and b) participants in the fisheries conducted in adjacent areas under the authority of another Council, after consultation with such Council and representatives of those participants taking into account potential impacts on the participants in the fisheries, as well as participants in adjacent fisheries.

The alternative actions considered in this analysis are described in Section 2.2 of the EA. The impacts of these actions on participants in the fisheries and fishing communities are the topic of Sections 5.0 and 6.0 of the RIR/IRFA.

7.1.2.1 Fishery Participants

The proposed actions directly impact the participants in the BSAI flatfish fisheries, the CDQ groups, and CDQ communities. Participants in the Non-AFA Trawl CP sector have traditionally harvested the

majority of the BSAI species impacted under this action. During the more recent years, the participants in that sector have harvested over 90 percent of each of those species. Vessels in the Non-AFA Trawl CP sector have also traditionally contracted to harvest the CDQ allocations of these species. Summaries of the sector's can be found in Section 5.6.6 of this document.

Although there are 43 LLP licenses for vessels in the Non-AFA Trawl CPs sector 22 to 26 vessels have been active in the BS flatfish fisheries in recent years. Seventeen of the vessels appear to operate out of Seattle, 6 vessels out of other Washington communities, and 3 vessels out of Maine. Several of the companies own and operate more than one vessel. Data that are currently available does not allow the analysts to exactly define ownership in this fleet. However, information produced in Amendment 79 (NPFMC, 2003) indicates that companies own from 1 to 5 of the qualified vessels.

The vessels range in length from 103' LOA to 295' LOA. The largest vessels are reported to harvest and retain more fish than smaller vessels, on average. Portions of the BS flatfish TACs may be harvested by the AFA Catcher Processors, AFA Catcher Vessels, or other trawl catcher vessels. During 2004, 3 AFA CPs harvested yellowfin sole as a directed fishery. A small number of AFA Catcher Vessels have also participated in harvesting yellowfin sole during the spring fishery. However, the analyses showed no revenue at risk in fleet sectors other than the H&G Trawl CP sector. Members of the AFA fleets generally do not participate in directed fishing for other species targeted by the Non-AFA Trawl CP fleet. The number of Non-AFA catcher vessels that participate in these fisheries is also very limited.

7.1.2.2 Fishing Communities

The fishing communities that are expected to be potentially directly impacted by the proposed action are the locations where the H&G trawl CP vessels engaged in fishing in areas considered for closure are homeported, offload product, take on supplies, obtain vessel maintenance and repair services, and their owners and crew live. The Non-AFA H&G Trawl CP fleet, the only fleet directly affected by the proposed action, is primarily associated with the greater Seattle, Washington area in terms of vessel homeporting and location of ownership, as well as the location for major maintenance and repair work. Dutch Harbor/Unalaska, Alaska is the homeport for a few of the relevant vessels, but serves the entire fleet as the primary offloading, supply, and service center while the fleet is working in the Bering Sea, and it is the location where a range of other associated activities, such as crew changes, limited vessel maintenance and repair, refueling and the like take place. A number of other communities appear as homeports in the records of H&G trawl CPs potentially affected by the proposed action, as measured in areas of fishing effort over the period 2003-2005, such as Kodiak, Anchorage, and Juneau, Alaska and Rockland, Maine, but these communities are not expected to be materially affected by the proposed action for reasons detailed in Section 5.6.5 of the RIR.

Information on the residence of the vessel crew and processing crew that work aboard the potentially affected vessels is not readily available. It is known, however, that in general companies operating vessels in the North Pacific H&G trawl CP sector tend to recruit crew in many locations, including Seattle, the Pacific Northwest as a region, and in urban centers elsewhere in the west and mid-west. Workers are also drawn from a number of foreign countries, such that location of residence is not tightly concentrated in Seattle, or one or even a few communities outside of the Seattle area. For the majority of vessels with agreements with CDQ groups, a typical term of those agreements is some degree of targeted hire from CDQ group communities in western Alaska, but the actual number of hires from those communities on the specific vessels potentially affected by the proposed action is not apparent in the available data.

Additional summary information on the fishing communities mentioned above may be found in Section 5.6.5 of the RIR. Detailed information on the range of fishing communities relevant to the proposed action may be found in a number of recently produced documents, including the *Alaska Groundfish Fisheries Final Programmatic Supplemental EIS* (NOAA 2004), *Sector and Regional Profiles of the North Pacific Groundfish Fishery* (Northern Economics and EDAW 2001), and in a technical paper

(Downs 2003) supporting the *Final EIS for Essential Fish Habitat Identification and Conservation in Alaska* (NOAA 2005) as well as that EIS itself. These sources also include specific characterizations of the degree of individual community and regional engagement in, and dependency upon, the North Pacific groundfish fishery.

Positive or negative indirect effects of the alternatives may be experienced in the western Alaska communities due to the exacerbation or elimination of potential gear conflicts between the directly affected (non-local) H&G trawl CP fleet and local, small scale fishing operations. Whether or not these impacts would occur is a function of many variables as discussed in the analysis of alternatives section in the RIR. It is important to note, however, that under existing conditions gear conflicts are being avoided through informal industry-community agreements in the absence of formal management direction.

7.1.2.3 Participants in Fisheries in Adjacent Areas

Neither the proposed action nor alternatives considered would significantly affect participants in the fisheries conducted in adjacent areas under the authority of another Council.

7.2 Marine Mammal Protection Act (MMPA)

The alternatives analyzed in this action are not likely to result in any significant impact to marine mammals.

7.3 Coastal Zone Management Act

This action is consistent with the Coastal Zone Management Act.

7.4 Executive Order 12898 Environmental Justice

E.O. 12898 focuses on environmental justice in relation to minority populations and low-income populations. The EPA defines environmental justice (EJ) as the: "fair treatment for people of all races, cultures, and incomes, regarding the development of environmental laws, regulations, and policies." This order (Environmental Justice, 59 Fed. Reg. 7629) requires each Federal agency to achieve environmental justice by addressing "disproportionately high and adverse human health and environmental effects on minority populations and low-income populations."

The EPA responded to this order by developing an Environmental Justice Strategy focusing the agency's efforts in addressing these concerns. In order to determine whether environmental justice concerns exist, the demographics of the affected area should be examined to determine whether minority populations and low-income populations are present, and if so, a determination must be made as to whether implementation of the alternatives may cause disproportionately high and adverse human health or environmental effects on these populations.

As developed in Section 5.6.5 of the RIR, the only sector of the fishing industry likely to be directly affected under any of the alternatives is the H&G trawl CP fleet. Also as developed in that section, the only communities substantially connected to that fleet in terms of engagement in and/or dependency upon that segment of the fleet and its activities in the relevant areas of the Bering Sea that therefore may also be affected by the proposed alternatives are Dutch Harbor/Unalaska, Alaska and Seattle, Washington. Detailed demographic and economic information for these two communities, and the relationship of specific populations within these communities to specific fishery sectors may be found in several recently produced documents, including the *Alaska Groundfish Fisheries Final Programmatic Supplemental EIS* (NOAA 2004), *Sector and Regional Profiles of the North Pacific Groundfish Fishery* (Northern Economics and EDAW 2001), *Steller Sea Lion Protection Measures Final SEIS* (NMFS 2001), and in a

technical paper (Downs 2003) supporting the *Final EIS for Essential Fish Habitat Identification and Conservation in Alaska* (NOAA 2005) as well as in that EIS itself. A comprehensive recent profile focusing specifically on Dutch Harbor/Unalaska may also be found in *Comprehensive Baseline Commercial Fishing Community Profiles: Unalaska, Akutan, King Cove, and Kodiak Alaska* prepared for the North Pacific Research Board and the NPFMC (EDAW and Northern Economics 2005). These documents indicate that there is significant minority population engagement in a number of fishery sectors in these communities, particularly in the processing sector, both in terms of the shoreside sector as well as aboard catcher processors associated with the communities, although third-party quantitative information is largely lacking for a demographic analysis of the catcher processor sector in general or the H&G trawl catcher processor fleet in particular. Analysis of the proposed alternatives, however, would indicate that the amount of revenue at risk is less than significant at the fleet level and at the community level for the directly engaged communities. As a result, significant impacts would not occur in general, nor would high and adverse impacts disproportionately accrue to minority populations or low-income populations in this industry sector or either of the two primarily associated communities.

Members of the 65 Western Alaskan communities associated with the six CDQ groups could theoretically be affected by the proposed alternatives, and these communities have largely Alaska Native populations and limited local economic opportunities in general. The revenue at risk analyses, however, found no revenue from CDQ harvests relevant to the proposed action were at risk during the analytic base years (2003-2005), such that it is unlikely that any impacts would disproportionately accrue to CDQ community populations.

Indirect effects of the alternatives may be experienced in the western Alaska communities of Kipnuk and Chefnak. Ninety-eight percent of the residents of these communities reported they were Alaska Native/Native American in whole or in part during the 2000 census. As summarized in Section 5.6.5 of the RIR, these communities are substantially dependent on commercial and subsistence fishing. Information on low-income status in these communities, along with comparative information from Dutch Harbor/Unalaska (as the most directly engaged relevant Alaska fishing community) and Anchorage (as a comparative reference as the urban demographic and economic center of the state) are presented in Table 7.4-1. As shown in this table, there are several income and employment indicators that suggest that both Kipnuk and Chefnak have relatively low-income populations.

Table 7.4-1 Selected 2000 Census Income and Employment Indicators, Kipnuk, Chefnak, Dutch Harbor/Unalaska and Anchorage, Alaska

Demographic Indicator	Kipnuk	Chefnak	Dutch Harbor	Anchorage
Percent Below Poverty	20.9%	25.1%	12.5%	7.4%
Per Capita Income	\$8,589	\$8,474	\$24,676	\$25,287
Unemployment Rate	20.2%	7.9%	11.1%	4.7%
Age 16 or older by not in Labor Force	40.4%	33.7%	16.8%	25.6%

Source: Sepez et al. 2005.

Positive or negative indirect effects to Kipnuk and Chefnak could occur under the alternatives due to the exacerbation or elimination of potential gear conflicts between the directly affected (non-local) H&G trawl CP fleet and local, small scale fishing operations. Whether or not these impacts would occur is a function of many variables as discussed in the analysis of alternatives section in the RIR. It is important to note, however, that under existing conditions gear conflicts are being avoided through informal industry-community agreements in the absence of formal management direction.

7.5 Management Policy of the BSAI Groundfish FMP

The alternatives discussed in this action accord with the management policy of the BSAI Groundfish FMP. The Council's management policy includes an objectives that aims to "minimize to the extent practicable the adverse effects of fishing on EFH," (EFH, EIS NMFS 2006). By closing portions of the flatfish habitat in the BS to NPT and/or requiring gear modifications to NPT gear to reduce impacts on habitat the Council is consistent with its management policy.

8.0 CONTRIBUTORS AND THE AGENCIES AND PERSONS CONSULTED

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Appendix A: Summary of Current Gear Research

Development and evaluation of trawl groundgear modifications to reduce damage to living structure in soft bottom areas. (Preliminary Results)

Craig S. Rose – Alaska Fisheries Science Center, NMFS

Summary – Simple modifications to trawl sweeps (Figure 1) were tested for their effectiveness at reducing effects on sessile seafloor animals on unconsolidated (sand – mud) substrates. The modifications support most of the sweeps 2 – 4 inches above the substrate, allowing space for animals to pass beneath. These were effective in reducing effects to basketstars and sea whips and did not substantially reduce catches of target flatfish until the space was increased to 4 inches.

Introduction

Scientists from the RACE Division's Conservation Engineering project have been working with the fishing industry to modify groundfish trawls to reduce their effects on the seafloor environment. We have initially focusing on areas with soft-bottom (sand – mud) substrates where most groundfish fishing occurs. In those areas, the seafloor features considered most likely to be both significant habitat elements and be vulnerable to fishing are the sessile invertebrates, such as anemones, ascidians, sponge and basketstars. Because they have relatively low profiles and flexible bodies, trawl modifications that create more space between the trawl and the seafloor are being evaluated as a way to reduce damage to these animals.

Do changes to trawl sweeps that reduce seafloor contact affect the degree of damage to structure-forming invertebrates?

From May 23 - June 7, RACE scientists compared the effects of conventional and modified sweeps (herding cables ahead of the trawl net) the on sessile invertebrates at four study sites on the eastern Bering Sea shelf (Figure 2). We selected sites with high abundances of such animals as well as a variety of the most common types. A site about 60 nautical miles west of St. Paul Island (A) was dominated by sea whips and basketstars. Sites 45 nm east of St. Paul (B) and 100 nm west of Cape Newenham (C) had mostly ascidians (*Halocynthia*, *Boltenia* and *Stryela*). Finally, sponge dominated the sessile seafloor fauna at a site 60 nm NNE of Port Moller (D).

At each site, experimental trawling created parallel tracks of four types of modified sweeps and two types of conventional sweeps. Conventional sweeps had the same diameter throughout, of either 2-inch diameter combination rope (rope including interwoven steel and fiber element, with the softer fiber on the outside) or 3-inch disks strung over steel cable, causing more continuous seafloor contact (Figure 3). Modified sweeps had clusters of cluster of 6 inch, 8 inch or 10 inch diameter disks secured at 30-foot (9.1 m) intervals, lifting the sweep cables above the seafloor. Modification included all diameters of disk clusters on combination rope and 8-inch clusters on disk and cable sweeps. Three sets of two trawl tows each were made in opposite directions on parallel tracks, each with two types of sweeps, resulting in 12 parallel sweep tracks. The exception to this was Site C, where time limitations restricted towing to a single trawl track with only bare combination rope and combination wire with 8-inch disk cluster sweeps.

A seafloor sled (Figure 4) with both sonar and video sensors was then towed across the parallel trawl tracks at several points to compare the condition of seafloor animals in areas affected by these different gears and in control areas between tracks. An acoustic camera (DIDSON) provided an image of seafloor terrain on which trawl marks could be consistently identified, making it possible to discern which part of

which trawl track the sled was in or whether it was between tracks. A video camera with strobed lights was then used to assess the condition and abundance of seafloor invertebrates associated with each area.

The imagery from these sensors was analyzed to estimate the relative effects of the alternative sweep designs on the principal structure-forming invertebrates at each site. Counts and condition evaluations were made for each crossing of a sweep track as well as for a swath of equal length from the seafloor on the other side of the adjacent door track, an area outside of the swath of the trawl system. Examples of the video from each site, including unaffected seafloor and those affected by conventional (combination rope) and modified (8-inch clusters on combination rope) gears, can be viewed at: http://www.afsc.noaa.gov/RACE/midwater/seafloor_videos.htm.

At this time, we have only completed analysis on the basketstars and sea whips from Site A. These are the two animals with the most vertical structure and have the clearest effects from sweep contact of all of the animals studied. Basketstars react to disturbance by curling their legs into a tight cluster. In their normal posture, they have upper legs spread to filter the water and lower legs braced against the substrate. Disturbance classes included 1) normal posture with all legs extended, 2) an intermediate level of disturbance where bracing legs are out, but filtering legs withdrawn 3) animals with all legs drawn in and 4) parts of basketstars (legs) lying separately on the seafloor. The proportions of these classes associated with each sweep type and the control areas are presented in Figure 5. The pattern is consistent with a reduction of effects from the conventional combination sweeps to those with larger disk cluster (more space beneath sweep), though the change is clearer when only the more severe effects are considered (25% vs. 40% damaged) than when the intermediate effects are included (41% vs. 46% damaged). Both types of rubber-over-cable footropes had larger effect rates than those with combination rope (roughly 65–55% damaged for more severe and with intermediate included) and there was little difference when due to adding the larger disks. Notice that some of the animals in the control areas were not in the normal posture as basketstars do sometimes retract arms to retrieve collected food.

Sea whips were classified into 3 groups: 1) normal (vertical) posture, 2) laying flat on the substrate and 3) broken or otherwise visibly damaged. Some bare sea whip rods were also present, but these were not counted, as they were clearly remnants of animals that were dead long before the experimental trawling. While the proportion of normal postures was much higher for sea whips than for basketstars, the pattern of effects was similar (Figure 6). The conventional sweeps of both kinds showed 16-17% damage, while the reduction of that rate was approximately proportional to disk cluster diameter for the modified sweeps. Smallest effects were seen for the combination rope with 8 and 10 inch disk clusters with only 8-9% affected. The vast majority of affected sea whips were flattened on the seafloor with no apparent damage. Research by Malecha and Stone (in a poster by these AFSC Auke Bay scientists at: http://www.afsc.noaa.gov/ABL/MarFish/pdfs/Whip_Poster.pdf) indicates that some of these are capable of righting themselves, though they are more vulnerable to some forms of predation while down.

Analysis for the sponge encountered at Site D should be completed for the NPFMC December meeting. Because damage of these amorphous animals is difficult to classify, the analysis is based on size composition of the sponge colonies, detecting breakage.

The purpose of this study was to test for a reduction in the effects of trawl sweeps on sessile invertebrates when the sweeps are elevated off of the seafloor. Even though all sites have not been analyzed and the effects seen are not directly interpretable as mortalities, the results to date show a consistent pattern of reduced effects with the space created below the sweeps. Differences between the 8-inch and 10-inch modifications were minimal, perhaps indicating that further height would not further reduce effects.

Do changes to trawl sweeps that reduce seafloor contact affect the capture of flatfish?

From September 6 – 23, AFSC scientists conducted experiments aboard the F/V Cape Horn to determine whether modifications to raise 97% of the trawl sweeps inches above the seafloor affect how well they herd fish into the trawl. The Cape Horn is the only vessel in the Alaska groundfish fleet that uses a twin trawl, two matched trawl systems fished side-by-side (Figure 7). This allowed catches from identical trawls, except for the sweep modifications, to be compared to determine how the modifications affected catch rates.

Clusters of disks (6 inch, 8 inch and 10 inch diameters) were placed at 30 foot intervals along 300 foot-long, combination-rope sweeps (2 inch diameter), which were fished ahead of one trawl, while sweeps without the disks were fished ahead of that trawl's twin. The catches were processed separately, with the primary commercial species sorted and then weighed on a motion-compensated flow scale. Thus the catch for each of these species from each net was directly measured instead of being estimated from the total catch weight and a sample of the species composition. Length samples of each species were taken to test for any selectivity by size.

Initial analyses (Figure 8) indicated that:

- 1) Using the 6 and 8-inch disks did not significantly change flatfish catch rates.
- 2) Ten inch disks reduced flatfish catch rates 5-10%.
- 3) Roundfish catches, while more variable, tended to increase with the disks.

Discussion –

The tested modifications were effective at reducing the effects of trawl sweeps on sessile seafloor animals that are considered the most vulnerable habitat feature in the sand – mud habitats of the eastern Bering Sea shelf. The 8-inch disk clusters, creating up to 3 inches of opening under the sweeps, seems the best configuration; having no greater effects than the 10-inch disk clusters with no significant loss of target catch.

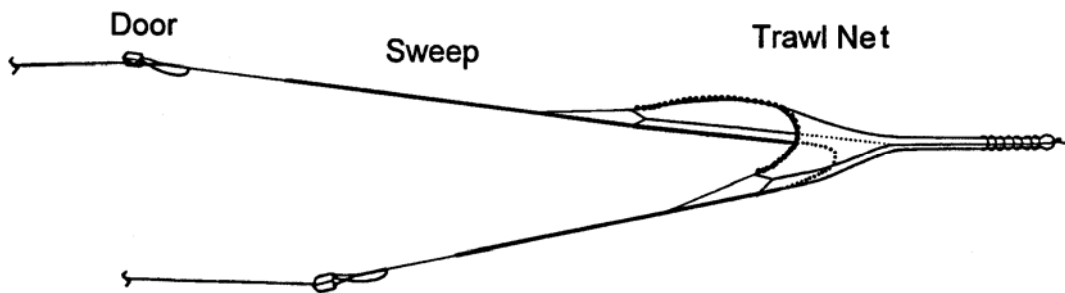


Figure 1 – Relative positions of doors, sweeps and trawl in an otter trawl system. Length of sweep varies with target species and seafloor. For most Bering Sea sole trawls sweeps are so long (up to 1500 feet) that they sweep 90% of the area covered between the doors.



Figure 2 – Seafloor camera/sonar sled.

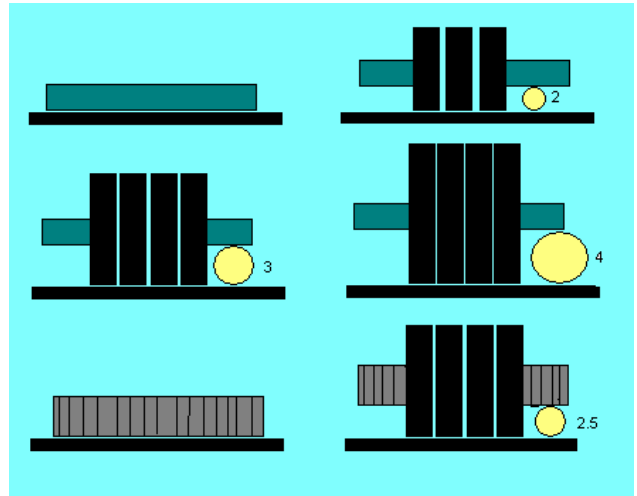


Figure 3. Sweep modifications tested for reduction of effects on sessile animals.

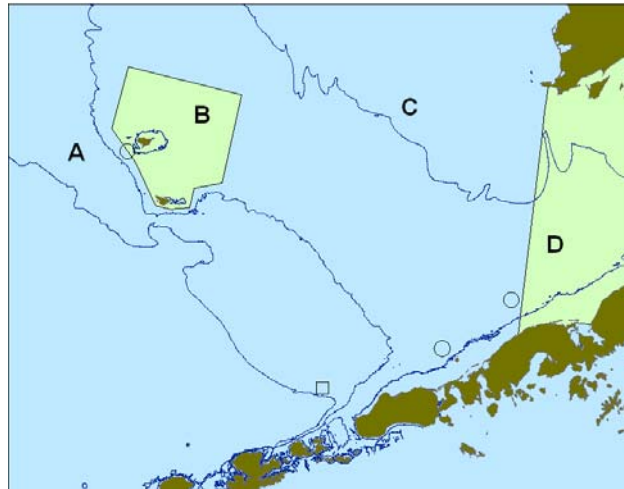


Figure 4 – Sites of studies of sweep modifications to reduce trawl effects on sessile animals

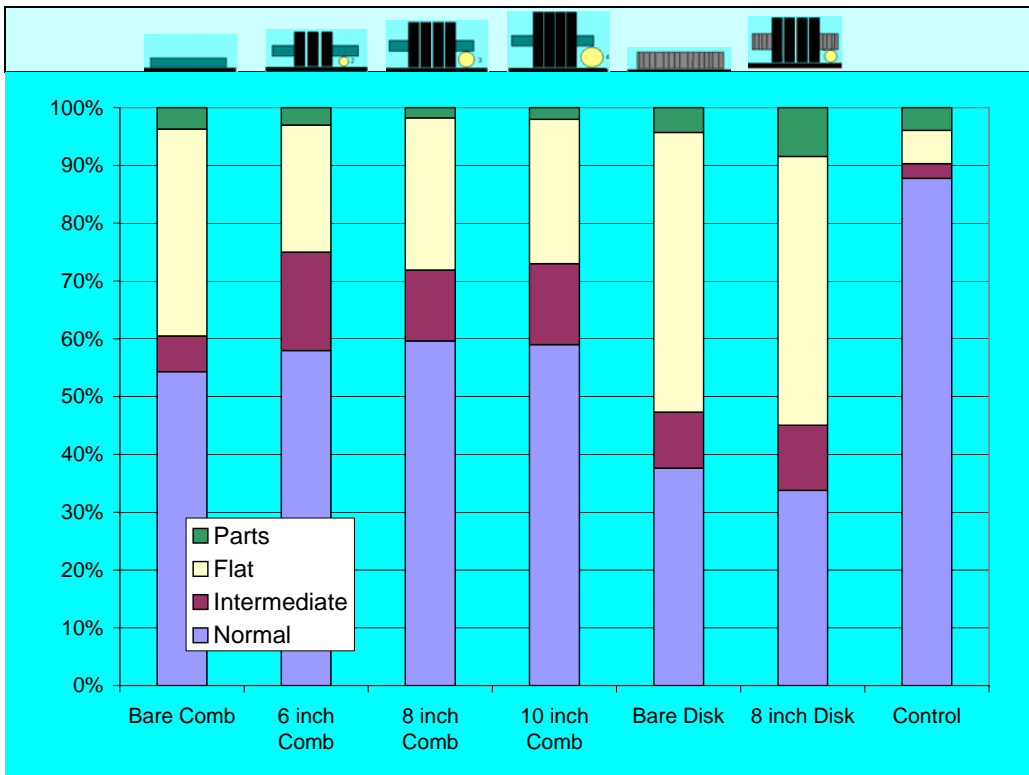


Figure 5 – Percent of basketstars in different condition categories after exposure to trawl sweep modifications.

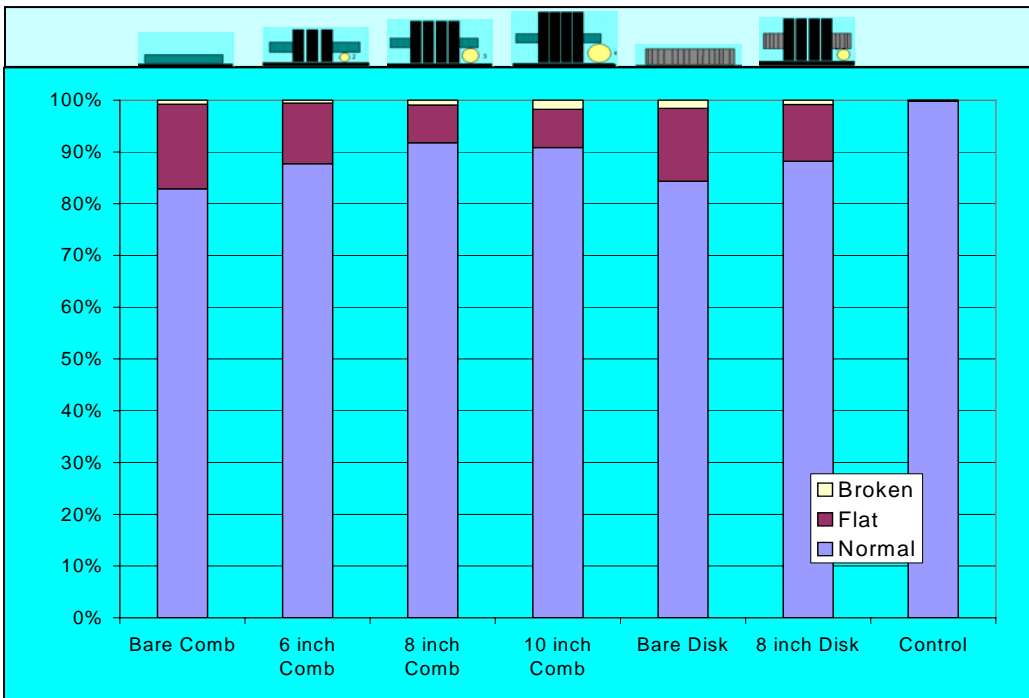


Figure 6 – Percent of sea whips in different condition categories after exposure to trawl sweep modifications.

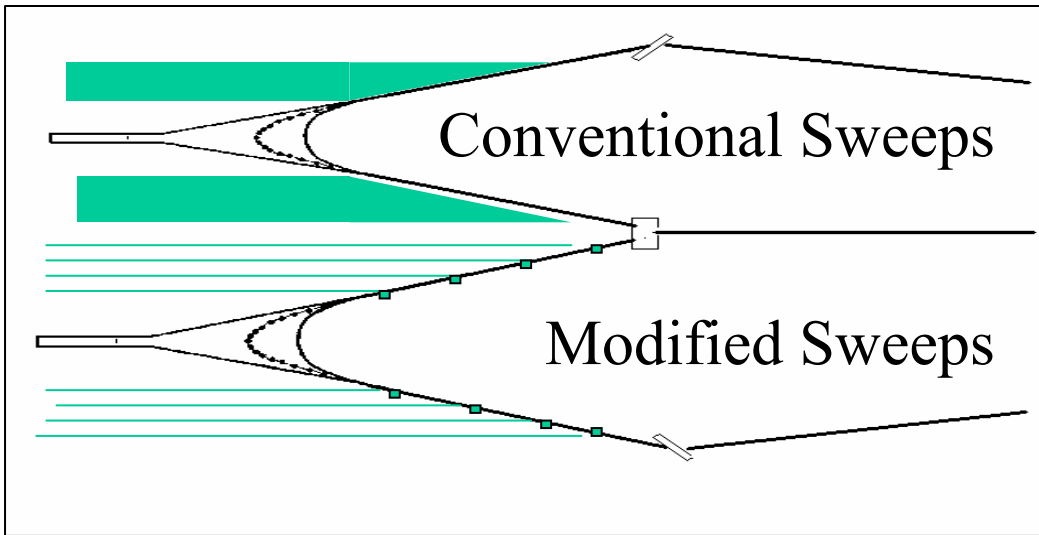


Figure 7 – Schematic of a twin trawl system, showing the concept of reducing bottom contact area of sweeps by limiting contact to disk clusters.

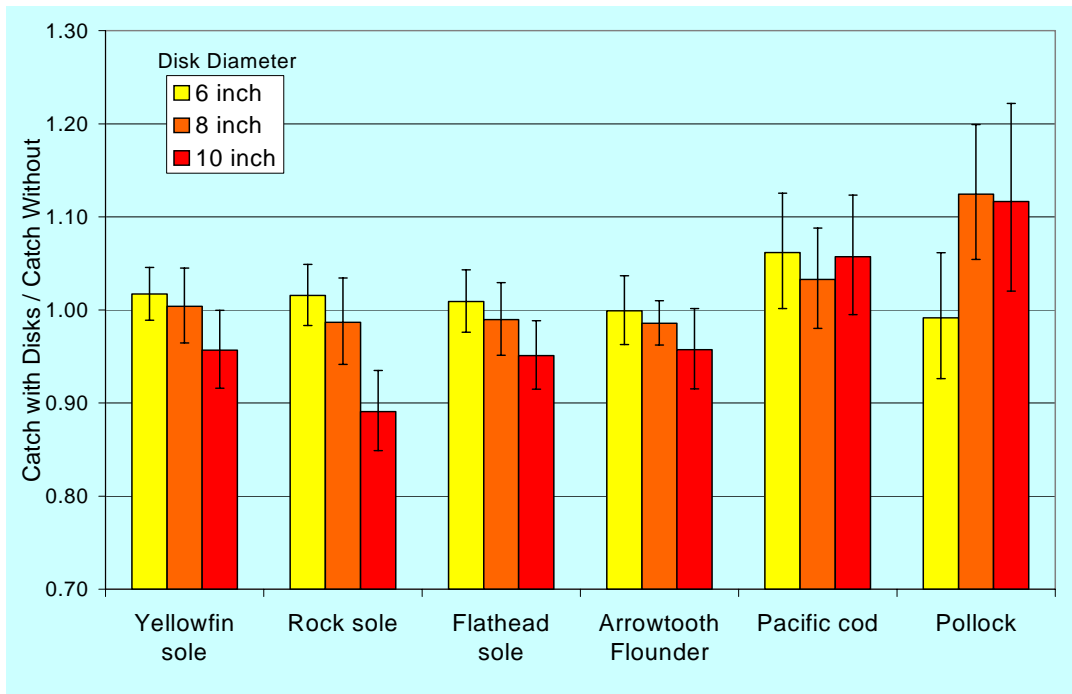


Figure 8 – Preliminary analysis of the proportional change in catch rates when trawl sweeps had disk clusters (6, 8 and 10 inch diameters) installed at 30 foot intervals.

APPENDIX B.

Descriptions of essential fish habitat (EFH) for managed species in the northern Bering Sea area.

EFH Definition for BSAI Yellowfin Sole

Eggs (duration unknown)—Level 0_a Pelagic inshore waters of the southeastern BS shelf from Norton Sound to Bristol Bay in spring and summer.

Larvae (duration 2 to 3 months)—Level 0_a Pelagic inshore waters of the southeastern BS shelf from Norton Sound to Bristol Bay in spring, summer, and fall.

Early Juveniles (to 5.5 years old)—Level 0_a Demersal areas (bottom and lower portion of the water column) on the inner, middle, and outer portions of the continental shelf (down to 250 m) and within nearshore bays of the eastern BS.

Late Juveniles (5.5 to 9 years old)—Level 1 Areas of sandy bottom along with the lower portion of the water column within nearshore bays and on the inner, middle and outer portions of the continental shelf (down to 250 m) of the eastern BS south of St. Matthew Island (approximately 61° N) and in Norton Sound. Feeding areas would be those containing polychaetes, bivalves, amphipods, and echiurids.

Adults (9+ years old)—Level 2 Areas of sandy bottom along with the lower portion of the water column on the inner, middle and outer portions of the continental shelf (down to 250 m) of the eastern BS south of St. Matthew Island (approximately 6° N) and in Norton Sound. Areas of known concentrations vary seasonally. Adult spawning areas in summer (May through August) are located along the inner shelf from Cape Constantine to Cape Peirce, throughout Kuskokwim Bay, and North of Nunivak Island. Summer (June through October) feeding concentrations of adults are located along the inner and middle portions of the shelf from Kuskokwim and Bristol Bays south along the Alaskan Peninsula to Amak Island, and northwest to St. Matthew Island. Feeding areas would be those containing polychaetes, bivalves, amphipods, and echiurids. In winter, yellowfin sole adults migrate to deeper waters of the shelf (100 to 200 m) south of 60° N to the Alaskan Peninsula.

EFH Definition for BSAI Alaska Plaice

Eggs (duration unknown)—Level 0_a Pelagic waters of the middle and outer continental shelf of the eastern BS in spring and early summer.

Larvae (duration 2 to 4 months)—Level 0_a Pelagic waters of the inner, middle, and outer continental shelf of the eastern BS in summer and fall.

Early Juveniles (up to 4 years)—Level 0_a Substrate (particularly areas of sand and mud) and lower portion of the water column on the inner and middle continental shelf of the eastern BS.

Late Juveniles (4 to 7 years)—Level 1 Substrate (particularly areas of sand and mud) and lower portion of the water column on the inner, middle and outer continental shelf of the eastern BS. Feeding areas will be those containing polychaetes, amphipods, and echiurids. With increasing age, plaice overwinter near the edge of the shelf, and return to the middle and inner shelf for feeding in spring, summer, and fall.

Adults (7+ years)—Level 2 Substrate (particularly areas of sand and mud) and lower portion of the water column on the inner, middle and outer continental shelf of the eastern BS. Feeding areas will be those containing polychaetes, amphipods, and echinurids. Plaice overwinters near the edge of the shelf in the southeastern BS from the Pribilof islands to Unimak Island and north along the Alaskan Peninsula. Adults also occurs across broad areas of the middle and inner shelf in summer and fall.

EFH Definition for BSAI Pacific Cod

Eggs (duration 15 to 20 days)—Level 0_a Areas of mud and sand on the inner, middle, and outer continental shelf and upper slope throughout the eastern BSAI in winter and spring.

Larvae (duration unknown)—Level 0_a Epipelagic waters throughout the eastern BSAI regions in winter and spring.

Early Juveniles (up to 2 years)—Level 0_a Areas of mud and sand and the water column on the inner and middle continental shelf of the eastern BSAI, particularly those with mysids, euphausiids and shrimp.

Late Juveniles (2 to 4 years)—Level 1

Areas of soft substrate (clay, mud, and sand) and the lower portion of the water column on the inner, middle, and outer continental shelf areas of the eastern BSAI, particularly those with mysids, euphausiids, shrimp, pollock, flatfish, crab, and fishery discards.

Adults (4+ years old)—Level 2 Areas of mud and sand along the inner, middle, and outer continental shelf up to 500 m along with the lower portion of the water column of the eastern BSAI. Spawning occurs from January through May near the bottom across broad areas of the shelf, but predominately along the outer shelf between 100 and 200 m in the eastern BS and throughout the area less than 200 m from the AI. After spawning, the mature population spreads out throughout the shelf in the eastern BSAI, but with concentrations along the outer shelf northwest of the Pribilof Islands and along the outer and middle shelf areas northwest of the Alaskan Peninsula and into Bristol Bay. Feeding areas are those containing pollock, flatfish, and crab.

EFH Definition for BSAI Walleye Pollock

Eggs (duration 14 to 25 days)—Level 1 Pelagic waters of the outer continental shelf and upper slope of the eastern BS from Unimak Island northwest to Zhenchug Canyon. Also in pelagic waters (200 to 400 m depth) over basin and lower slope areas in the AI and the Aleutian Basin. These are likely areas of upwelling or have gyres. Spawning occurs from February through April.

Larvae (duration 60 days)—Level 1 Epipelagic waters on the inner, middle, and outer continental shelf and upper slope throughout the eastern BS, eastern portions of the Aleutian Basin and throughout the AI. Survival is enhanced where food (copepod nauplii and small euphausiids) is concentrated, such as along semi-permanent fronts (mid-shelf front near the 100-m isobath) in the eastern BS, within ephemeral gyres, and possibly in association with jellyfish.

Juveniles (up to 4 years)—Level 1 Throughout the eastern BS and the AI both pelagically and on-bottom (no known substrate preferences) throughout the inner, middle, and outer shelf regions. At ages 2 and 3 years, pollock are located off-bottom within the water column, principally in the middle and outer shelf regions northwest of the Pribilof Islands. Ranges of juveniles of strong year-classes have varied from throughout the eastern BS (1978 year-class) to almost exclusively north of Zhenchug Canyon (1989 year-class). Feeding areas contain pelagic crustaceans such as copepods and euphausiids.

Adults (4+ years old)—Level 2 Meso-pelagic and semi-demersal habitats (no known substrate preferences) along the middle and outer continental shelf in the eastern BS from the U.S. Russia Convention Line to Unimak Pass and northeast along the Alaska Peninsula and throughout the AI. Adults also exist pelagically over deep Aleutian basin waters. Feeding areas are those that concentrate pelagic crustaceans (e.g., euphausiids) and juvenile fish (primarily juvenile pollock), such as in upwelling regions along the shelf break or fronts on the middle shelf. Known spawning areas in the eastern BS are: north of Unimak Island, along the mid-shelf front (100-m isobath) between Unimak Island and the Pribilof Islands, south of the Pribilof Islands, and possibly at other areas to the north, particularly at heads of submarine canyons. Known spawning areas in the AI are: over deep waters north of Umnak and Unalaska Islands, the region north of the Islands of Four Mountains, through Amukta Pass to Seguam Island, and north of Kanaga and Tanaga Islands. Pollock may prefer waters of 2° to 3°C for spawning.

EFH Definition for Blue King Crab

Eggs—Levels 0, 1, and 2 Essential habitat for eggs is known for the stock of blue king crab in the Pribilof Islands based on general distribution (Level 1) and density (Level 2) of egg-bearing female crabs. Essential habitat for eggs of the St. Matthew Island blue king crab stock is based on general distribution (Level 1) of the egg-bearing females. Essential habitat for eggs of the St. Lawrence Island blue king crab stock is inferred from incidental catch of mature female crab (see also Adults).

Larvae—Levels 0 and 1 (no EFH definition determined for the St. Matthew Island and St.

Lawrence stocks) Blue king crab larvae spend 3.5 to 4 months in pelagic larval stages before settling to the benthic life stage. Larvae are found in waters of depths between 40 to 60 m. Essential habitat of larval blue king crab of the Pribilof Islands stock is defined using the general distribution (Level 1) of larvae in the water column. Information to define essential habitat is not available for the St. Matthew Island and St. Lawrence Island stocks of larval blue king crab.

Early Juveniles—Levels 0 and 2 (no EFH definition determined for the St. Matthew and St.

Lawrence Island stocks) Early juvenile blue king crabs require refuge substrate characterized by gravel and cobble overlaid with shell hash and sponge, hydroid, and barnacle assemblages. These habitat areas have been found at 40 to 60 m around the Pribilof Islands. Essential habitat of early juvenile blue king crabs is based on general distribution (Level 1) and density (Level 2) of this life stage in the Pribilof Island stock. Information to define essential habitat for early juvenile blue king crabs in the St. Matthew Island and St. Lawrence Island stocks is not available.

Late Juveniles—Levels 0, 1 and 2 (no EFH definition determined for the St. Lawrence Island stock) Late juvenile blue king crab require nearshore rocky habitat with shell hash. Essential habitat is based on general distribution (Level 1) and density (Level 2) of late juvenile blue king crab of the Pribilof Islands stock. General distribution (Level 1) of the late juvenile blue king crabs is used to identify essential habitat for the St. Matthew Island stock. Information is not available to define essential habitat for the St. Lawrence Island stock of late juvenile blue king crab.

Adults—Levels 1 and 2 Mature blue king crabs occur most often between 45 and 75 m depth on mud-sand substrate adjacent to gravel rocky bottom. Female crabs are found in a habitat with a high percentage of shell hash. Mating occurs in mid-spring. Larger, older females reproduce biennially while small females tend to reproduce annually. Fecundity of females range from 50,000 to 200,000 eggs per female. It has been suggested that spawning may depend on availability of nearshore rocky-cobble substrate for protection of females. Larger, older crabs disperse farther offshore and are thought to migrate inshore for molting and mating. General distribution (Level 1) and density (Level 2) of mature blue king crab are used to identify essential habitat for the Pribilof Islands and St. Matthew Island stocks. Essential habitat of mature blue king crab is based on distribution (Level 1) data for the St. Lawrence Island stock.

EFH Definition for Snow Crab (*C. opilio*)

Eggs—Level 2 Essential habitat for eggs is known for the stocks of *C. opilio* snow crabs in the Eastern BS based on general distribution (level 1) and density (level 2) of egg-bearing female crabs. (See also Matures.)

Larvae—Level 1 Larvae of *C. opilio* snow crab are found in early summer and exhibit diel migration. The last of three larval stages settles onto bottom in nursery areas. Essential habitat is based on general distribution (level 1) of *C. opilio* snow crab larvae of the Eastern BS stock.

Early Juveniles—Level 1 Shallow water areas of the Eastern BS are considered nursery areas for *C. opilio* snow crabs and are confined to the mid-shelf area due to the thermal limits of early and late juvenile life stages. Essential habitat is identified as the general distribution (level 1) of early juvenile crabs of the Eastern BS stock of *C. opilio* snow crabs.

Late Juveniles—Level 2 A geographic decline in size of *C. opilio* snow crabs indicates a large number of morphometrically immature crabs occur in shallow waters less than 80 m. Essential habitat is based on the general distribution (level 1) and density (level 2) of juvenile crabs of the Eastern BS stock of *C. opilio* snow crabs.

Matures—Level 2 Female *C. opilio* snow crabs are acknowledged to attain terminal molt status at maturity. Primiparous female snow crabs mate from January through June and may exhibit longer egg development period and lower fecundity than multiparous female crabs. Multiparous female snow crabs are able to store spermatophores in seminal vesicles and fertilize subsequent egg clutches without mating. At least two clutches can be fertilized from stored spermatophores, but the frequency of this occurring in nature is not known. Females carry clutches of approximately 36,000 eggs and nurture the embryos for approximately 1 year after fertilization. However, fecundity may decrease up to 50 percent between the time of egg extrusion and hatching presumably due to predation, parasitism, abrasion, or decay of unfertilized eggs. Brooding probably occurs in depths greater than 50 m. Changes in proportion of morphometrically mature crabs by carapace width have been related to an interaction between cohort size and depth.

APPENDIX C

Bering Sea Habitat Conservation Gear Modification Alternative

Prepared by Melanie Brown, NMFS Alaska Region (AKR) Sustainable Fisheries Division (SF), Craig Rose, Alaska Fisheries Science Center (AFSC) and Ken Hansen, NOAA Office of Law Enforcement (OLE) - January 25, 2007

Background

This document is an initial evaluation of methods to implement a program for gear modification under the Bering Sea (BS) Habitat Conservation action being considered by the North Pacific Fishery Management Council (Council). Alternative 3 of the Council's December 2006 motion for this proposed action stated that gear modifications would be required for all flatfish fishing in the Bering Sea. Discs or some sort of elevating device would be required for the sweeps to reduce seafloor contact and/or increase clearance between the gear and the substrate. A performance standard of at least 2.5 inches elevation of the sweep from the bottom would be required. NMFS will identify potential implementation options in the analysis for the management and enforcement of this standard.

Sweeps are not part of the trawl net itself, though they are certainly part of the trawl gear. On most, larger vessels, when the trawl is onboard the vessel, the trawl net is wound onto the reels on top of the sweeps. A few boats, including the smaller vessels, do not have net reels and wind the sweeps onto the main deck winches over the top of the trawl main wire (Jeff June, personal communication, January 9, 2007). The net has to be deployed or stacked onto the deck to access the sweeps. On vessels using 200 fathoms of sweeps, more than 70 elevating devices and 70 spaces would need to be checked to determine if the requirements are being met. The sweeps are much too long to be completely stretched across the deck. Onboard inspection would require examining the sweep by sections while stacking the remainder, putting it onto another net reel (if available), or setting it into the water.

To establish a requirement for modified trawl sweeps for the directed flatfish fishery in the BS, requirements for using the gear and standards for the gear must be stated in the regulations. NMFS would need to establish a method of ensuring that vessel owners and operators comply with the gear requirements. The program should ensure the gear is properly constructed, used, and maintained. Personnel from the Alaska Fisheries Science Center (AFSC), NOAA Office of Law Enforcement (NOAA OLE), North Pacific Groundfish Observer Program (NPGOP) and Sustainable Fisheries (SF) likely would be needed to develop and implement the program.

The following is a result of discussions among industry representatives, NMFS Alaska Region SF, the AFSC, NMFS Headquarters Vessel Monitoring System (VMS) Program, and NOAA OLE. This is the initial investigation of potential management and enforcement options.

Regulation Changes:

Several regulations in 50 CFR part 679 would need to be revised to implement a modified trawl sweep requirement.

1. A new definition under § 679.2 should be added for a non-pelagic trawl sweep. To ensure the correct species are included in the meaning of directed fishing for flatfish, a definition could be added for flatfish.

* * * * *

Flatfish means yellowfin sole, rock sole, Greenland turbot, arrowtooth flounder, flathead sole, other flatfish and Alaska plaice, as specified under § 679.20 for the BSAI for purposes of non-pelagic trawl restrictions under § 679.22 (X) and gear modification requirements under §§ 679.7(c)(3) and 679.24 (f).

Sweeps means the lines connecting the doors to the footrope on a non-pelagic trawl.

2. A new subparagraph (3) would also be added to § 679.7(c) to prohibit directed fishing for BS flatfish without sweeps that meets the standards specified at § 679.24(f).

§ 679.7(c)(3) Conduct directed fishing for flatfish in the Bering Sea subarea without meeting the standards and requirements for the trawl sweeps specified in § 679.24(f).

Should this include state waters or just the EEZ, or does it matter? As written, it would only apply to the EEZ. There are limited non-pelagic trawling and fishing closures in State waters of the Bering Sea. (5 AAC 39.164) (See maps)

3. To establish standards and requirements for the use of modified non-pelagic trawl sweeps, add paragraph (f) to § 679.24 Gear Limitations.

§ 679.24(f) Non-pelagic trawl sweeps for directed flatfish fishing in the BS subarea. (State waters?)

(1) Vessel owner or operators using non-pelagic trawl gear for directed fishing for flatfish in the Bering Sea subarea must have elevating discs, bobbins or similar devices installed on the sweeps that raise the sweeps at least 2.5 inches (6.35 cm) from the sea floor as measured adjacent to the device when resting on a flat surface, regardless of device orientation. Elevating devices must be secured along the entire length of the sweeps at the spacing specified under subparagraph (2), except within 25 fathoms (45.72 m) of the door or the footrope. The largest cross-section of the sweeps between elevating devices shall not be greater than at the nearest measurement location. Wider cross-sections resulting from doubling the line back for section terminations and devices required to connect sections are exempt from this requirement.

(2) The distance between elevating devices on the sweep must be between 25 feet (7.62 m) and 35 feet (10.67 m), unless the Regional Administrator specifies an alternative spacing specified an alternative spacing that is at least as effective at elevating the sweep and minimizing contact with the sea floor.

Additional Considerations for § 679.24:

- Do we need to add a requirement for a letter of approval to be available for inspection? The lack of such a document opens the possibility of requiring a potentially time-consuming measurement at-sea.
- What information should the fisher or manufacturer provide NMFS for approval? Options: a design identification corresponding to an approved design, or a listing of actual measurements (clearance and spacing) made after assembly, including a date of manufacture, measurement, and who did the measurements.
- If a letter of approval is required, what information should be in the letter to link the sweep with the approval? A serial number corresponding to a durable and tamper-proof (and hopefully visible from a distance) mark on the sweep may be a possibility.

- Should NMFS provide a discrete mode of identification that can't be tampered with like an embossed metal tag with the approval letter? NMFS could provide the tag to the manufacturer to place on the sweep before sale of the sweep.
- Would the information needed to get the approval trigger the Paperwork Reduction Act? **Bearden is checking on this 1-19-07.**
- Should the approval expire within a certain time period or after a certain amount of use? Time would be easier to track than usage. An annual remeasurement or replacement may be appropriate because the sweeps are usually replaced annually (Jeff June, personal communication, January 9, 2007).
- Do we require the fisher to allow for inspection of the sweep by NMFS-authorized personnel? With the approval letter, inspection should be limited to a cursory inspection to see if spacing and diameters appear correct (apparent problems could then trigger a measurement). If an approval document was not required, some actual measurements likely would be required. In any case the regulations should explicitly provide for enforcement to perform compliance inspections of the gear.

Enforcement Considerations:

How do we ensure the modified sweeps are meeting the standards?

Potential Methods for an Alaska NMFS sweep approval program

- Specify components and dimensions in the regulations and require fisher to supply documentation of sweeps meeting the standard;
- Establish manufacturer's approval program and require use of a sweep from the approved manufacturer which displays a NMFS approval tag;
- In both cases, follow up with inspections.

Examples of equipment approval programs:

VMS Program (Manufacturer Example)

OLE publishes a national directive in the *Federal Register* of standards to be met and the procedures for approval (71 FR 3053, January 19, 2006) for VMSs. The manufacturer submits an approval request that must address all of the standards in the directive and the equipment. OLE tests the equipment to ensure it meets the standards before giving approval. In addition, OLE publishes a list of approved devices for a region (AKR in 69 FR 19985, April 15, 2004). A national directive is used for the standards rather than proposed and final rule-making because VMS is a law enforcement investigative tool (J. Pinkerton, National VMS Program Manager, personal communication, December 21, 2006).

Regulations at § 679.7 prohibit fishing unless using VMS for certain fisheries and areas. Regulations at § 679.28 (f) require a NMFS-approved VMS transmitter, explain how to get approved, list NMFS *Federal Register* notices of unit specifications, approved units and amendments, and how the VMS is to be used.

If this type of program was applied to approving a modified sweep, the approval would need to occur at the manufacturer. This method would require a process similar to that used for VMS where manufacturers would apply to NMFS for approval and the vessel owner/operator would have to choose a sweep from an approved list. The vessel owner/operator would have to prove to NMFS that they are using an approved sweep. We may consider the use of tags added at the point of manufacture, as further discussed below.

Scales Program (Vessel Owner/Operator Example)

Prohibitions under § 679.7 require scale use in compliance with § 679.28. Section 679.28 refers to national manufacturing standards for scales for basing NMFS' approval. Vessel owners/operators must demonstrate that the unit initially met standards, meets annual inspection and is tested daily, and meets maximum permissible error. SF conducts the initial approval and annual scale inspections. Proof of approval is a letter from SF maintained on the vessel. Detailed performance and technical requirements are in Appendix A to 50 CFR part 679. The daily test is conducted by the vessel operator in the presence of an observer. At least two SF staff initially approve and annually inspect scales.

If the scales program model was used for the modified sweeps program, certain issues need to be considered. Vessels very rarely have their nets onboard when SF inspects scales (A. Kinsolving personal communication, December 2006). If they do have the nets onboard, the hydraulics are usually being maintained; and the bag cannot be taken off for inspection. Annual inspections may not be needed. A similar program for sweep approval could be as follows:

1. Regulations would specify performance standards. Standards for previously approved designs could be available on the AK Region web page.
2. The vessel owner/operator or net maker would submit a design for approval to SF.
3. NMFS approves design and sends the vessel a letter with the approved specifications.
4. The approval is only valid as long as the net meets these specifications. Any changes to the net either through deliberate modification or wear will invalidate the approval.
5. If there is evidence from an observer or enforcement that the net doesn't meet the specifications, the vessel owner/operator cannot fish with it. This would be an incentive to maintain the sweep within the standards and to maintain spare parts for repairs. After an offload, the vessel operator will generally want to get back out fishing as soon as possible and will not want to wait on new bobbins, etc for repairs.

If a tag is used, no detailed sweep inspection would be needed. If an inspection determines that the modified sweep does not meet the standards, enforcement should be able to remove the tag. After receiving documentation that the sweep meets the standards, NMFS would send the approval tag to the boat with instructions on how to attach it to the gear. Removal of the tag would destroy it. If a tag is used, NMFS needs to investigate what type would meet our needs.

Seabird Avoidance Gear Program (Vessel Owner/Operator Example)

Section 679.24 states who must use seabird avoidance gear and what standards have to be met. The vessel owner or operator must make the gear available to an authorized inspector or observer. There is no preapproval before use of the gear, only that the vessel owner/operator is responsible to make sure they use gear that meets the standards specified in the regulations. OLE currently receives affidavits from the NPGOP if a vessel is not using the avoidance gear, but observers do not try to compare gear to standards in regulations. OLE also performs dockside enforcement to determine whether the vessel has the gear on board.

This type of program would be less labor intensive for SF than the scales program model. Implementation would primarily be dependent on the observations of NPGOP and OLE to ensure the modified gear is being used. The observer may be available to see the trawl deployment or haulback to determine if the sweep is modified or not. This should be possible sometime during an entire trip. Most vessels have a reasonably safe location from which the observer can watch a retrieval. They would only need to assess the approximate size and spacing or maybe check for just the presence of the modified gear.

Models Summary and Conclusions:

The VMS model would not work well for the trawl sweep gear modification program because it depends on a national directive and is designed for a different type of equipment than fishing gear. For the non-pelagic trawl gear modifications, a national directive is not likely to be as effective as training and approval of manufacturers and publishing Alaska specific standards. The modified gear would be designed to meet Alaska habitat conservation needs, and developing a national directive would add more difficulty to implementing the program. The modified gear does not provide enforcement data and does not need a detailed standards program like VMS.

The scales program is more labor intensive for checking and approval because of the nature of the equipment and how it is used. The information gathered from scales and VMS equipment is used in enforcement, so it is important to ensure that the devices are operating accurately and effectively. No information is provided by a modified trawl sweep so it is not necessary to have as complicated an approval and inspection program as used for VMS and scales.

The seabird avoidance gear may provide the most likely management model for requiring modified trawl sweeps because both programs are related to fishing gear, and fewer resources are needed for management. The seabird avoidance program has been successful at reducing seabird bycatch. With education, and, in some cases free gear, compliance with the gear standards has not been a problem. It is possible that the compliance program for trawl gear modification would be easier to implement than the compliance program for seabird avoidance gear. Seabird avoidance gear requires decision making (e.g. determining wind speed) and separate deployment of the avoidance gear when fishing gear is deployed, issues that are not related to trawl gear modification. Because the gear modification requirements would be less complicated than the seabird avoidance gear requirements, compliance may be easier for the fishers and easier to determine by the enforcement personal or NPGOP.

If we use the seabird avoidance gear model, no prior approval would be necessary. Compliance could be checked during the fishing year through NPGOP observations or United States Coast Guard, and dockside OLE inspections. A system of prior approval could reduce the burden or intensity of inspections during the fishing year. In order to save inspection time during the fishing year, the industry representatives at the December 2006 NMFS gear modification workshop were interested in a pre-approval process. Considering the difficulty in viewing the entire sweep on board the vessel, it may be more practical to use a pre-approval process. It is expected that once the sweep is modified, it will likely stay in compliance Any approval method would need to include ensuring the device is built and used in a manner intended to meet the standards.

Before making a decision on a model program, additional research should be done to determine if approval and compliance programs for gear used in other NMFS regions may apply to the sweep modifications in Alaska. Potential similar programs may include turtle excluders, gear requirements to protect Atlantic right whales, or bycatch reduction devices in the SWR.

Potential Methods of Compliance

- Approve sweep before the beginning of a fishing year. This method would be similar to the VMS and scales program where the vessel owner/operator would have to demonstrate that the sweep meets the standards. Approval would be through paperwork and/or inspections.
- Inspect sweeps during the fishing year. Inspections could be planned (like scales) or ad hoc (like seabird avoidance gear). This activity would encourage continued use of modified sweeps during the fishing year. The frequency of inspections would depend on the resources available. Scheduled inspections would be the most resource intensive option for NMFS.

Implementation questions include:

1. Would repeat inspections be needed and at what frequency? What would be the nature of an inspection? Would it depend on prior approval?
2. Who does the inspection? SF could do this during scale checks. OLE could use dockside inspections. The USCG may or may not be able to do this during a boarding. The NPGOP may be able to observe the deployment or retrieval of the equipment. The table below shows that at least 23 vessels fishing for flatfish have 100 percent observer coverage. The remaining 9 vessels have 30 percent observer coverage. Twenty-two of the catcher/processors would be required to use scales. Most of the vessels in the flatfish fishery in the Bering Sea have a scale inspection, and all have some amount of observer coverage during the fishing season. No vessels less than 60 feet in length overall (LOA) fished in the flatfish fishery in 2006 and therefore, all vessels have some form of inspection or observation during the fishing year. NMFS could consider having the deployment procedure for an observer to include the check on the modified gear. This would allow for several checks of the gear during the season to support enforcement. The details of the observer's documentation of problem gear could be developed by OLE and the NPGOP.

Number of Vessels and Lengths in the 2006 Flatfish Fishery in the Bering Sea (Source: NMFS Inseason data, Mary Furuness, 1-19-07)

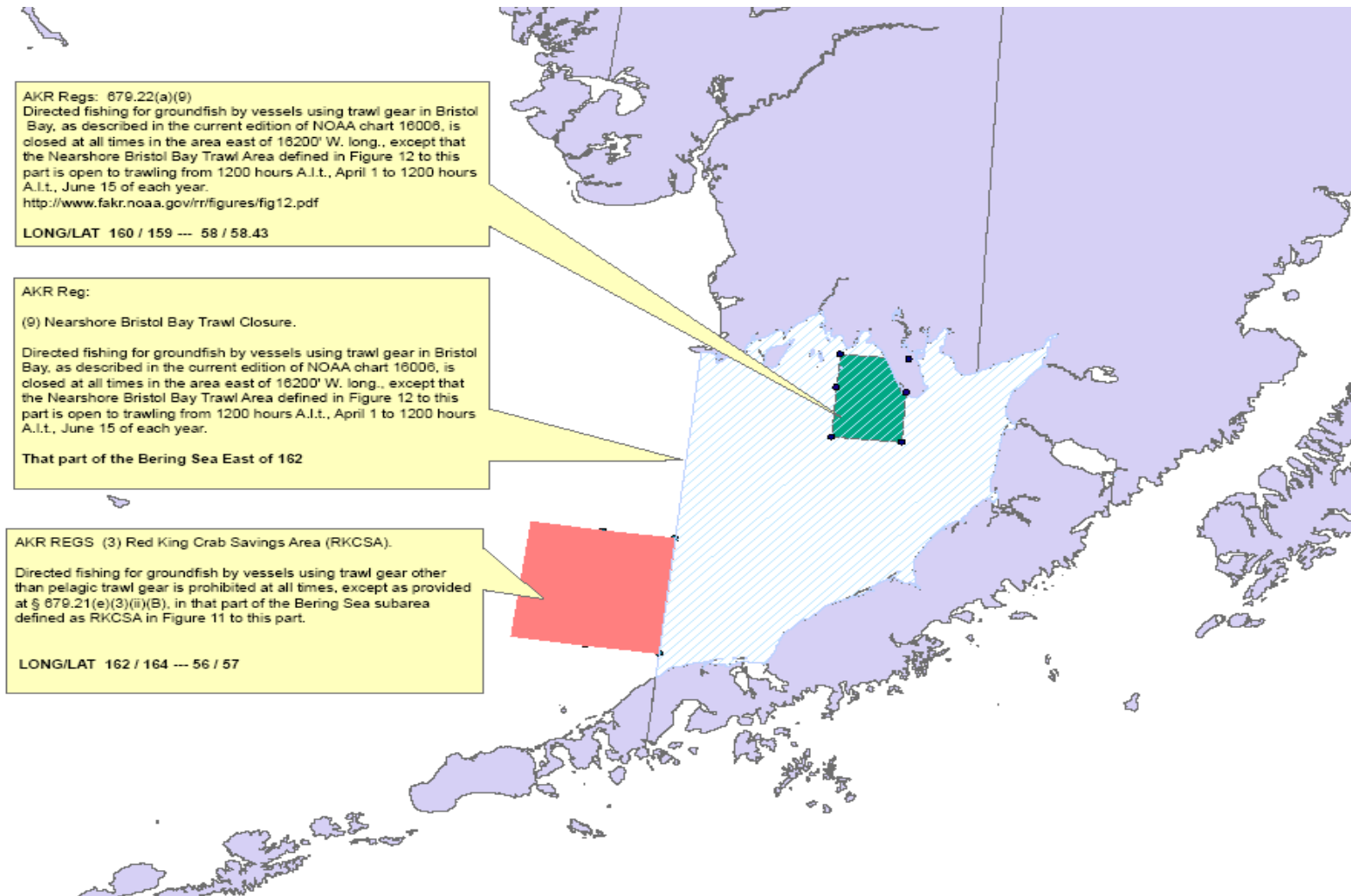
Vessel Type	Length	Number
Catcher Processor	≥ 60 feet and <125 feet LOA	6
Catcher Vessels	≥ 60 feet and <125 feet LOA	3
Catcher Processors	≥125 feet LOA	22
Catcher Vessels	≥125 feet LOA	1

3. What happens if the vessel is fishing and it is discovered that the sweep doesn't meet the standard for a variety of reasons? Is one missing disc as bad as several? If disc spacing is not consistently 30 feet or less, is that a problem? Could the sweep be marked every thirty feet for easy visual determination? OLE, NPGOP, and NOAA General Counsel will need to work with the fishing industry to develop workable standards to effectively and reasonably enforce the gear modification requirements, taking into account wear and tear of the sweeps. Field criteria could be developed to establish when a violation may occur.

Violations:

If an approval program is used, violation occurs if the vessel operator or owner directly fishes for flatfish with sweeps that are not approved or if no approval letter is onboard the vessel. Any modification of sweeps needs to be approved.

If no approval program is used and only inspections or observations are used for compliance, a violation would occur if it is determined through inspection or observation that the vessel owner or operator has directly fished for flatfish without a modified sweep that meets the standards. In most cases, compliance would be determined by the presence or absence of the modified sweep attached to the trawl gear on the vessel.



State of Alaska Non-Pelagic Trawl Restrictions in the Bering Sea

